

CONTRACT BIDDING DOCUMENTS

FOR

PHASE III

ROOF REPLACEMENT

AT

KING PHILIP MIDDLE SCHOOL

BID # 6637F



TOWN OF WEST HARTFORD

INFORMATION

**PHASE II - ROOF REPLACEMENT AT
KING PHILIP MIDDLE SCHOOL
100 KING PHILIP DRIVE
WEST HARTFORD, CT
BID# 6637F**

ARCHITECT

**SILVER PETRUCELLI & ASSOCIATES
3190 WHITNEY AVENUE
HAMDEN, CT 06518**

ENVIRONMENTALIST

**ASHIS ROYCHOWDHURY
EAGLE ENVIRONMENTAL INC.
85 MAIN STREET
TERRYVILLE, CT 06786**

PROJECT MANAGER

**WILLIAM PHIBBS
CAPITAL PROJECTS MANAGER**

**ALL QUESTIONS TO
PURCHASING SERVICES**

**TAMMY BRADLEY
SENIOR BUYER**

All questions must be submitted in writing and mailed to the Purchasing Office emailed to Tammyb@westhartfordCT.gov or faxed to 860-561-7507 at least seven calendar days prior to the date established for the opening of bids. Please do not call the Engineer/ Architect, Project Manager or Purchasing Office with questions.

00101

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PROJECT NARRATIVE

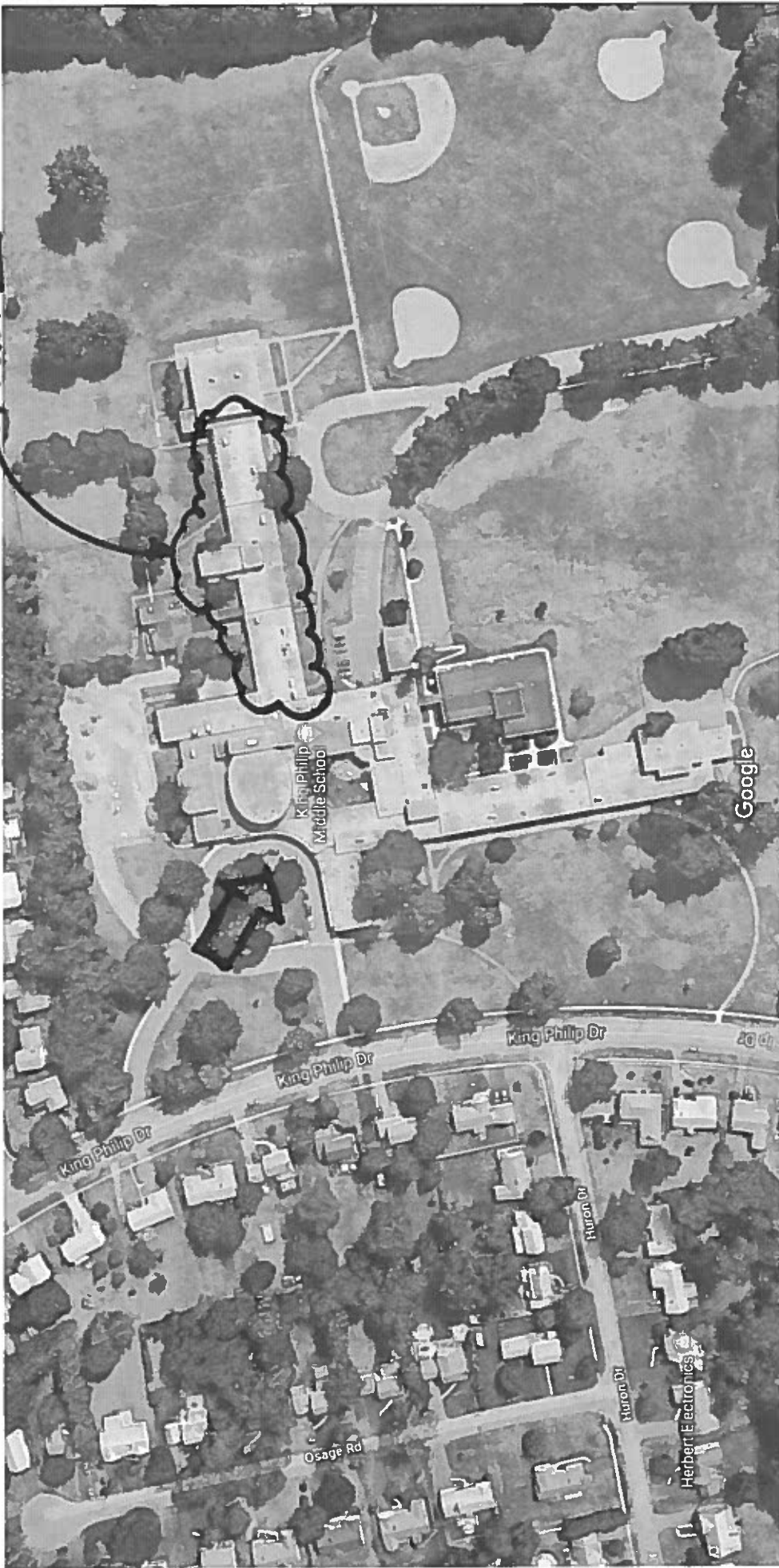
The Project generally includes, but is not necessary limited to the following major elements:

1. Removal and disposal of asbestos containing and other hazardous materials.
2. Removal of existing membrane roofing, insulation, cant strips and tapered edges, flashings, termination bars, scuppers, gravel stops, collection boxes, and metal caps.
3. Off-site disposal of all removed materials.
4. Removal and replacement of deteriorated wood blocking and concrete deck.
5. Removal of existing and installation of new brick masonry, through-wall flashing and weep vents where indicated on the Drawings.
6. Installation of EPDM sheet roofing, adhered underlayment, flashings, flat and tapered insulations.
7. New flashings, caps, fasciae, manufactured edges, gutters, downspouts and other trim metal work as detailed and specified and sealants.
8. Painting of existing exterior soffits.
9. Removal of existing and installation of new roof drains and related piping and pipe insulation as indicated in the construction documents.
10. Removal and reinstallation of mechanical units as indicated in Drawings, including all electrical supply, piping, and pipe insulation from units into building.
11. Provide cutting/boring and patching/firesafing for any new mechanical and electrical penetrations up to 6 inches in diameter.
12. Removal of all abandoned MEP equipment, fume hood, exhausts, weather stations and other items as indicated on drawings for removal.

LIST OF DRAWINGS

	COVER SHEET
C1	CODE INFORMATION
A1	OVERALL ROOF PLAN
A2	ROOF PLAN – PART 1 & 2
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A4	FLOOR PLAN
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PHASE III ROOF AREA



Imagery ©2018 Google, Map data ©2018 Google 100 ft

KING PHILIP M. SCHOOL
100 KING PHILIP DRIVE

00105-1

General

1. Contractor, Supervisory, and Trades personnel will be required to be familiar with and adhere to the Project Work Rules. Failure to comply with the Work Rules may result in being banned from the project site.
2. The Contractor shall take direction only from the Capital Project Manager or their representative.
3. All construction activities that are disruptive to school operations (due to noise, vibration, dust, orders, etc.) shall occur outside regular school instructional hours.
4. Contractors shall not use Town-owned dumpsters for refuse disposal unless given prior written permission from the Town's capital projects manager.
5. No entry into the building is allowed without prior permission of the Town. When entry is granted each individual must sign in at the main office and obtain a visitor's badge.
6. Have staff available on site to receive and upload your materials whenever deliveries are made. If Contractor staff is not available the delivery will be refused.
7. The Contractor shall maintain, at the site, one copy of the drawings, specifications, addenda, change orders and other modifications, in good order and marked currently; and one copy of approved shop drawings, product data, samples and similar required submittals.
8. Maintain complete files of Material Safety Data Sheets (MSDS) on the jobsite.
9. The Owner does not provide secure storage for the Contractor's materials and tools.

Foreman/Supervisory Personnel

1. The Trade Foreman/Superintendent must be on the jobsite whenever their staff is on site. This includes subcontractor personnel.

All Contractor Personnel

1. Contractors, subcontractors, and all their personnel shall wear a uniform with the company's logo while on site.
2. For individuals working in school buildings or on school sites, the Contractors must conduct a criminal background check. Prior to working in any school building, the Contractor shall provide verification that their employees and subcontractors do not appear on any Sex Offender Registry.
3. Job hours are 7:00 AM to 3:30 PM for first shift and 3:30 PM to 11:00 PM for second shift. Additional time may be subject to custodial overtime charges of approximately \$40.00 per hour.

4. Materials deliveries or movement of construction vehicles is not permitted among buses and students during drop-off of pickup times 8:00-8:45 AM & 3:15-3:45 PM Monday, Tuesday, Thursday, Friday and 1:45-2:15 PM on Wednesday. Times vary among elementary, middle and high school and will be confirmed with the Contractor.
5. No alcohol or controlled substances are allowed on the school property.
6. No smoking is allowed within the building or on the school property.
7. No food is to be eaten in the building. All food-related trash is to be removed from the site at the end of each day.
8. Use of radios and other amplified sound systems is disruptive to building occupants and is not permitted during classroom instructional hours.
9. Clean up all work areas daily. Keep the job clean and debris free.
10. Coordinate your work with the work of other trades. Check preceding work prior to starting new work. Do not proceed unless preceding work is completely acceptable.
11. Protect your work at all times from damage.
12. Park in designated areas only. Keep parking areas accessible for emergency vehicles. Privately owned vehicles are not permitted in areas of construction.
13. Passenger elevators are not to be used by Contractors for transporting materials.

Safety

1. All work activities are to be planned with Safety as the #1 priority.
2. A copy of the Contractor's safety program shall be present at job site.
3. A first aid kit appropriate to the size of the work crew is to be provided by the Contractor
4. Appropriate fire extinguishing supplied by the Contractor shall be present at the work area.
5. All personnel in work areas will have, at a minimum, hard hats, safety glasses, work shoes, shirts with sleeves, and long pants. Hard hats have to have company and employees name.
6. No interruption of building services (e.g. power, water, fire alarm intercom, ventilation, heating, cooling, etc.) without prior coordination with, and permission from, the Owner.
7. No use of any tools, equipment or supplies, other than those supplied by the Contractor.

§ 123-2

NOISE

- L.** Noise created as a result of or relating to an emergency.
- M.** Noise generated by construction activity shall be exempted between the hours of 7:00 a.m. to one hour after sundown, Monday through Saturday.
- N.** Noise created by blasting other than that conducted in connection with construction activities shall be exempted, provided that the blasting is conducted between 8:00 a.m. and 5:00 p.m. local time at specified hours previously announced to the local public or provided that a permit for such blasting has been obtained from local authorities.
- O.** Noise created by on-site recreational or sporting activity which is sanctioned by the state or local government, provided that noise discharged from exhausts is adequately muffled to prevent loud and/or explosive noises therefrom.
- P.** Patriotic or public celebrations not extending longer than one calendar day.
- Q.** Noise created by aircraft.
- R.** Noise created by products undergoing test, where one of the primary purposes of the test is the evaluation of product noise characteristics and where practical noise control measures have been taken.
- S.** Noise generated by transmission facilities, distribution facilities and substations of public utilities providing electrical powers, telephone, cable television or other similar services and located on property which is not owned by the public utility and which may or may not be within utility easements.

INVITATION TO BID

Sealed bids marked "**PHASE III ROOF REPLACEMENT AT KING PHILIP MIDDLE SCHOOL BID#6637F**" will be received at the office of the Purchasing Division, Room 223, Town Hall, 50 South Main Street, West Hartford, Connecticut until **2:00 PM** on **June 5, 2018** at which time they will be publicly opened and read.

Plans and specifications are available for downloading at www.westhartfordct.gov/bids. Any questions concerning this request for bid shall be addressed to the Purchasing Agent at the address above.

A pre-bid conference will be held on May 22, 2018 at 10:00 AM at King Philip Middle School, 100 King Philip Drive at which time questions concerning the project will be answered. Prospective bidders are expected to attend the pre-bid meeting as this will be the only opportunity to verbalize questions relative to this project and view the job site with the Town's project team.

All Bidders must file with their bid a bid bond, certified or treasurer's check in the amount of 10% of the total of the base bid made payable to the Town of West Hartford.

Performance and Labor and Material Payment bonds in the amount of 100% of the contract price will be required of the successful bidder if the contract pursuant to this request for bids exceeds \$50,000.00.

No bid may be withdrawn for a period of ninety (90) days after the opening of bids without the approval and written consent of the Town of West Hartford.

The right is reserved to reject any and all bids, to waive any informalities in the bidding and to make awards in any manner that is the most beneficial to the Town.

Bidders are encouraged to attend the Town's bid opening at which time the public is afforded an opportunity to record bid prices received in response to the Town's solicitation. Bidders who would like the results of the bid but are unable to attend the bid opening, may check the Town website, www.westhartfordct.gov/gov/departments/purchasing/bid_results a week after the bid opening date. Bidders calling the Purchasing Office for bid results will be referred to the above procedure.

TOWN OF WEST HARTFORD
PETER PRIVITERA
PURCHASING AGENT

00201-1



AIA[®] Document A701[™] – 1997

Instructions to Bidders

for the following PROJECT:

(Name and location or address)

PHASE III ROOF REPLACEMENT AT KING PHILIP MIDDLE SCHOOL BID#6637F
100 KING PHILIP DRIVE
WEST HARTFORD, CT 06117

THE OWNER:

(Name, legal status and address)

TOWN OF WEST HARTFORD
50 SOUTH MAIN STREET
WEST HARTFORD, CT 06107

THE ARCHITECT:

(Name, legal status and address)

SILVER PETRUCELLI & ASSOCIATES
3190 WHITNEY AVENUE
HAMDEN CT 06518

ADDITIONS AND DELETIONS:

The author of this document has added information needed for its completion. The author may also have revised the text of the original AIA standard form. An *Additions and Deletions Report* that notes added information as well as revisions to the standard form text is available from the author and should be reviewed. A vertical line in the left margin of this document indicates where the author has added necessary information and where the author has added to or deleted from the original AIA text.

This document has important legal consequences. Consultation with an attorney is encouraged with respect to its completion or modification.

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ARTICLE 1 DEFINITIONS

§ 1.1 Bidding Documents include the Bidding Requirements and the proposed Contract Documents. The Bidding Requirements consist of the Advertisement or Invitation to Bid, Instructions to Bidders, Supplementary Instructions to Bidders, the bid form, and other sample bidding and contract forms. The proposed Contract Documents consist of the form of Agreement between the Owner and Contractor, Conditions of the Contract (General, Supplementary and other Conditions), Drawings, Specifications and all Addenda issued prior to execution of the Contract.

§ 1.2 Definitions set forth in the General Conditions of the Contract for Construction, AIA Document A201, or in other Contract Documents are applicable to the Bidding Documents.

§ 1.3 Addenda are written or graphic instruments issued by the Architect prior to the execution of the Contract which modify or interpret the Bidding Documents by additions, deletions, clarifications or corrections.

§ 1.4 A Bid is a complete and properly executed proposal to do the Work for the sums stipulated therein, submitted in accordance with the Bidding Documents.

§ 1.5 The Base Bid is the sum stated in the Bid for which the Bidder offers to perform the Work described in the Bidding Documents as the base, to which Work may be added or from which Work may be deleted for sums stated in Alternate Bids.

§ 1.6 An Alternate Bid (or Alternate) is an amount stated in the Bid to be added to or deducted from the amount of the Base Bid if the corresponding change in the Work, as described in the Bidding Documents, is accepted.

§ 1.7 A Unit Price is an amount stated in the Bid as a price per unit of measurement for materials, equipment or services or a portion of the Work as described in the Bidding Documents.

§ 1.8 A Bidder is a person or entity who submits a Bid and who meets the requirements set forth in the Bidding Documents.

§ 1.9 A Sub-bidder is a person or entity who submits a bid to a Bidder for materials, equipment or labor for a portion of the Work.

ARTICLE 2 BIDDER'S REPRESENTATIONS

§ 2.1 The Bidder by making a Bid represents that:

§ 2.1.1 The Bidder has read and understands the Bidding Documents or Contract Documents, to the extent that such documentation relates to the Work for which the Bid is submitted, and for other portions of the Project, if any, being bid concurrently or presently under construction.

§ 2.1.2 The Bid is made in compliance with the Bidding Documents.

§ 2.1.3 The Bidder has visited the site, become familiar with local conditions under which the Work is to be performed and has correlated the Bidder's personal observations with the requirements of the proposed Contract Documents.

§ 2.1.4 The Bid is based upon the materials, equipment and systems required by the Bidding Documents without exception.

ARTICLE 3 BIDDING DOCUMENTS

§ 3.1 COPIES

§ 3.1.1 Bidders may obtain complete sets of the Bidding Documents from the issuing office designated in the Advertisement or Invitation to Bid in the number and for the deposit sum, if any, stated therein. The deposit will be refunded to Bidders who submit a bona fide Bid and return the Bidding Documents in good condition within ten days after receipt of Bids. The cost of replacement of missing or damaged documents will be deducted from the deposit. A Bidder receiving a Contract award may retain the Bidding Documents and the Bidder's deposit will be refunded.

§ 3.1.2 Bidding Documents will not be issued directly to Sub-bidders unless specifically offered in the Advertisement or Invitation to Bid, or in supplementary instructions to bidders.

§ 3.1.3 Bidders shall use complete sets of Bidding Documents in preparing Bids; neither the Owner nor Architect assumes responsibility for errors or misinterpretations resulting from the use of incomplete sets of Bidding Documents.

§ 3.1.4 The Owner and Architect may make copies of the Bidding Documents available on the above terms for the purpose of obtaining Bids on the Work. No license or grant of use is conferred by issuance of copies of the Bidding Documents.

§ 3.2 INTERPRETATION OR CORRECTION OF BIDDING DOCUMENTS

§ 3.2.1 The Bidder shall carefully study and compare the Bidding Documents with each other, and with other work being bid concurrently or presently under construction to the extent that it relates to the Work for which the Bid is submitted, shall examine the site and local conditions, and shall at once report to the Architect errors, inconsistencies or ambiguities discovered.

§ 3.2.2 Bidders and Sub-bidders requiring clarification or interpretation of the Bidding Documents shall make a written request which shall reach the Architect at least seven days prior to the date for receipt of Bids.

§ 3.2.3 Interpretations, corrections and changes of the Bidding Documents will be made by Addendum. Interpretations, corrections and changes of the Bidding Documents made in any other manner will not be binding, and Bidders shall not rely upon them.

§ 3.3 SUBSTITUTIONS

§ 3.3.1 The materials, products and equipment described in the Bidding Documents establish a standard of required function, dimension, appearance and quality to be met by any proposed substitution.

§ 3.3.2 No substitution will be considered prior to receipt of Bids unless written request for approval has been received by the Architect at least ten days prior to the date for receipt of Bids. Such requests shall include the name of the material or equipment for which it is to be substituted and a complete description of the proposed substitution including drawings, performance and test data, and other information necessary for an evaluation. A statement setting forth changes in other materials, equipment or other portions of the Work, including changes in the work of other contracts that incorporation of the proposed substitution would require, shall be included. The burden of proof of the merit of the proposed substitution is upon the proposer. The Architect's decision of approval or disapproval of a proposed substitution shall be final.

§ 3.3.3 If the Architect approves a proposed substitution prior to receipt of Bids, such approval will be set forth in an Addendum. Bidders shall not rely upon approvals made in any other manner.

§ 3.3.4 No substitutions will be considered after the Contract award unless specifically provided for in the Contract Documents.

§ 3.4 ADDENDA

§ 3.4.1 Addenda will be transmitted to all who are known by the issuing office to have received a complete set of Bidding Documents.

§ 3.4.2 Copies of Addenda will be made available for inspection wherever Bidding Documents are on file for that purpose.

§ 3.4.3 Addenda will be issued no later than four days prior to the date for receipt of Bids except an Addendum withdrawing the request for Bids or one which includes postponement of the date for receipt of Bids.

§ 3.4.4 Each Bidder shall ascertain prior to submitting a Bid that the Bidder has received all Addenda issued, and the Bidder shall acknowledge their receipt in the Bid.

ARTICLE 4 BIDDING PROCEDURES

§ 4.1 PREPARATION OF BIDS

§ 4.1.1 Bids shall be submitted on the forms included with the Bidding Documents.

§ 4.1.2 All blanks on the bid form shall be legibly executed in a non-erasable medium.

§ 4.1.3 Sums shall be expressed in both words and figures. In case of discrepancy, the amount written in words shall govern.

§ 4.1.4 Interlineations, alterations and erasures must be initialed by the signer of the Bid.

§ 4.1.5 All requested Alternates shall be bid. If no change in the Base Bid is required, enter "No Change."

§ 4.1.6 Where two or more Bids for designated portions of the Work have been requested, the Bidder may, without forfeiture of the bid security, state the Bidder's refusal to accept award of less than the combination of Bids stipulated by the Bidder. The Bidder shall make no additional stipulations on the bid form nor qualify the Bid in any other manner.

§ 4.1.7 Each copy of the Bid shall state the legal name of the Bidder and the nature of legal form of the Bidder. The Bidder shall provide evidence of legal authority to perform within the jurisdiction of the Work. Each copy shall be signed by the person or persons legally authorized to bind the Bidder to a contract. A Bid by a corporation shall further give the state of incorporation and have the corporate seal affixed. A Bid submitted by an agent shall have a current power of attorney attached certifying the agent's authority to bind the Bidder.

§ 4.2 BID SECURITY

§ 4.2.1 Each Bid shall be accompanied by a bid security in the form and amount required if so stipulated in the Instructions to Bidders. The Bidder pledges to enter into a Contract with the Owner on the terms stated in the Bid and will, if required, furnish bonds covering the faithful performance of the Contract and payment of all obligations arising thereunder. Should the Bidder refuse to enter into such Contract or fail to furnish such bonds if required, the amount of the bid security shall be forfeited to the Owner as liquidated damages, not as a penalty. The amount of the bid security shall not be forfeited to the Owner in the event the Owner fails to comply with Section 6.2.

§ 4.2.2 If a surety bond is required, it shall be written on AIA Document A310, Bid Bond, unless otherwise provided in the Bidding Documents, and the attorney-in-fact who executes the bond on behalf of the surety shall affix to the bond a certified and current copy of the power of attorney.

§ 4.2.3 The Owner will have the right to retain the bid security of Bidders to whom an award is being considered until either (a) the Contract has been executed and bonds, if required, have been furnished, or (b) the specified time has elapsed so that Bids may be withdrawn or (c) all Bids have been rejected.

§ 4.3 SUBMISSION OF BIDS

§ 4.3.1 All copies of the Bid, the bid security, if any, and any other documents required to be submitted with the Bid shall be enclosed in a sealed opaque envelope. The envelope shall be addressed to the party receiving the Bids and shall be identified with the Project name, the Bidder's name and address and, if applicable, the designated portion of the Work for which the Bid is submitted. If the Bid is sent by mail, the sealed envelope shall be enclosed in a separate mailing envelope with the notation "SEALED BID ENCLOSED" on the face thereof.

§ 4.3.2 Bids shall be deposited at the designated location prior to the time and date for receipt of Bids. Bids received after the time and date for receipt of Bids will be returned unopened.

§ 4.3.3 The Bidder shall assume full responsibility for timely delivery at the location designated for receipt of Bids.

§ 4.3.4 Oral, telephonic, telegraphic, facsimile or other electronically transmitted bids will not be considered.

§ 4.4 MODIFICATION OR WITHDRAWAL OF BID

§ 4.4.1 A Bid may not be modified, withdrawn or canceled by the Bidder during the stipulated time period following the time and date designated for the receipt of Bids, and each Bidder so agrees in submitting a Bid.

§ 4.4.2 Prior to the time and date designated for receipt of Bids, a Bid submitted may be modified or withdrawn by notice to the party receiving Bids at the place designated for receipt of Bids. Such notice shall be in writing over the

signature of the Bidder. Written confirmation over the signature of the Bidder shall be received, and date- and time-stamped by the receiving party on or before the date and time set for receipt of Bids. A change shall be so worded as not to reveal the amount of the original Bid.

§ 4.4.3 Withdrawn Bids may be resubmitted up to the date and time designated for the receipt of Bids provided that they are then fully in conformance with these Instructions to Bidders.

§ 4.4.4 Bid security, if required, shall be in an amount sufficient for the Bid as resubmitted.

ARTICLE 5 CONSIDERATION OF BIDS

§ 5.1 OPENING OF BIDS

At the discretion of the Owner, if stipulated in the Advertisement or Invitation to Bid, the properly identified Bids received on time will be publicly opened and will be read aloud. An abstract of the Bids may be made available to Bidders.

§ 5.2 REJECTION OF BIDS

The Owner shall have the right to reject any or all Bids. A Bid not accompanied by a required bid security or by other data required by the Bidding Documents, or a Bid which is in any way incomplete or irregular is subject to rejection.

§ 5.3 ACCEPTANCE OF BID (AWARD)

§ 5.3.1 It is the intent of the Owner to award a Contract to the lowest qualified Bidder provided the Bid has been submitted in accordance with the requirements of the Bidding Documents and does not exceed the funds available. The Owner shall have the right to waive informalities and irregularities in a Bid received and to accept the Bid which, in the Owner's judgment, is in the Owner's own best interests.

§ 5.3.2 The Owner shall have the right to accept Alternates in any order or combination, unless otherwise specifically provided in the Bidding Documents, and to determine the low Bidder on the basis of the sum of the Base Bid and Alternates accepted.

ARTICLE 6 POST-BID INFORMATION

§ 6.1 CONTRACTOR'S QUALIFICATION STATEMENT

Bidders to whom award of a Contract is under consideration shall submit to the Architect, upon request, a properly executed AIA Document A305, Contractor's Qualification Statement, unless such a Statement has been previously required and submitted as a prerequisite to the issuance of Bidding Documents.

§ 6.2 OWNER'S FINANCIAL CAPABILITY

The Owner shall, at the request of the Bidder to whom award of a Contract is under consideration and no later than seven days prior to the expiration of the time for withdrawal of Bids, furnish to the Bidder reasonable evidence that financial arrangements have been made to fulfill the Owner's obligations under the Contract. Unless such reasonable evidence is furnished, the Bidder will not be required to execute the Agreement between the Owner and Contractor.

§ 6.3 SUBMITTALS

§ 6.3.1 The Bidder shall, as soon as practicable or as stipulated in the Bidding Documents, after notification of selection for the award of a Contract, furnish to the Owner through the Architect in writing:

- .1 a designation of the Work to be performed with the Bidder's own forces;
- .2 names of the manufacturers, products, and the suppliers of principal items or systems of materials and equipment proposed for the Work; and
- .3 names of persons or entities (including those who are to furnish materials or equipment fabricated to a special design) proposed for the principal portions of the Work.

§ 6.3.2 The Bidder will be required to establish to the satisfaction of the Architect and Owner the reliability and responsibility of the persons or entities proposed to furnish and perform the Work described in the Bidding Documents.

§ 6.3.3 Prior to the execution of the Contract, the Architect will notify the Bidder in writing if either the Owner or Architect, after due investigation, has reasonable objection to a person or entity proposed by the Bidder. If the Owner or Architect has reasonable objection to a proposed person or entity, the Bidder may, at the Bidder's option, (1)

withdraw the Bid or (2) submit an acceptable substitute person or entity with an adjustment in the Base Bid or Alternate Bid to cover the difference in cost occasioned by such substitution. The Owner may accept the adjusted bid price or disqualify the Bidder. In the event of either withdrawal or disqualification, bid security will not be forfeited.

§ 6.3.4 Persons and entities proposed by the Bidder and to whom the Owner and Architect have made no reasonable objection must be used on the Work for which they were proposed and shall not be changed except with the written consent of the Owner and Architect.

ARTICLE 7 PERFORMANCE BOND AND PAYMENT BOND

§ 7.1 BOND REQUIREMENTS

§ 7.1.1 If stipulated in the Bidding Documents, the Bidder shall furnish bonds covering the faithful performance of the Contract and payment of all obligations arising thereunder. Bonds may be secured through the Bidder's usual sources.

§ 7.1.2 If the furnishing of such bonds is stipulated in the Bidding Documents, the cost shall be included in the Bid. If the furnishing of such bonds is required after receipt of bids and before execution of the Contract, the cost of such bonds shall be added to the Bid in determining the Contract Sum.

§ 7.1.3 If the Owner requires that bonds be secured from other than the Bidder's usual sources, changes in cost will be adjusted as provided in the Contract Documents.

§ 7.2 TIME OF DELIVERY AND FORM OF BONDS

§ 7.2.1 The Bidder shall deliver the required bonds to the Owner not later than three days following the date of execution of the Contract. If the Work is to be commenced prior thereto in response to a letter of intent, the Bidder shall, prior to commencement of the Work, submit evidence satisfactory to the Owner that such bonds will be furnished and delivered in accordance with this Section 7.2.1.

§ 7.2.2 Unless otherwise provided, the bonds shall be written on AIA Document A312, Performance Bond and Payment Bond. Both bonds shall be written in the amount of the Contract Sum.

§ 7.2.3 The bonds shall be dated on or after the date of the Contract.

§ 7.2.4 The Bidder shall require the attorney-in-fact who executes the required bonds on behalf of the surety to affix thereto a certified and current copy of the power of attorney.

ARTICLE 8 FORM OF AGREEMENT BETWEEN OWNER AND CONTRACTOR

Unless otherwise required in the Bidding Documents, the Agreement for the Work will be written on AIA Document A101, Standard Form of Agreement Between Owner and Contractor Where the Basis of Payment Is a Stipulated Sum.

INSTRUCTIONS TO BIDDERS

AIA Document A701, "Instructions to Bidders", 1997 Edition, American Institute of Architects, Articles 1 through 8, are bound herein and are hereby made a part of the Contract Documents, and shall apply to all Contractors and Subcontractors.

SUPPLEMENTARY INSTRUCTIONS TO BIDDERS

Certain Articles of the AIA Instructions to Bidders are revised or replaced by requirements of the Supplementary Instructions, listed below. Such revisions are replacements and shall take precedence over the AIA Instructions to Bidders.

The Following Articles, revised paragraphs, and clauses have the same numerical designations occurring in the AIA Instructions to Bidders, and all additions follow in direct numbered sequence.

Article 1 - Definition

1.3 Delete paragraph 1.3 in its' entirety and substitute the following: Addenda are written or graphic instruments issued by the Architect and distributed by the Owner prior to the bid opening which modify or interpret the Bidding Documents by additions, deletions, clarifications or corrections.

Article 2 - Bidder's Representation

Add the following as paragraphs 2.2 and 2.3

2.2 A pre-bid conference may be held prior to bidding, at which time all interested parties are requested to attend. The intent of the project and Bidding Documents will be discussed. There will be a question and answer period, during which time prospective bidders are invited to request clarification or interpretation of any and all parts of the Bidding Documents. See Invitation to Bid for date, time, and location of Conference.

2.3 Guided tours of the Project Site, at the discretion of the owner, may be conducted prior to the pre-bid conference. Questions and or requests for clarification will not be addressed while the tour is being conducted.

ARTICLE 3 - BIDDING DOCUMENTS

3.1.1: Delete second sentence and substitute with the following:

Refer to instructions on Invitation to Bid Page 00201-1.

3.1.2: Delete Paragraph 3.1.2.

3.2.2: Delete the word "Architect" and substitute the word "Owner".

3.3.4: Delete paragraph 3.3.4 in its entirety and substitute with the following:

After the award of the Contract, no substitutions will be considered for the brands specified, except upon written request of the Contractor and written approval by the Architect and Owner. Substitutions shall be submitted in accordance with the requirements listed in Article 3.3.2.

3.3.5: Add new paragraph 3.3.5 as follows:

Approval by the Owner and the Architect of any such substitution shall not relieve the Contractor requesting the substitution of any responsibility for additional costs incurred by other trades for changes made necessary to accommodate the substituted item.

3.4.1: Delete paragraph 3.4.1 in its' entirety and substitute with the following:

Addenda will be issued by the Owner and will be mailed to all who are known by the Owner to have received a completed set of Bidding Documents.

ARTICLE 4 - BIDDING PROCEDURES

4.1.6: Add the following words to the beginning of paragraph - "Unless otherwise provided in the Contract Bidding Documents".

4.1.7: Delete paragraph 4.1.7 in its' entirety and substitute with the following:

Each copy of the Bid shall include the legal name of the bidder and a statement that the Bidder is a sole proprietor, partnership, corporation or other legal entity. Each copy shall be signed by the person or persons legally authorized to bind the Bidder to a contract. A Bid by a corporation shall further give the state of incorporation and, if the Owner so requests, have the corporate seal affixed. A Bid submitted by an agent shall have a current power of attorney attached certifying the agent's authority to bind the Bidder.

4.2.2: Delete paragraph 4.2.2 in its' entirety and substitute with the following:

Surety Bonds shall be written on forms substantially similar in content to AIA Document A310, and executed by a company authorized to transact business within the State of Connecticut, and the attorney-in-fact who executes the Bond on behalf of the Surety shall affix to the Bond a certified and current copy of his power of attorney.

ARTICLE 5 - CONSIDERATION OF BID

5.1.1: Add new paragraph 5.1.1 as follows:

Bidders are encouraged to attend the Town's bid opening at which time the public is afforded an opportunity to record bid prices received in response to the Town's solicitation. Bidders who would like the results of the bid but are unable to attend the bid opening must submit with their bid a self addressed stamped envelope and note requesting a copy of the bid results. **BIDDERS CALLING THE PURCHASING OFFICE FOR BID RESULTS WILL BE REFERRED TO THE ABOVE PROCEDURE.**

5.3.1: Delete 1st sentence and substitute the following:

It is the intent of the Owner to award a Contract to the bidder providing the best value to the Owner and is in accordance with requirements of the Bidding Documents and does not exceed the funds available.

5.3.3: Add new paragraph 5.3.3 as follows:

The Owner in awarding the Contract shall be guided by pertinent provisions of the "Town Charter" and "Code of Ordinances".

5.3.4: Add new paragraph 5.3.4 as follows:

A Bid may be rejected if the Bidder cannot show that he has the necessary supervisory staff, labor, capital, materials, machinery and resources to commence the work at the time prescribed and thereafter to prosecute and complete the Work at the rate or time specified; and that he is not already obligated for other work which would delay the commencement, prosecution, or completion of this work. A Bid may also be rejected if the bidder has previously failed to complete a contract within the time required, had previously performed similar work in an unsatisfactory manner, or in the judgment of the Owner is deemed unable to satisfactorily perform the Work.

5.3.5: Add new paragraph 5.3.5 as follows:

Prior to the award of a Contract, if so requested, Bidders must present satisfactory evidence that they have been regularly engaged in the business of doing such Work as they propose to execute and that they are prepared with the necessary supervisory staff, labor, capital, materials, and machinery, resources and responsibilities to conduct and complete the work to be contracted for in accordance with the Contract Documents and to begin it promptly when ordered.

ARTICLE 6 - POST BID INFORMATION

6.3.3: Delete paragraph 6.3.3 in its' entirety and substitute with the following:

Prior to the award of the Contract, the Owner will notify the Bidder in writing if either the Owner or the Architect, after due investigation, has a reasonable objection to any such proposed person or entity. If the Owner or Architect has reasonable objection to any such proposed person or entity, the Bidder may, at his option, (1) withdraw his Bid, or (2) submit an acceptable substitute

person or entity. In the event of withdrawal under this sub-paragraph, Bid Security will not be forfeited, notwithstanding the provisions of Paragraph 4.4.1.

ARTICLE 7 - PERFORMANCE BOND AND PAYMENT BOND

7.1.1: Delete paragraph 7.1.1 in its' entirety and substitute with the following:

If the amount of the Contract to be awarded is Fifty Thousand Dollars (\$50,000) or more, the successful Contract Bidder shall furnish and pay for Surety in the full amount of the Contract. This Bond shall provide 100% security for faithful performance and for payment of all persons performing labor or furnishing materials in connection with this Contract and shall be executed by a company authorized to transact business within the State of Connecticut.

The Contractor shall increase the principal amount of the performance and labor and materials payments bond(s) in direct proportion to any increase in the value of the Contract resulting from such change orders.

7.2.1: Delete paragraph 7.2.1 and substitute the following:

The Bidder shall deliver the required bonds to the Owner prior to execution of a contract and not later than (5) five days from notice of the Owner's intent to award the Contract to the bidder.

ARTICLE 9 - SUPPLEMENTARY INSTRUCTIONS

9.1: Add new paragraph 9.1 as follows:

9.1.1 - The Contractor shall agree that, except in the case of bona fide occupational qualification or need, neither he nor his Subcontractors and/or agents will refuse to hire or employ, or will bar or discharge from employment, or will otherwise discriminate against any individual in compensation or in terms, conditions, or privileges of employment because of race, color, national origin, ancestry, present or past history of mental disorder, mental retardation, or physical disability, including, but not limited to, blindness.

9.1.2 - The Contractor shall further agree that neither he nor his subcontractors and/or agents will discharge, expel, or otherwise discriminate against any person because he/she has opposed any discriminatory employment practice or because he has filed a complaint or testified or assisted in any proceeding under Connecticut General Statutes Sections 46a-82, 46a-83, or 46a-84 or as may be amended.

9.1.3 - The Contractor shall further agree that, except in the case of a bona fide occupational qualification or need, neither he nor his subcontractors and/or agents will advertise employment opportunities in such manner as to restrict such employment so as to discriminate against individuals because of their race, color, religious creed, age, sex, marital status, national origin, ancestry, present or past history of mental disorder, mental retardation or physical disability, including, but not limited to, blindness.

9.1.4 - The terms used in paragraphs 9.1.1, 9.1.2, and 9.1.3 shall have the definitions set forth in Connecticut General Statutes Section 46a-51 or as may be amended.

9.1.5 - The Contractor further agrees, for himself, his subcontractors, and agents, not to otherwise discriminate or permit discrimination against any person or group of persons on the grounds of race, color, religious creed, age, sex, marital status, national origin, ancestry, present or past history of mental disorder, mental retardation or physical disability (including but not limited to blindness) in any manner prohibited by the laws and regulations of the United States, State of Connecticut or Town of West Hartford.

9.2: Add new paragraph 9.2 as follows:

Time: The Contractor to whom this Contract may be awarded, will be required to commence work at the site within ten (10) days of Contract signing unless, otherwise indicated in the sample AIA Standard Form of Agreement Form A101. The work shall be executed diligently thereafter and shall be completed in accordance with the Contract Documents.

9.3: Add new paragraph 9.3 as follows:

The Bidder is directed to the Bid Forms for additional information, instructions, qualifications and requirements.

Bid of _____, BIDDER,
(Name of Bidder)

FOR **PHASE III ROOF REPLACEMENT AT KING PHILIP MIDDLE SCHOOL BID#6496F** FOR
THE TOWN OF WEST HARTFORD, CONNECTICUT.

To: Town of West Hartford
Peter Privitera, Purchasing Agent
Purchasing Services

The undersigned proposes to furnish all labor, materials and equipment, and to perform all work described in the Contract Bidding Documents for **PHASE III ROOF REPLACEMENT AT KING PHILIP MIDDLE SCHOOL BID#6637F** in accordance with the Contract Bidding Documents for the amounts shown herein under Schedule of Bids.

Receipt acknowledged of the following addenda:

Addendum No. _____ Dated _____

Addendum No. _____ Dated _____

Addendum No. _____ Dated _____

Addendum No. _____ Dated _____

Addendum No. _____ Dated _____

Addendum No. _____ Dated _____

It is understood and agreed that the Owner has the privilege of rejecting any or all Bids and of waiving informality in any Bid.

It is further understood and agreed that this Bid shall be irrevocable for ninety (90) calendar days after Bid receipt date.

SCHEDULE OF BIDS

1. Base Bid No. 1 for furnishing all labor, materials, equipment and all else whatsoever necessary to perform all work described in the Contract Bidding Documents for **PHASE III ROOF REPLACEMENT AT KING PHILIP MIDDLE SCHOOL BID#6637F**

2. for the lump sum of _____
_____ Dollars (\$_____)

UNIT PRICING

1. Caulking compound at concrete roof deck seams, removal and disposal as ACM \$_____ per L. F.
2. Reglet flashing, removal and disposal as ACM \$_____ per L.F.
3. Patch Flashing, removal and disposal as ACM \$_____ per S. F.
4. Roof felt and associated asphalt, removal and disposal as Connecticut Regulated PCB Waste \$_____ per S. F.

CONTRACT TIME

The undersigned Bidder will accomplish all Work required by the Contract Bidding Documents and will provide Substantial completion by **August 17, 2018**, and will provide the Project, ready for Final Completion, by **August 28, 2018**.

BIDDER QUALIFICATIONS

A: If the Bidder is a Corporation, fill out:

The Bidder is a Corporation, organized under the laws of _____, having its principal office at _____.
The Principal officers of said Corporation, with their titles and addresses, are as follows:

All persons interested in the Bid as principals are to be named above.

B. Bid must be accompanied by either a certified check, treasurer's check or a Bid Bond, as provided in the Invitation to Bid. If a check is enclosed herein, fill out the following:

(Name of Bank)	(Address of Bank)	(Amount of Check)
----------------	-------------------	-------------------

C. Attached hereto are two forms entitled "Summary of Work History". The Bidder is required to complete Form 1 and 2.

- D. The Bidder is required to submit a Certificate of Insurance in amounts and types specified in Article 11 of the Supplementary General Conditions or provide a letter from the Bidder's insurance agent or broker that such insurance is obtainable at the time of execution of the Agreement and that a Certificate of Insurance shall be provided to that effect not later than the date of Contract signing. (See page #00204- 7)
- E. Contract award will be by AIA Agreement Form 101. A copy of the AIA Form 101 is included for the Bidder's information. The parties shall enter into an Agreement in substantially the same form as the attached subject to technical and other modifications as the parties mutually agree. A purchase order shall be issued by the Town subsequent to the execution of the Agreement.
- F. The Contractor by executing this Bid agrees and represents that no person acting for or employed by the Town of West Hartford is directly or indirectly interested in the Bid or proposed Agreement or in the supplies or works to which it relates, or will receive any part of the profit or any commission there from in any manner which is unethical or contrary to the best interest of the Owner.
- G. The Contractor agrees and warrants that in the performance of this Contract it will not discriminate or permit discrimination against any person or group of persons on the grounds of sex, race, color, religion, age, marital status, ancestry, national origin, past history of mental disorder, mental retardation or physical disability or other basis in any manner prohibited by the laws of the United States, the State of Connecticut, or the Town of West Hartford.
- H. The Contractor shall employ a full time, on-the-job Project Superintendent as his representative.
- I. The Contractor and/or Subcontractor offers and agrees to assign to the Town of West Hartford and/or the West Hartford Board of Education all rights, titles and interest in all causes of action it may have under Section 4 of the Clayton Act., 15 U.S.C. Section 15, or under Connecticut General Statutes 35-24 et. seq., as amended, arising out of the purchase of services, property, or intangibles of any kind pursuant to the Agreement, or Subcontracts thereunder. This assignment shall be made and become effective at the time the Town/Board awards or accepts such Agreement, without further acknowledgment by the parties. In the alternative, at the option of the Town, the Contractor and/or Subcontractor agrees to pay to the Town its proportionate share of recoveries for anti-trust violations which relate to purchases pursuant to this Contract, or Subcontracts hereunder. The Contractor and/or Subcontractor agrees promptly to notify the Purchasing Agent of the Town of West Hartford of suspected anti-trust violations and claims.

J. The Bidder is aware of and agrees that, if awarded an Agreement, he is bound by the following indemnification language:

1. To the fullest extent permitted by law, the Contractor shall release, defend, indemnify, and hold harmless the Town of West Hartford, and the West Hartford Board of Education, their respective boards, commissions, officers, officials, employees, agents, representatives, and servants from any and all suits, claims, losses, damages, costs (including without limitation reasonable attorneys' fees), compensation, penalties, fines, liabilities or judgments or any name or nature for:

1. Bodily injury, sickness, disease, or death; and/or
2. Damage to or destruction of property, real or personal; and/or
3. Financial losses (including, without limitation, those caused by loss of use)

sustained by any person or concern, including officers, employees, agents, Subcontractors or servants of the Town, the Board of Education, or the Contractor, or by the public, which is cause or alleged to have been caused in whole or in part by the negligent act(s) or omission(s) of the Contractor, its officers, employees, agents, or Subcontractors, in the performance of this Agreement or from the inaccuracy of any representation or warranty of the Contractor contained in the Contract Documents. This indemnity shall not be affected by other portions of the Agreement relating to insurance requirements.

2. To the fullest extent permitted by law, the Contractor agrees to release, defend, indemnify, and hold harmless the West Hartford Board of Education, and the Town of West Hartford, their respective boards and commissions, officials, officers, employees, agents, representatives, and servants from any loss, claim, cost penalty, fine or damage that may arise out of the failure of the Contractor, its officers, agents, employees or Subcontractors to comply with any laws or regulations of the United States of America, the State of Connecticut, the Town of West Hartford, West Hartford Board of Education, or their respective agencies. This undertaking shall not be affected by other portions of the Agreement relating to insurance requirements.

K. Substantial completion must be achieved by August 17, 2018 and final completion must be achieved by August 28, 2018. The Contractor shall pay the Owner liquidated damages in the amount of Three Hundred Dollars (\$300.00) per calendar day, which sum is hereby agreed upon, and shall be assessed not as a penalty, but as liquidated damages which the Owner shall suffer by reason of such default. The Owner and Contractor shall acknowledge that failure to effect substantial completion as noted above will precipitate inconvenience and disruption. The Owner and Contractor shall acknowledge that such damages are uncertain or difficult to prove and that the amounts established herein are reasonable assessment of these damages.

BIDDER:

COMPANY

Bidder must sign. Failure to provide an original signature will result in rejection of the bid.

®

SIGNATURE BY DULY AUTHORIZED
(SEAL)

PRINT OR TYPE NAME

The bidder agrees that by affixing their signature to this request for bids, the authorized signatory grants approval to the Town of West Hartford to obtain third party credit reports for the purpose of assessing the financial capacity of the business entity tendering such bid to the Town.

TITLE

DATE

ADDRESS

TELEPHONE

FAX #

E-MAIL

VENDOR FEIN #

BID FORMS TO BE SUBMITTED IN DUPLICATE

If you are not registered with the Town of West Hartford, please go to www.westhartfordct.gov/gov/departments/purchasing/vendor_registration.asp and select register.

00204-6

TO: Town of West Hartford
Peter Privitera
Purchasing Agent

FROM:

CLIENT:

DATE:

Dear Mr. Privitera:

In accordance with page 00204-3, Paragraph D of the "Bid Form", please be advised that my client currently has or will have by the date of the execution of the Agreement for this project, a Certificate of Insurance in amounts and types as specified in Article 11 of the Supplementary General Conditions.

Signature
Authorized Agent or Broker

00204-7

SUMMARY OF WORK HISTORY

2. The bidder is further required to furnish a complete list of all projects for which he has signed a construction contract within the past 36 months.

<u>Project Name</u>	<u>Project Description</u>	<u>Contract Award Amount</u>	<u>Client</u>	<u>Contact Person</u>	<u>Telephone #</u>
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
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_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____

Bid Form

00204-9

**INDEMNIFICATION AND INSURANCE EXHIBIT
CONTRACT BIDDING DOCUMENTS
PHASE III ROOF REPLACEMENT AT KPMS
BID #6637F**

I. INDEMNIFICATION

- A. To the fullest extent permitted by law, the Contractor shall release, defend, indemnify, and hold harmless the Town of West Hartford, the Board of Education, their respective boards, commissions, officers, officials, employees, agents, representatives, and servants from any and all suits, claims, losses, damages, costs (including without limitation reasonable attorneys' fees), compensation, penalties, fines, liabilities or judgments of any name or nature for:

Bodily injury, sickness, disease, or death; and/or

Damage to or destruction of real and/or personal property; and/or

Financial losses (including, without limitation, those caused by loss of use)

sustained by any person or concern, including officers, employees, agents, Subcontractors, materialmen, or servants of the Town, the Board of Education, or the Contractor, or by the public, which is caused or alleged to have been caused in whole or in part by the negligent act(s) or omission(s) of the Contractor, or any Subcontractor, or materialmen, or anyone directly or indirectly employed by them arising from or related to the performance of this Contract or from the inaccuracy of any representation or warranty contained in the Contract Documents. This indemnity shall not be affected by other portions of the Contract relating to insurance requirements

- B. To the fullest extent permitted by law, the Contractor shall release, defend, indemnify, and hold harmless the West Hartford Board of Education and the Town of West Hartford, their respective boards and commissions, officials, officers, employees, agents, representatives, and servants from any and all suits, claims, damages, costs, (including without limitation reasonable attorneys' fees), compensation, penalties, fines, liabilities or judgments that may arise out of the failure of the Contractor, its officers, agents, Subcontractors, materialmen or anyone directly or indirectly employed by them to comply with any laws, statutes, ordinances, building codes, and rules and regulations of the United States of America, the State of Connecticut, the Town of West Hartford, or their respective agencies. This indemnity shall not be affected by other portions of the Contract relating to insurance requirements.

II. INSURANCE

A. Insurance Requirements

1. For purpose of this Exhibit, the term "Contractor" shall also include their respective agents, representatives, employees, subcontractors or sub-subcontractors and the term "Town of West Hartford, and West Hartford Board of Education" (hereinafter called the "Owner") shall include their respective boards, commissions, officials, officers, agents, consultants, employees and volunteers.
2. The Contractor shall obtain and maintain at its own cost and expense all the insurance described below continuously for the duration of the Contract, including any and all extensions, except as defined otherwise in this Exhibit.

3. The provisions of this Exhibit shall survive the expiration, suspension or termination of this Contract with respect to any event occurring prior to such expiration, suspension or termination.
4. Contractor's policies shall be written by insurance companies authorized to do business in the State of Connecticut, with a Best's rating of no less than A:VII, or otherwise approved by the Owner.
5. **All liability policies (with the exception of Worker's Compensation) shall include the Town of West Hartford, the West Hartford Board of Education, and their respective officials, boards and commissions, officers, representatives, agents, servants, employees and volunteers as an Additional Insured.** The coverage shall include, but not be limited to, investigation, defense, settlement, judgment or payment of any legal liability. Any **Insured vs. Insured** language shall be amended to eliminate any conflicts or coverage restrictions between the respective Insureds.
6. If the Contractor fails to purchase or maintain the required insurance specified by this Exhibit, the failure shall be treated as a default in Work. The Owner may (but shall not be obligated to) purchase such insurance on the Contractor's behalf and shall be entitled to be repaid for any premiums paid therefore by the Contractor in the manner set forth in Paragraph 2.4.
7. When the Owner or the Contractor is damaged by failure of the Contractor to purchase or maintain insurance required under this Exhibit, the Contractor shall bear all reasonable costs including, but not limited to, attorney's fees and costs of litigation properly attributable thereto.
8. If requested by the Owner after the date of the Owner-Contractor Agreement, the Contractor shall promptly procure, at the Owner's expense, insurance coverage in such amounts as the Owner may request coverage not listed in this Exhibit.

B. Required Insurance Coverages:

1. **Commercial General Liability:** \$1,000,000 limit each occurrence / \$2,000,000 aggregate for premises/ operations, independent contractors' protective, products/ completed operations, contractual liability, personal injury and broad form property damage. Contractor shall continue to provide products/ completed operations coverage for two (2) years after Final Completion of the Work.
2. **Automobile Liability and Physical Damage Coverage:** \$1,000,000 limit each accident for any auto, including statutory uninsured/underinsured motorist coverage and medical payments. Policy shall include collision and comprehensive physical damage coverage.
3. **Umbrella Liability:** \$2,000,000 each occurrence, following form. Excess/umbrella liability coverage may be included to meet minimum requirements.
4. **Workers' Compensation and Employer's Liability:** Statutory coverage in compliance with the Workers' Compensation laws of the State of Connecticut or applicable to the Work to be performed with an Experience Modification Rate of 1.0 or less. Policy shall include Employer's Liability with minimum limits of \$100,000 each accident, \$500,000 disease/policy limit, \$100,000 disease/each employee.

The Contractor represents that they are currently in compliance with all requirements of the State of Connecticut Workers' Compensation Act and that it shall remain in compliance for the duration of the Contract. The Contractor agrees that Workers' Compensation is their sole

remedy and shall indemnify and hold harmless the Owner from all suits, claims, and actions arising from personal injuries to the Contractor, however caused. This indemnity shall not be affected by a lapse of Workers' Compensation coverage and/or if the Contractor failed, neglected, refused or is unable to obtain Workers' Compensation insurance.

5. Personal Property:

All personal property of the Contractor are the sole risk of the Contractor. The Contractor agrees to indemnify, defend and hold harmless the Owner from any and all losses or damages, however caused, to any and all personal property belonging to the Contractor.

C. Additional Terms

1. **Minimum Scope and Limits:** The required insurance shall meet the minimum scope and limits of insurance specified in this Exhibit, or required by applicable federal, state and/or municipal law, regulation or requirement, whichever coverage is greater. Providing proof of compliance with the insurance requirements described in this Exhibit is not intended, and shall not be construed to exclude the Owner from additional limits and coverage available to the Contractor.

Acceptance by the Owner of insurance submitted by the Contractor does not relieve or decrease in any manner the liability of the Contractor arising out of or in connection with this Contract. The Contractor is responsible for any losses, claims and costs of any kind which exceed the Contractor's limits of liability, or which may be outside the coverage scope of the policies, or a result of non-compliance with any laws including, but not limited to, environmental laws. The requirements herein are not intended, and shall not be construed to limit or eliminate the liability of the Contractor that arises from the Contract.

2. **Certificates of Insurance:** The Contractor shall provide certificates of insurance acceptable to the Owner confirming compliance with this Exhibit and thereafter upon renewal or replacement of each required policy of insurance.
3. **Subcontractors:** All subcontractors of the Contractor are required to comply with this Exhibit. The Contractor shall include all subcontractors as an Insured under its insurance policies or shall furnish separate certificates of insurance and endorsements for each subcontractor.
4. **Premiums, Deductibles and Other Liabilities:** Any and all related costs, including but not limited to, deductibles, retentions, losses, claim expenses, premiums, taxes, and audit charges earned are the sole responsibility of the Contractor.
5. **Occurrence Form, Primary and Non-Contributory:** All required insurance coverage shall be written on an occurrence basis. Each required policy of insurance shall be primary and non-contributory with respect to any insurance or self-insurance maintained by the Owner.
6. **Waiver of Rights of Recovery:** Both the Contractor and Contractor's insurers shall waive their rights of recovery or subrogation against the Owner.
7. **Claim Reporting:** Any failure of the Contractor to comply with the claim reporting provisions of the required insurance policies shall not relieve the Contractor of any liability or indemnification in favor of the Owner for losses which otherwise would have been covered by said policies.
8. **Cancellation Notice:** Each required insurance policy shall not be suspended, voided, cancelled or reduced except after thirty (30) days prior written notice has been given to the Owner, ten (10) days for non-payment of premium.

3.0 LABOR REQUIREMENTS

ALL BIDS MUST INCORPORATE STATE OF CONNECTICUT PREVAILING WAGE RATES AS PROVIDED IN THIS DOCUMENT. The awarded bidder will be required to pay prevailing wages.

003.00

3.01 PREVAILING WAGE RATES

- 3.01.01 The Contractor shall certify in writing and under oath to the Labor Commissioner the pay scale to be used by the Contractor and any Subcontractors. The provisions of this section shall not apply where the total cost of all work to be performed by ALL Contractors and Subcontractors in connection with new construction of any public works project is less than FOUR HUNDRED thousand dollars or where the total cost of all work to be performed by ALL Contractors and Subcontractors in connection with any remodeling, refinishing, refurbishing, rehabilitation, alteration or repair of any public works project is less than ONE HUNDRED thousand dollars. The Contractor shall fully comply with all provisions of Connecticut General Statutes (CGS) 31-53 and shall be subject to such sanctions mandated for violations of said Public Act.
- 3.01.02 The wages paid on an hourly basis to any mechanic, laborer or workman employed upon the work herein contracted to be done and the amount of payment or contribution paid or payable on behalf of each such employee to any employee welfare fund, as defined in CGS 31-53 shall be at a rate equal to the rate customary or prevailing for the same work in the same trade or occupation in the Town in which such public works project is being constructed. Any contractor who is not obligated by agreement to make payment or contribution on behalf of such employees to any such employee welfare fund shall pay to each employee as part of his wages the amount of payment or contribution for his classification on each pay day.
- 3.01.03 The contractor shall not be paid in accordance with the payment provisions of these Contract Bidding Documents unless the contractor is in full compliance with the mandates of CGS 31-53.
- 3.01.04 Bidders are further advised that if the initial consideration due and payable pursuant to the Contract exceeds the mandatory limits at which prevailing wages rates are required, then the contractor and any subcontractors shall pay the appropriate prevailing wages retroactive to the date of commencement of work on the project. The contractor shall not receive any additional compensation from the Owner as a result of an occurrence of the aforementioned event.

Project: Roof Replacement At King Philip Middle School

**Minimum Rates and Classifications
for Building Construction**

ID# : B 24532

**Connecticut Department of Labor
Wage and Workplace Standards Division**

By virtue of the authority vested in the Labor Commissioner under provisions of Section 31-53 of the General Statutes of Connecticut, as amended, the following are declared to be the prevailing rates and welfare payments and will apply only where the contract is advertised for bid within 20 days of the date on which the rates are established. Any contractor or subcontractor not obligated by agreement to pay to the welfare and pension fund shall pay this amount to each employee as part of his/her hourly wages.

Project Number:

Project Town: West Hartford

State#:

FAP#:

Project: Roof Replacement At King Philip Middle School

CLASSIFICATION	Hourly Rate	Benefits
1a) Asbestos Worker/Insulator (Includes application of insulating materials, protective coverings, coatings, & finishes to all types of mechanical systems; application of firestopping material for wall openings & penetrations in walls, floors, ceilings	38.25	27.96
1b) Asbestos/Toxic Waste Removal Laborers: Asbestos removal and encapsulation (except its removal from mechanical systems which are not to be scrapped), toxic waste removers, blasters.**See Laborers Group 7**		
1c) Asbestos Worker/Heat and Frost Insulator	39.00	28.76

As of: Thursday, March 15, 2018

Project: Roof Replacement At King Philip Middle School

2) Boilermaker	38.34	26.01
<hr/>		
3a) Bricklayer, Cement Mason, Concrete Finisher (including caulking), Stone Masons	33.48	32.06 + a
<hr/>		
3b) Tile Setter	34.90	25.87
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3c) Terrazzo Mechanics and Marble Setters	31.69	22.35
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3d) Tile, Marble & Terrazzo Finishers	26.70	21.75
<hr/>		
3e) Plasterer	33.48	32.06
<hr/>		

As of: Thursday, March 15, 2018

Project: Roof Replacement At King Philip Middle School

-----LABORERS-----

4) Group 1: Laborers (common or general), acetylene burners, carpenter tenders, concrete specialists, wrecking laborers, fire watchers.	29.25	19.50
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4a) Group 2: Mortar mixers, plaster tender, power buggy operators, powdermen, fireproofers/mixer/nozzleman (Person running mixer and spraying fireproof only).	29.50	19.50
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4b) Group 3: Jackhammer operators/pavement breaker, mason tender (brick), mason tender (cement/concrete), forklift operators and forklift operators (masonry).	29.75	19.50
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4c) **Group 4: Pipelayers (Installation of water, storm drainage or sewage lines outside of the building line with P6, P7 license) (the pipelayer rate shall apply only to one or two employees of the total crew who primary task is to actually perform the mating of pipe sections) P6 and P7 rate is \$26.80.	29.75	19.50
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4d) Group 5: Air track operator, sand blaster and hydraulic drills.	29.75	19.50
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As of: Thursday, March 15, 2018

Project: Roof Replacement At King Philip Middle School

4e) Group 6: Blasters, nuclear and toxic waste removal. 31.00 19.50

4f) Group 7: Asbestos/lead removal and encapsulation (except it's removal from mechanical systems which are not to be scrapped). 30.25 19.50

4g) Group 8: Bottom men on open air caisson, cylindrical work and boring crew. 28.38 19.50

4h) Group 9: Top men on open air caisson, cylindrical work and boring crew. 27.86 19.50

4i) Group 10: Traffic Control Signalman 16.00 19.50

5) Carpenter, Acoustical Ceiling Installation, Soft Floor/Carpet Laying, Metal Stud Installation, Form Work and Scaffold Building, Drywall Hanging, Modular-Furniture Systems Installers, Lathers, Piledrivers, Resilient Floor Layers. 32.60 25.34

As of: Thursday, March 15, 2018

Project: Roof Replacement At King Philip Middle School

5a) Millwrights 33.14 25.74

6) Electrical Worker (including low voltage wiring) (Trade License required: E1,2 L-5,6 C-5,6 T-1,2 L-1,2 V-1,2,7,8,9) 39.15 25.17+3% of gross wage

7a) Elevator Mechanic (Trade License required: R-1,2,5,6) 51.71 32.645+a+b

-----LINE CONSTRUCTION-----

Groundman 26.50 6.5% + 9.00

Linemen/Cable Splicer 48.19 6.5% + 22.00

As of: Thursday, March 15, 2018

Project: Roof Replacement At King Philip Middle School

8) Glazier (Trade License required: FG-1,2)	36.28	20.45 + a
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9) Ironworker, Ornamental, Reinforcing, Structural, and Precast Concrete Erection	35.47	33.39 + a
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----OPERATORS----

Group 1: Crane handling or erecting structural steel or stone, hoisting engineer 2 drums or over, front end loader (7 cubic yards or over), work boat 26 ft. and over and Tunnel Boring Machines. (Trade License Required)	39.30	24.05 + a
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Group 2: Cranes (100 ton rate capacity and over); Excavator over 2 cubic yards; Piledriver (\$3.00 premium when operator controls hammer); Bauer Drill/Caisson. (Trade License Required)	38.98	24.05 + a
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Group 3: Excavator; Backhoe/Excavator under 2 cubic yards; Cranes (under 100 ton rated capacity), Grader/Blade; Master Mechanic; Hoisting Engineer (all types of equipment where a drum and cable are used to hoist or drag material regardless of motive power of operation), Rubber Tire Excavator (Drott-1085 or similar); Grader Operator; Bulldozer Fine Grade. (slopes, shaping, laser or GPS, etc.). (Trade License Required)	38.24	24.05 + a
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As of: Thursday, March 15, 2018

Project: Roof Replacement At King Philip Middle School

Group 4: Trenching Machines; Lighter Derrick; Concrete Finishing Machine; CMI Machine or Similar; Koehring Loader (Skooper).	37.85	24.05 + a
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Group 5: Specialty Railroad Equipment; Asphalt Paver; Asphalt Reclaiming Machine; Line Grinder; Concrete Pumps; Drills with Self Contained Power Units; Boring Machine; Post Hole Digger; Auger; Pounder; Well Digger; Milling Machine (over 24" Mandrell)	37.26	24.05 + a
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Group 5 continued: Side Boom; Combination Hoe and Loader; Directional Driller; Pile Testing Machine.	37.26	24.05 + a
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Group 6: Front End Loader (3 up to 7 cubic yards); Bulldozer (rough grade dozer).	36.95	24.05 + a
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Group 7: Asphalt roller, concrete saws and cutters (ride on types), vermeer concrete cutter, Stump Grinder; Scraper; Snooper; Skidder; Milling Machine (24" and under Mandrell).	36.61	24.05 + a
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Group 8: Mechanic, grease truck operator, hydroblaster; barrier mover; power stone spreader; welding; work boat under 26 ft.; transfer machine.	36.21	24.05 + a
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As of: Thursday, March 15, 2018

Project: Roof Replacement At King Philip Middle School

Group 9: Front end loader (under 3 cubic yards), skid steer loader regardless of attachments, (Bobcat or Similar): forklift, power chipper; landscape equipment (including Hydroseeder).	35.78	24.05 + a
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Group 10: Vibratory hammer; ice machine; diesel and air, hammer, etc.	33.74	24.05 + a
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Group 11: Conveyor, earth roller, power pavement breaker (whiphammer), robot demolition equipment.	33.74	24.05 + a
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Group 12: Wellpoint operator.	33.68	24.05 + a
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Group 13: Compressor battery operator.	33.10	24.05 + a
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Group 14: Elevator operator; tow motor operator (solid tire no rough terrain).	31.96	24.05 + a
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As of: Thursday, March 15, 2018

Project: Roof Replacement At King Philip Middle School

Group 15: Generator Operator; Compressor Operator; Pump Operator; Welding Machine Operator; Heater Operator.	31.55	24.05 + a
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Group 16: Maintenance Engineer/Oiler.	30.90	24.05 + a
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Group 17: Portable asphalt plant operator; portable crusher plant operator; portable concrete plant operator.	35.21	24.05 + a
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Group 18: Power safety boat; vacuum truck; zim mixer; sweeper; (Minimum for any job requiring a CDL license).	32.79	24.05 + a
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-----PAINTERS (Including Drywall Finishing)-----

10a) Brush and Roller	32.72	20.45
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As of: Thursday, March 15, 2018

Project: Roof Replacement At King Philip Middle School

10b) Taping Only/Drywall Finishing	33.47	20.45
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10c) Paperhanger and Red Label	33.22	20.45
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10e) Blast and Spray	35.72	20.45
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11) Plumber (excluding HVAC pipe installation) (Trade License required: P-1,2,6,7,8,9 J-1,2,3,4 SP-1,2)	41.62	30.36
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12) Well Digger, Pile Testing Machine	33.01	19.40 + a
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13) Roofer (composition)	34.92	19.28
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As of: Thursday, March 15, 2018

Project: Roof Replacement At King Philip Middle School

14) Roofer (slate & tile)	35.42	19.28
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15) Sheetmetal Worker (Trade License required for HVAC and Ductwork: SM-1,SM-2,SM-3,SM-4,SM-5,SM-6)	37.18	34.29
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16) Pipefitter (Including HVAC work) (Trade License required: S-1,2,3,4,5,6,7,8 B-1,2,3,4 D-1,2,3,4, G-1, G-2, G-8 & G-9)	41.62	30.36
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-----TRUCK DRIVERS-----

17a) 2 Axle	29.13	22.32 + a
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17b) 3 Axle, 2 Axle Ready Mix	29.23	22.32 + a
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As of: Thursday, March 15, 2018

Project: Roof Replacement At King Philip Middle School

17c) 3 Axle Ready Mix	29.28	22.32 + a
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17d) 4 Axle, Heavy Duty Trailer up to 40 tons	29.33	22.32 + a
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17e) 4 Axle Ready Mix	29.38	22.32 + a
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17f) Heavy Duty Trailer (40 Tons and Over)	29.58	22.32 + a
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17g) Specialized Earth Moving Equipment (Other Than Conventional Type on-the-Road Trucks and Semi-Trailers, Including Euclids)	29.38	22.32 + a
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18) Sprinkler Fitter (Trade License required: F-1,2,3,4)	43.92	15.84 + a
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As of: Thursday, March 15, 2018

Project: Roof Replacement At King Philip Middle School

19) Theatrical Stage Journeyman	25.76	7.34
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***As of:* Thursday, March 15, 2018**

Project: Roof Replacement At King Philip Middle School

Welders: Rate for craft to which welding is incidental.

**Note: Hazardous waste removal work receives additional \$1.25 per hour for truck drivers.*

***Note: Hazardous waste premium \$3.00 per hour over classified rate*

ALL Cranes: When crane operator is operating equipment that requires a fully licensed crane operator to operate he receives an extra \$4.00 premium in addition to the hourly wage rate and benefit contributions:

1) Crane handling or erecting structural steel or stone; hoisting engineer (2 drums or over)

2) Cranes (100 ton rate capacity and over) Bauer Drill/Caisson

3) Cranes (under 100 ton rated capacity)

Crane with 150 ft. boom (including jib) - \$1.50 extra

Crane with 200 ft. boom (including jib) - \$2.50 extra

Crane with 250 ft. boom (including jib) - \$5.00 extra

Crane with 300 ft. boom (including jib) - \$7.00 extra

Crane with 400 ft. boom (including jib) - \$10.00 extra

All classifications that indicate a percentage of the fringe benefits must be calculated at the percentage rate times the "base hourly rate".

Apprentices duly registered under the Commissioner of Labor's regulations on "Work Training Standards for Apprenticeship and Training Programs" Section 31-51-d-1 to 12, are allowed to be paid the appropriate percentage of the prevailing journeymen hourly base and the full fringe benefit rate, providing the work site ratio shall not be less than one full-time journeyman instructing and supervising the work of each apprentice in a specific trade.

The Prevailing wage rates applicable to this project are subject to annual adjustments each July 1st for the duration of the project.

Each contractor shall pay the annual adjusted prevailing wage rate that is in effect each July 1st, as posted by the Department of Labor.

It is the contractor's responsibility to obtain the annual adjusted prevailing wage rate increases directly from the Department of Labor's website.

The annual adjustments will be posted on the Department of Labor's Web page: www.ct.gov/dol. For those without internet access, please contact the division listed below.

The Department of Labor will continue to issue the initial prevailing wage rate schedule to the Contracting Agency for the project.

All subsequent annual adjustments will be posted on our Web Site for contractor access.

Contracting Agencies are under no obligation pursuant to State labor law to pay any increase due to the annual adjustment provision.

As of: Thursday, March 15, 2018

Project: Roof Replacement At King Philip Middle School

Effective October 1, 2005 - Public Act 05-50: any person performing the work of any mechanic, laborer, or worker shall be paid prevailing wage

All Person who perform work ON SITE must be paid prevailing wage for the appropriate mechanic, laborer, or worker classification.

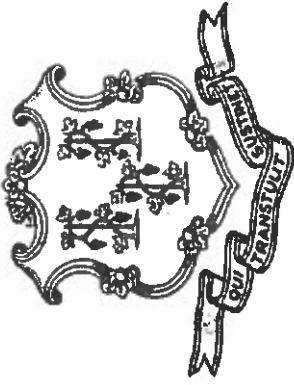
All certified payrolls must list the hours worked and wages paid to All Persons who perform work ON SITE regardless of their ownership i.e.: (Owners, Corporate Officers, LLC Members, Independent Contractors, et. al)

Reporting and payment of wages is required regardless of any contractual relationship alleged to exist between the contractor and such person.

~~Unlisted classifications needed for work not included within the scope of the classifications listed may be added after award only as provided in the labor standards contract clause (29 CFR 5.5 (a) (1) (ii)).

Please direct any questions which you may have pertaining to classification of work and payment of prevailing wages to the Wage and Workplace Standards Division, telephone (860)263-6790.

As of: Thursday, March 15, 2018



THIS IS A PUBLIC WORKS PROJECT

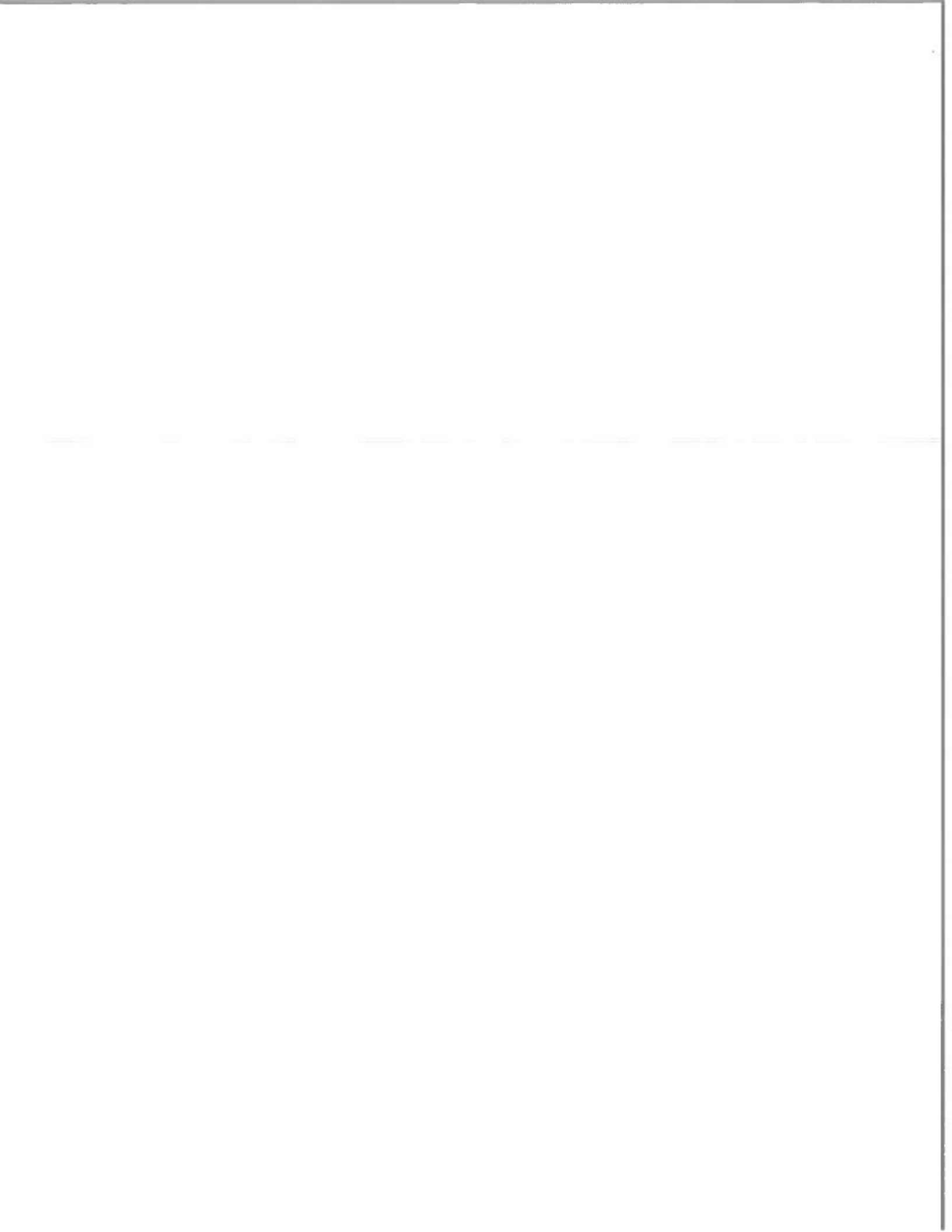
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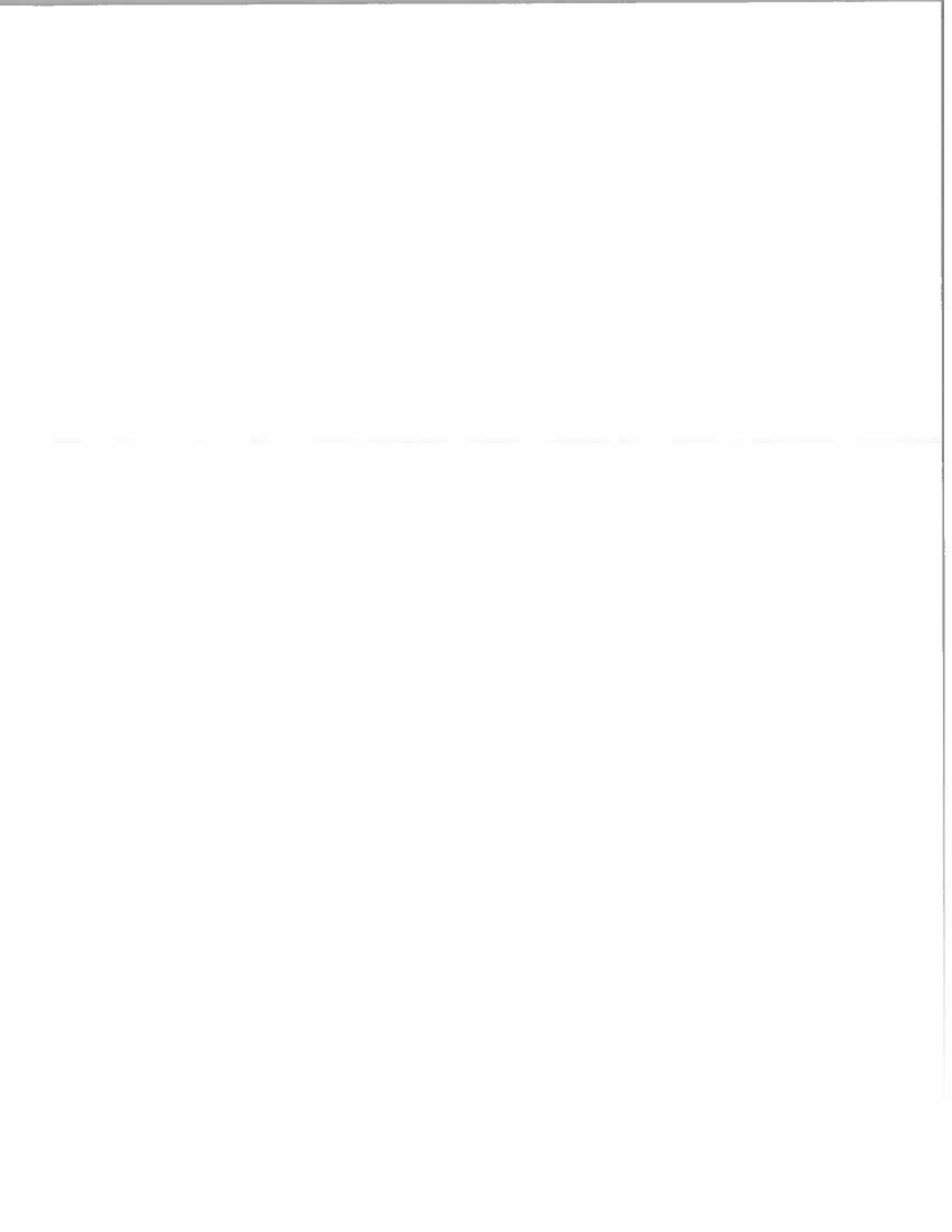
PREVAILING WAGE LAW

CT General Statutes Section 31-53

**If you have QUESTIONS regarding your wages
CALL (860) 263-6790**

Section 31-55 of the CT State Statutes requires every contractor or subcontractor performing work for the state to post in a prominent place the prevailing wages as determined by the Labor Commissioner.





Informational Bulletin

THE 10-HOUR OSHA CONSTRUCTION SAFETY AND HEALTH COURSE

(applicable to public building contracts entered into *on or after July 1, 2007*, where the total cost of all work to be performed is at least \$100,000)

- (1) This requirement was created by Public Act No. 06-175, which is codified in Section 31-53b of the Connecticut General Statutes (pertaining to the prevailing wage statutes);
- (2) The course is required for public building construction contracts (projects funded in whole or in part by the state or any political subdivision of the state) entered into on or after July 1, 2007;
- (3) It is required of private employees (not state or municipal employees) and apprentices who perform manual labor for a general contractor or subcontractor on a public building project where the total cost of all work to be performed is at least \$100,000;
- (4) The ten-hour construction course pertains to the ten-hour Outreach Course conducted in accordance with federal OSHA Training Institute standards, and, for telecommunications workers, a ten-hour training course conducted in accordance with federal OSHA standard, 29 CFR 1910.268;
- (5) The internet website for the federal OSHA Training Institute is http://www.osha.gov/fso/ote/training/edcenters/fact_sheet.html;
- (6) The statutory language leaves it to the contractor and its employees to determine who pays for the cost of the ten-hour Outreach Course;
- (7) Within 30 days of receiving a contract award, a general contractor must furnish proof to the Labor Commissioner that all employees and apprentices performing manual labor on the project will have completed such a course;
- (8) Proof of completion may be demonstrated through either: (a) the presentation of a *bona fide* student course completion card issued by the federal OSHA Training Institute; *or* (2) the presentation of documentation provided to an employee by a trainer certified by the Institute pending the actual issuance of the completion card;
- (9) Any card with an issuance date more than 5 years prior to the commencement date of the construction project shall not constitute proof of compliance;

- (10) Each employer shall affix a copy of the construction safety course completion card to the certified payroll submitted to the contracting agency in accordance with Conn. Gen. Stat. § 31-53(f) on which such employee's name first appears;
- (11) Any employee found to be in non-compliance shall be subject to removal from the worksite if such employee does not provide satisfactory proof of course completion to the Labor Commissioner by the fifteenth day after the date the employee is determined to be in noncompliance;
- (12) Any such employee who is determined to be in noncompliance may continue to work on a public building construction project for a maximum of fourteen consecutive calendar days while bringing his or her status into compliance;
- (13) The Labor Commissioner may make complaint to the prosecuting authorities regarding any employer or agent of the employer, or officer or agent of the corporation who files a false certified payroll with respect to the status of an employee who is performing manual labor on a public building construction project;
- (14) The statute provides the minimum standards required for the completion of a safety course by manual laborers on public construction contracts; any contractor can exceed these minimum requirements; and
- (15) Regulations clarifying the statute are currently in the regulatory process, and shall be posted on the CTDOL website as soon as they are adopted in final form.
- (16) Any questions regarding this statute may be directed to the Wage and Workplace Standards Division of the Connecticut Labor Department via the internet website of <http://www.ctdol.state.ct.us/wgwkstnd/wgemenu.htm>; or by telephone at (860)263-6790.

THE ABOVE INFORMATION IS PROVIDED EXCLUSIVELY AS AN EDUCATIONAL RESOURCE, AND IS NOT INTENDED AS A SUBSTITUTE FOR LEGAL INTERPRETATIONS WHICH MAY ULTIMATELY ARISE CONCERNING THE CONSTRUCTION OF THE STATUTE OR THE REGULATIONS.

November 29, 2006

Notice
To All Mason Contractors and Interested Parties
Regarding Construction Pursuant to Section 31-53 of the
Connecticut General Statutes (Prevailing Wage)

The Connecticut Labor Department Wage and Workplace Standards Division is empowered to enforce the prevailing wage rates on projects covered by the above referenced statute.

Over the past few years the Division has withheld enforcement of the rate in effect for workers who operate a forklift on a prevailing wage rate project due to a potential jurisdictional dispute.

The rate listed in the schedules and in our Occupational Bulletin (see enclosed) has been as follows:

Forklift Operator:

- **Laborers (Group 4) Mason Tenders** - operates forklift solely to assist a mason to a maximum height of nine feet only.

- **Power Equipment Operator (Group 9)** - operates forklift to assist any trade and to assist a mason to a height over nine feet.

The U.S. Labor Department conducted a survey of rates in Connecticut but it has not been published and the rate in effect remains as outlined in the above Occupational Bulletin.

Since this is a classification matter and not one of jurisdiction, effective January 1, 2007 the Connecticut Labor Department will enforce the rate on each schedule in accordance with our statutory authority.

Your cooperation in filing appropriate and accurate certified payrolls is appreciated.

STATUTE 31-55a

- SPECIAL NOTICE -

To: All State and Political Subdivisions, Their Agents, and Contractors

Connecticut General Statute 31-55a - Annual adjustments to wage rates by contractors doing state work.

Each contractor that is awarded a contract on or after October 1, 2002, for (1) the construction of a state highway or bridge that falls under the provisions of section 31-54 of the general statutes, or (2) the construction, remodeling, refinishing, refurbishing, rehabilitation, alteration or repair of any public works project that falls under the provisions of section 31-53 of the general statutes shall contact the Labor Commissioner on or before July first of each year, for the duration of such contract, to ascertain the prevailing rate of wages on an hourly basis and the amount of payment or contributions paid or payable on behalf of each mechanic, laborer or worker employed upon the work contracted to be done, and shall make any necessary adjustments to such prevailing rate of wages and such payment or contributions paid or payable on behalf of each such employee, effective each July first.

- The prevailing wage rates applicable to any contract or subcontract awarded on or after October 1, 2002 are subject to annual adjustments each July 1st for the duration of any project which was originally advertised for bids on or after October 1, 2002.
- Each contractor affected by the above requirement shall pay the annual adjusted prevailing wage rate that is in effect each July 1st, as posted by the Department of Labor.
- It is the *contractor's* responsibility to obtain the annual adjusted prevailing wage rate increases directly from the Department of Labor's Web Site. The annual adjustments will be posted on the Department of Labor Web page: www.ctdol.state.ct.us. For those without internet access, please contact the division listed below.
- The Department of Labor will continue to issue the initial prevailing wage rate schedule to the Contracting Agency for the project. All subsequent annual adjustments will be posted on our Web Site for contractor access.

Any questions should be directed to the Contract Compliance Unit, Wage and Workplace Standards Division, Connecticut Department of Labor, 200 Folly Brook Blvd., Wethersfield, CT 06109 at (860)263-6790.

**Connecticut Department of Labor
Wage and Workplace Standards Division
FOOTNOTES**

⇒ Please Note: If the "Benefits" listed on the schedule for the following occupations includes a letter(s) (+ a or + a+b for instance), refer to the information below.

Benefits to be paid at the appropriate prevailing wage rate for the listed occupation.

If the "Benefits" section for the occupation lists only a dollar amount, disregard the information below.

**Bricklayers, Cement Masons, Cement Finishers, Concrete Finishers, Stone Masons
(Building Construction) and
(Residential- Hartford, Middlesex, New Haven, New London and Tolland Counties)**

- a. Paid Holiday: Employees shall receive 4 hours for Christmas Eve holiday provided the employee works the regularly scheduled day before and after the holiday. Employers may schedule work on Christmas Eve and employees shall receive pay for actual hours worked in addition to holiday pay.

Elevator Constructors: Mechanics

- a. Paid Holidays: New Year's Day, Memorial Day, Independence Day, Labor Day, Veterans' Day, Thanksgiving Day, Christmas Day, plus the Friday after Thanksgiving.
- b. Vacation: Employer contributes 8% of basic hourly rate for 5 years or more of service or 6% of basic hourly rate for 6 months to 5 years of service as vacation pay credit.

Glaziers

- a. Paid Holidays: Labor Day and Christmas Day.

**Power Equipment Operators
(Heavy and Highway Construction & Building Construction)**

- a. Paid Holidays: New Year's Day, Good Friday, Memorial day, Independence Day, Labor Day, Thanksgiving Day and Christmas Day, provided the employee works 3 days during the week in which the holiday falls, if scheduled, and if scheduled, the working day before and the working day after the holiday. Holidays falling on Saturday may be observed on Saturday, or if the employer so elects, on the preceding Friday.

Ironworkers

- a. Paid Holiday: Labor Day provided employee has been on the payroll for the 5 consecutive work days prior to Labor Day.

Laborers (Tunnel Construction)

- a. Paid Holidays: New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day and Christmas Day. No employee shall be eligible for holiday pay when he fails, without cause, to work the regular work day preceding the holiday or the regular work day following the holiday.

Roofers

- a. Paid Holidays: July 4th, Labor Day, and Christmas Day provided the employee is employed 15 days prior to the holiday.

Sprinkler Fitters

- a. Paid Holidays: Memorial Day, July 4th, Labor Day, Thanksgiving Day and Christmas Day, provided the employee has been in the employment of a contractor 20 working days prior to any such paid holiday.

Truck Drivers

(Heavy and Highway Construction & Building Construction)

- a. Paid Holidays: New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, Christmas day, and Good Friday, provided the employee has at least 31 calendar days of service and works the last scheduled day before and the first scheduled day after the holiday, unless excused.

AIA® Document A101™ – 2007

Standard Form of Agreement Between Owner and Contractor where the basis of payment is a Stipulated Sum

AGREEMENT made as of the day of in the year
(In words, indicate day, month and year.)

BETWEEN the Owner:
(Name, legal status, address and other information)

TOWN OF WEST HARTFORD
50 SOUTH MAIN STREET
WEST HARTFORD, CT 06107

and the Contractor:
(Name, legal status, address and other information)

for the following Project:
(Name, location and detailed description)

PHASE III ROOF REPLACEMENT AT KING PHILIP MIDDLE SCHOOL, BID#6637F
100 KING PHILIP DRIVE
WEST HARTFORD, CT 06117

The Architect:
(Name, legal status, address and other information)

SILVER PETRUCELLI & ASSOCIATES
3190 WHITNEY AVENUE
HAMDEN CT 06518

The Owner and Contractor agree as follows.

This document has important legal consequences. Consultation with an attorney is encouraged with respect to its completion or modification.

AIA Document A201™-2007, General Conditions of the Contract for Construction, is adopted in this document by reference. Do not use with other general conditions unless this document is modified.

ELECTRONIC COPYING of any portion of this AIA® Document to another electronic file is prohibited and constitutes a violation of copyright laws as set forth in the footer of this document.

TABLE OF ARTICLES

- 1 THE CONTRACT DOCUMENTS**
- 2 THE WORK OF THIS CONTRACT**
- 3 DATE OF COMMENCEMENT AND SUBSTANTIAL COMPLETION**
- 4 CONTRACT SUM**
- 5 PAYMENTS**
- 6 DISPUTE RESOLUTION**
- 7 TERMINATION OR SUSPENSION**
- 8 MISCELLANEOUS PROVISIONS**
- 9 ENUMERATION OF CONTRACT DOCUMENTS**
- 10 INSURANCE AND BONDS**

ARTICLE 1 THE CONTRACT DOCUMENTS

The Contract Documents consist of this Agreement, Conditions of the Contract (General, Supplementary and other Conditions), Drawings, Specifications, Addenda issued prior to execution of this Agreement, other documents listed in this Agreement and Modifications issued after execution of this Agreement, all of which form the Contract, and are as fully a part of the Contract as if attached to this Agreement or repeated herein. The Contract represents the entire and integrated agreement between the parties hereto and supersedes prior negotiations, representations or agreements, either written or oral. An enumeration of the Contract Documents, other than a Modification, appears in Article 9.

ARTICLE 2 THE WORK OF THIS CONTRACT

The Contractor shall fully execute the Work described in the Contract Documents, except as specifically indicated in the Contract Documents to be the responsibility of others.

ARTICLE 3 DATE OF COMMENCEMENT AND SUBSTANTIAL COMPLETION

§ 3.1 The date of commencement of the Work shall be the date of this Agreement unless a different date is stated below or provision is made for the date to be fixed in a notice to proceed issued by the Owner.

(Insert the date of commencement if it differs from the date of this Agreement or, if applicable, state that the date will be fixed in a notice to proceed.)

If, prior to the commencement of the Work, the Owner requires time to file mortgages and other security interests, the Owner's time requirement shall be as follows:

§ 3.2 The Contract Time shall be measured from the date of commencement.

§ 3.3 The Contractor shall achieve Substantial Completion of the entire Work not later than ~~() days from the date of commencement, or as follows:~~ August 17, 2018 and Final Completion of the work not later than August 28, 2018. *(Insert number of calendar days. Alternatively, a calendar date may be used when coordinated with the date of commencement. If appropriate, insert requirements for earlier Substantial Completion of certain portions of the Work.)*

Liquidated damages in the amount of \$300.00 (Three Hundred Dollars) per calendar day shall be assessed for the failure to achieve Substantial Completion of the work not later than August 17, 2018 and Final Completion of the work not later than August 28, 2018.

Portion of Work

Substantial Completion Date

, subject to adjustments of this Contract Time as provided in the Contract Documents.
(Insert provisions, if any, for liquidated damages relating to failure to achieve Substantial Completion on time or for bonus payments for early completion of the Work.)

ARTICLE 4 CONTRACT SUM

§ 4.1 The Owner shall pay the Contractor the Contract Sum in current funds for the Contractor's performance of the Contract. The Contract Sum shall be \$ (), subject to additions and deductions as provided in the Contract Documents.

§ 4.2 The Contract Sum is based upon the following alternates, if any, which are described in the Contract Documents and are hereby accepted by the Owner:
(State the numbers or other identification of accepted alternates. If the bidding or proposal documents permit the Owner to accept other alternates subsequent to the execution of this Agreement, attach a schedule of such other alternates showing the amount for each and the date when that amount expires.)

BASE BID

§ 4.3 Unit prices, if any:
(Identify and state the unit price, state quantity limitations, if any, to which the unit price will be applicable.)

Item	Units and Limitations	Price Per Unit (\$0.00)
------	-----------------------	-------------------------

§ 4.4 Allowances included in the Contract Sum, if any:
(Identify allowance and state exclusions, if any, from the allowance price.)

Item	Price
------	-------

ARTICLE 5 PAYMENTS

§ 5.1 PROGRESS PAYMENTS

§ 5.1.1 Based upon Applications for Payment submitted to the Architect by the Contractor and Certificates for Payment issued by the Architect, the Owner shall make progress payments on account of the Contract Sum to the Contractor as provided below and elsewhere in the Contract Documents.

§ 5.1.2 The period covered by each Application for Payment shall be one calendar month ending on the last day of the month, or as follows:

§ 5.1.3 Provided that an Application for Payment is received by the Architect not later than the First day of a month, the Owner shall make payment of the certified amount to the Contractor not later than the first Friday after the Fifteenth day of the Same month. If an Application for Payment is received by the Architect after the application date fixed above, payment shall be made by the Owner not later than Fifteen (15) days after the Architect receives the Application for Payment.
(Federal, state or local laws may require payment within a certain period of time.)

§ 5.1.4 Each Application for Payment shall be based on the most recent schedule of values submitted by the Contractor in accordance with the Contract Documents. The schedule of values shall allocate the entire Contract Sum among the various portions of the Work. The schedule of values shall be prepared in such form and supported by such data to substantiate its accuracy as the Architect may require. This schedule, unless objected to by the Architect, shall be used as a basis for reviewing the Contractor's Applications for Payment.

§ 5.1.5 Applications for Payment shall show the percentage of completion of each portion of the Work as of the end of the period covered by the Application for Payment.

§ 5.1.6 Subject to other provisions of the Contract Documents, the amount of each progress payment shall be computed as follows:

- .1 Take that portion of the Contract Sum properly allocable to completed Work as determined by multiplying the percentage completion of each portion of the Work by the share of the Contract Sum allocated to that portion of the Work in the schedule of values, less retainage of Five percent (5.00 %). Pending final determination of cost to the Owner of changes in the Work, amounts not in dispute shall be included as provided in Section 7.3.9 of AIA Document A201™-2007, General Conditions of the Contract for Construction;
- .2 Add that portion of the Contract Sum properly allocable to materials and equipment delivered and suitably stored at the site for subsequent incorporation in the completed construction (or, if approved in advance by the Owner, suitably stored off the site at a location agreed upon in writing), less retainage of Five percent (5.00 %);
- .3 Subtract the aggregate of previous payments made by the Owner; and
- .4 Subtract amounts, if any, for which the Architect has withheld or nullified a Certificate for Payment as provided in Section 9.5 of AIA Document A201-2007.

§ 5.1.7 The progress payment amount determined in accordance with Section 5.1.6 shall be further modified under the following circumstances:

- .1 Add, upon Substantial Completion of the Work, a sum sufficient to increase the total payments to the full amount of the Contract Sum, less such amounts as the Architect shall determine for incomplete Work, retainage applicable to such work and unsettled claims; and
(Section 9.8.5 of AIA Document A201-2007 requires release of applicable retainage upon Substantial Completion of Work with consent of surety, if any.)
- .2 Add, if final completion of the Work is thereafter materially delayed through no fault of the Contractor, any additional amounts payable in accordance with Section 9.10.3 of AIA Document A201-2007.

§ 5.1.8 Reduction or limitation of retainage, if any, shall be as follows:

(If it is intended, prior to Substantial Completion of the entire Work, to reduce or limit the retainage resulting from the percentages inserted in Sections 5.1.6.1 and 5.1.6.2 above, and this is not explained elsewhere in the Contract Documents, insert here provisions for such reduction or limitation.)

§ 5.1.9 Except with the Owner's prior approval, the Contractor shall not make advance payments to suppliers for materials or equipment which have not been delivered and stored at the site.

§ 5.2 FINAL PAYMENT

§ 5.2.1 Final payment, constituting the entire unpaid balance of the Contract Sum, shall be made by the Owner to the Contractor when

- .1 the Contractor has fully performed the Contract except for the Contractor's responsibility to correct Work as provided in Section 12.2.2 of AIA Document A201-2007, and to satisfy other requirements, if any, which extend beyond final payment; and
- .2 a final Certificate for Payment has been issued by the Architect.

§ 5.2.2 The Owner's final payment to the Contractor shall be made no later than 30 days after the issuance of the Architect's final Certificate for Payment, or as follows:

ARTICLE 6 DISPUTE RESOLUTION

§ 6.1 INITIAL DECISION MAKER

The Architect will serve as Initial Decision Maker pursuant to Section 15.2 of AIA Document A201-2007, unless the parties appoint below another individual, not a party to this Agreement, to serve as Initial Decision Maker. *(If the parties mutually agree, insert the name, address and other contact information of the Initial Decision Maker, if other than the Architect.)*

[Redacted]

§ 6.2 BINDING DISPUTE RESOLUTION

For any Claim subject to, but not resolved by, mediation pursuant to Section 15.3 of AIA Document A201-2007, the method of binding dispute resolution shall be as follows: *(Check the appropriate box. If the Owner and Contractor do not select a method of binding dispute resolution below, or do not subsequently agree in writing to a binding dispute resolution method other than litigation, Claims will be resolved by litigation in a court of competent jurisdiction.)*

- Arbitration pursuant to Section 15.4 of AIA Document A201-2007
- Litigation in a court of competent jurisdiction
- Other *(Specify)*

ARTICLE 7 TERMINATION OR SUSPENSION

§ 7.1 The Contract may be terminated by the Owner or the Contractor as provided in Article 14 of AIA Document A201-2007.

§ 7.2 The Work may be suspended by the Owner as provided in Article 14 of AIA Document A201-2007.

ARTICLE 8 MISCELLANEOUS PROVISIONS

§ 8.1 Where reference is made in this Agreement to a provision of AIA Document A201-2007 or another Contract Document, the reference refers to that provision as amended or supplemented by other provisions of the Contract Documents.

§ 8.2 Payments due and unpaid under the Contract shall bear interest from the date payment is due at the rate stated below, or in the absence thereof, at the legal rate prevailing from time to time at the place where the Project is located.

(Insert rate of interest agreed upon, if any.)

0.00 %
per annum

§ 8.3 The Owner's representative:
(Name, address and other information)

William Phibbs, Capital Projects Manager 860-561-7523
Town of West Hartford
50 South Main Street
West Hartford, CT 06107

§ 8.4 The Contractor's representative:
(Name, address and other information)

§ 8.5 Neither the Owner's nor the Contractor's representative shall be changed without ten days written notice to the other party.

§ 8.6 Other provisions:

ARTICLE 9 ENUMERATION OF CONTRACT DOCUMENTS

§ 9.1 The Contract Documents, except for Modifications issued after execution of this Agreement, are enumerated in the sections below.

§ 9.1.1 The Agreement is this executed AIA Document A101-2007, Standard Form of Agreement Between Owner and Contractor.

§ 9.1.2 The General Conditions are AIA Document A201-2007, General Conditions of the Contract for Construction.

§ 9.1.3 The Supplementary and other Conditions of the ~~Contract~~ Contract are those contained in the Project Specification Document BID #6637F and are as follows:

Document	Title	Date	Pages
<u>INSTRUCTIONS TO BIDDERS</u>			
00101	PROJECT INFORMATION PAGE		
00102	TABLE OF CONTENTS		
00103	PROJECT NARRATIVE		
00104	LIST OF DRAWINGS		
00105	LOCATION MAP		
00106	WORK RULES		
00107	NOISE ORDINANCE		
<u>BIDDING REQUIREMENTS AND FORMS</u>			
00201	INVITATION TO BID		
00202	INSTRUCTIONS TO BIDDERS - AIA DOCUMENT A-701 - 1997		
00203	SUPPLEMENTARY INSTRUCTIONS TO BIDDERS		
00204	BID FORMS		
00205	SAMPLE AGREEMENT FORM		
<u>LABOR REQUIREMENTS</u>			
00303	CONTRACT LABOR RATES		
<u>GENERAL CONDITIONS</u>			
00401	GENERAL CONDITIONS - AIA DOCUMENT A-201		
00402	SUPPLEMENTARY GENERAL CONDITIONS		

§ 9.1.4 The Specifications: Specifications are those contained in the Project Specification Document BID #6637F as in Section 9.1.3:

(Either list the Specifications here or refer to an exhibit attached to this Agreement.)



Section	Title	Date	Pages
<u>DIVISION 1 – GENERAL REQUIREMENTS</u>			
<u>SECTION 01010 SUMMARY OF WORK</u>			
<u>SECTION 01019 CONTRACT CONSIDERATIONS</u>			
<u>SECTION 01045 CUTTING AND PATCHING</u>			
<u>SECTION 01300 SUBMITTALS</u>			
<u>SECTION 01600 MATERIALS AND EQUIPMENT</u>			
<u>SECTION 01700 CONTRACT CLOSEOUT</u>			
<u>SECTION 01730 OPERATIONS AND MAINTENANCE DATA</u>			
<u>SECTION 01740 WARRANTIES AND BONDS</u>			
<u>DIVISION 2 – EXISTING CONDITIONS</u>			
<u>SECTION 02080 ASBESTOS ABATEMENT</u>			
<u>SECTION 02085 PCB REMEDIATION AND DISPOSAL PLAN</u>			
<u>POLYCHLORINATED BIPHENYLS & ASBESTOS CONTAINING MATERIALS ROOFING INSPECTION</u>			
<u>DIVISION 3 – CONCRETE</u>			
<u>SECTION 03500 GYPSUM ROOF DECK SYSTEMS (CONCRETE DECK REPAIRS)</u>			
<u>DIVISION 4 – MASONRY</u>			
<u>SECTION 04100 MORTAR</u>			
<u>SECTION 04330 CAVITY WALL MASONRY SYSTEM</u>			
<u>DIVISION 6 – WOOD AND PLASTIC</u>			
<u>SECTION 06100 ROUGH CARPENTRY</u>			
<u>DIVISION 7 – THERMAL AND MOISTURE PROTECTION</u>			
<u>SECTION 07212 ROOF INSULATION BOARD</u>			
<u>SECTION 07213 BATT AND BLANKET INSULATION</u>			
<u>SECTION 07531 ELASTOMERIC SHEET ROOFING</u>			
<u>SECTION 07565 ROOFING REMOVALS AND PREPARATION</u>			
<u>SECTION 07600 FLASHING AND SHEET METAL</u>			
<u>SECTION 07631 GUTTERS AND DOWNSPOUTS</u>			
<u>SECTION 07900 SEALANTS</u>			
<u>DIVISION 9 - FINISHES</u>			
<u>SECTION 09900 PAINTING</u>			
<u>DIVISION 15 – MECHANICAL</u>			
<u>SECTION 15183 REFRIGERANT PIPING</u>			
<u>SECTION 15260 PIPING INSULATION</u>			
<u>SECTION 15410 PLUMBING PIPING</u>			
<u>DIVISION 16 – ELECTRICAL</u>			
<u>SECTION 16010 BASIC ELECTRICAL REQUIREMENTS</u>			
<u>SECTION 16060 GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS</u>			
<u>SECTION 16073 HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS</u>			
<u>SECTION 16074 VIBRATION AND SEISMIC CONTROLS FOR ELECTRICAL SYSTEMS</u>			
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<u>SECTION 16120 LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES</u>			
<u>SECTION 16130 RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS</u>			
<u>SECTION 16140 WIRING DEVICES</u>			
<u>SECTION 16410 ENCLOSED SWITCHES AND CIRCUIT BREAKERS</u>			
<u>SECTION 16491 FUSES</u>			

§ 9.1.5 The Drawings:

(Either list the Drawings here or refer to an exhibit attached to this Agreement.)

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Number	Title	Date

- COVER SHEET
- C1 CODE INFORMATION
- A1 OVERALL ROOF PLAN
- A2 ROOF PLAN – PART 1 & 2
- A3 ROOF DETAILS
- A4 FLOOR PLAN
- RP-1 ROOF ASBESTOS AND PCB ABATEMENT PLAN

§ 9.1.6 The Addenda, if any:

Number	Date	Pages

Portions of Addenda relating to bidding requirements are not part of the Contract Documents unless the bidding requirements are also enumerated in this Article 9.

§ 9.1.7 Additional documents, if any, forming part of the Contract Documents:

- 1 AIA Document E201™–2007, Digital Data Protocol Exhibit, if completed by the parties, or the following:

- 2 Other documents, if any, listed below:
(List here any additional documents that are intended to form part of the Contract Documents. AIA Document A201–2007 provides that bidding requirements such as advertisement or invitation to bid, Instructions to Bidders, sample forms and the Contractor's bid are not part of the Contract Documents unless enumerated in this Agreement. They should be listed here only if intended to be part of the Contract Documents.)

Contractors bid response attached herein.

ARTICLE 10 INSURANCE AND BONDS

The Contractor shall purchase and maintain insurance and provide bonds as set forth in Article 11 of AIA Document A201–2007.

(State bonding requirements, if any, and limits of liability for insurance required in Article 11 of AIA Document A201–2007.)

Type of insurance or bond	Limit of liability or bond amount (\$0.00)

This Agreement entered into as of the day and year first written above.

OWNER (Signature)

Peter Privitera, Purchasing Agent
Town of West Hartford

(Printed name and title)

CONTRACTOR (Signature)

(Printed name and title)



AIA® Document A201™ – 2007

General Conditions of the Contract for Construction

for the following PROJECT:

(Name and location or address)

PHASE III ROOF REPLACEMENT AT KING PHILIP MIDDLE SCHOOL BID#6637F
100 KING PHILIP DRIVE
WEST HARTFORD, CT 06117

THE OWNER:

(Name, legal status and address)

TOWN OF WEST HARTFORD
50 SOUTH MAIN STREET
WEST HARTFORD, CT 06107

THE ARCHITECT:

(Name, legal status and address)

SILVER PETRUCELLI & ASSOCIATES
3190 WHITNEY AVENUE
HAMDEN CT 06518

ADDITIONS AND DELETIONS:

The author of this document has added information needed for its completion. The author may also have revised the text of the original AIA standard form. An *Additions and Deletions Report* that notes added information as well as revisions to the standard form text is available from the author and should be reviewed. A vertical line in the left margin of this document indicates where the author has added necessary information and where the author has added to or deleted from the original AIA text.

This document has important legal consequences. Consultation with an attorney is encouraged with respect to its completion or modification.

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ARTICLE 1 GENERAL PROVISIONS

§ 1.1 BASIC DEFINITIONS

§ 1.1.1 THE CONTRACT DOCUMENTS

The Contract Documents are enumerated in the Agreement between the Owner and Contractor (hereinafter the Agreement) and consist of the Agreement, Conditions of the Contract (General, Supplementary and other Conditions), Drawings, Specifications, Addenda issued prior to execution of the Contract, other documents listed in the Agreement and Modifications issued after execution of the Contract. A Modification is (1) a written amendment to the Contract signed by both parties, (2) a Change Order, (3) a Construction Change Directive or (4) a written order for a minor change in the Work issued by the Architect. Unless specifically enumerated in the Agreement, the Contract Documents do not include the advertisement or invitation to bid, Instructions to Bidders, sample forms, other information furnished by the Owner in anticipation of receiving bids or proposals, the Contractor's bid or proposal, or portions of Addenda relating to bidding requirements.

§ 1.1.2 THE CONTRACT

The Contract Documents form the Contract for Construction. The Contract represents the entire and integrated agreement between the parties hereto and supersedes prior negotiations, representations or agreements, either written or oral. The Contract may be amended or modified only by a Modification. The Contract Documents shall not be construed to create a contractual relationship of any kind (1) between the Contractor and the Architect or the Architect's consultants, (2) between the Owner and a Subcontractor or a Sub-subcontractor, (3) between the Owner and the Architect or the Architect's consultants or (4) between any persons or entities other than the Owner and the Contractor. The Architect shall, however, be entitled to performance and enforcement of obligations under the Contract intended to facilitate performance of the Architect's duties.

§ 1.1.3 THE WORK

The term "Work" means the construction and services required by the Contract Documents, whether completed or partially completed, and includes all other labor, materials, equipment and services provided or to be provided by the Contractor to fulfill the Contractor's obligations. The Work may constitute the whole or a part of the Project.

§ 1.1.4 THE PROJECT

The Project is the total construction of which the Work performed under the Contract Documents may be the whole or a part and which may include construction by the Owner and by separate contractors.

§ 1.1.5 THE DRAWINGS

The Drawings are the graphic and pictorial portions of the Contract Documents showing the design, location and dimensions of the Work, generally including plans, elevations, sections, details, schedules and diagrams.

§ 1.1.6 THE SPECIFICATIONS

The Specifications are that portion of the Contract Documents consisting of the written requirements for materials, equipment, systems, standards and workmanship for the Work, and performance of related services.

§ 1.1.7 INSTRUMENTS OF SERVICE

Instruments of Service are representations, in any medium of expression now known or later developed, of the tangible and intangible creative work performed by the Architect and the Architect's consultants under their respective professional services agreements. Instruments of Service may include, without limitation, studies, surveys, models, sketches, drawings, specifications, and other similar materials.

§ 1.1.8 INITIAL DECISION MAKER

The Initial Decision Maker is the person identified in the Agreement to render initial decisions on Claims in accordance with Section 15.2 and certify termination of the Agreement under Section 14.2.2.

§ 1.2 CORRELATION AND INTENT OF THE CONTRACT DOCUMENTS

§ 1.2.1 The intent of the Contract Documents is to include all items necessary for the proper execution and completion of the Work by the Contractor. The Contract Documents are complementary, and what is required by one shall be as binding as if required by all; performance by the Contractor shall be required only to the extent consistent with the Contract Documents and reasonably inferable from them as being necessary to produce the indicated results.

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§ 1.2.2 Organization of the Specifications into divisions, sections and articles, and arrangement of Drawings shall not control the Contractor in dividing the Work among Subcontractors or in establishing the extent of Work to be performed by any trade.

§ 1.2.3 Unless otherwise stated in the Contract Documents, words that have well-known technical or construction industry meanings are used in the Contract Documents in accordance with such recognized meanings.

§ 1.3 CAPITALIZATION

Terms capitalized in these General Conditions include those that are (1) specifically defined, (2) the titles of numbered articles or (3) the titles of other documents published by the American Institute of Architects.

§ 1.4 INTERPRETATION

In the interest of brevity the Contract Documents frequently omit modifying words such as "all" and "any" and articles such as "the" and "an," but the fact that a modifier or an article is absent from one statement and appears in another is not intended to affect the interpretation of either statement.

§ 1.5 OWNERSHIP AND USE OF DRAWINGS, SPECIFICATIONS AND OTHER INSTRUMENTS OF SERVICE

§ 1.5.1 The Architect and the Architect's consultants shall be deemed the authors and owners of their respective Instruments of Service, including the Drawings and Specifications, and will retain all common law, statutory and other reserved rights, including copyrights. The Contractor, Subcontractors, Sub-subcontractors, and material or equipment suppliers shall not own or claim a copyright in the Instruments of Service. Submittal or distribution to meet official regulatory requirements or for other purposes in connection with this Project is not to be construed as publication in derogation of the Architect's or Architect's consultants' reserved rights.

§ 1.5.2 The Contractor, Subcontractors, Sub-subcontractors and material or equipment suppliers are authorized to use and reproduce the Instruments of Service provided to them solely and exclusively for execution of the Work. All copies made under this authorization shall bear the copyright notice, if any, shown on the Instruments of Service. The Contractor, Subcontractors, Sub-subcontractors, and material or equipment suppliers may not use the Instruments of Service on other projects or for additions to this Project outside the scope of the Work without the specific written consent of the Owner, Architect and the Architect's consultants.

§ 1.6 TRANSMISSION OF DATA IN DIGITAL FORM

If the parties intend to transmit Instruments of Service or any other information or documentation in digital form, they shall endeavor to establish necessary protocols governing such transmissions, unless otherwise already provided in the Agreement or the Contract Documents.

ARTICLE 2 OWNER

§ 2.1 GENERAL

§ 2.1.1 The Owner is the person or entity identified as such in the Agreement and is referred to throughout the Contract Documents as if singular in number. The Owner shall designate in writing a representative who shall have express authority to bind the Owner with respect to all matters requiring the Owner's approval or authorization. Except as otherwise provided in Section 4.2.1, the Architect does not have such authority. The term "Owner" means the Owner or the Owner's authorized representative.

§ 2.1.2 The Owner shall furnish to the Contractor within fifteen days after receipt of a written request, information necessary and relevant for the Contractor to evaluate, give notice of or enforce mechanic's lien rights. Such information shall include a correct statement of the record legal title to the property on which the Project is located, usually referred to as the site, and the Owner's interest therein.

§ 2.2 INFORMATION AND SERVICES REQUIRED OF THE OWNER

§ 2.2.1 Prior to commencement of the Work, the Contractor may request in writing that the Owner provide reasonable evidence that the Owner has made financial arrangements to fulfill the Owner's obligations under the Contract. Thereafter, the Contractor may only request such evidence if (1) the Owner fails to make payments to the Contractor as the Contract Documents require; (2) a change in the Work materially changes the Contract Sum; or (3) the Contractor identifies in writing a reasonable concern regarding the Owner's ability to make payment when due. The Owner shall furnish such evidence as a condition precedent to commencement or continuation of the Work or the

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portion of the Work affected by a material change. After the Owner furnishes the evidence, the Owner shall not materially vary such financial arrangements without prior notice to the Contractor.

§ 2.2.2 Except for permits and fees that are the responsibility of the Contractor under the Contract Documents, including those required under Section 3.7.1, the Owner shall secure and pay for necessary approvals, easements, assessments and charges required for construction, use or occupancy of permanent structures or for permanent changes in existing facilities.

§ 2.2.3 The Owner shall furnish surveys describing physical characteristics, legal limitations and utility locations for the site of the Project, and a legal description of the site. The Contractor shall be entitled to rely on the accuracy of information furnished by the Owner but shall exercise proper precautions relating to the safe performance of the Work.

§ 2.2.4 The Owner shall furnish information or services required of the Owner by the Contract Documents with reasonable promptness. The Owner shall also furnish any other information or services under the Owner's control and relevant to the Contractor's performance of the Work with reasonable promptness after receiving the Contractor's written request for such information or services.

§ 2.2.5 Unless otherwise provided in the Contract Documents, the Owner shall furnish to the Contractor one copy of the Contract Documents for purposes of making reproductions pursuant to Section 1.5.2.

§ 2.3 OWNER'S RIGHT TO STOP THE WORK

If the Contractor fails to correct Work that is not in accordance with the requirements of the Contract Documents as required by Section 12.2 or repeatedly fails to carry out Work in accordance with the Contract Documents, the Owner may issue a written order to the Contractor to stop the Work, or any portion thereof, until the cause for such order has been eliminated; however, the right of the Owner to stop the Work shall not give rise to a duty on the part of the Owner to exercise this right for the benefit of the Contractor or any other person or entity, except to the extent required by Section 6.1.3.

§ 2.4 OWNER'S RIGHT TO CARRY OUT THE WORK

If the Contractor defaults or neglects to carry out the Work in accordance with the Contract Documents and fails within a ten-day period after receipt of written notice from the Owner to commence and continue correction of such default or neglect with diligence and promptness, the Owner may, without prejudice to other remedies the Owner may have, correct such deficiencies. In such case an appropriate Change Order shall be issued deducting from payments then or thereafter due the Contractor the reasonable cost of correcting such deficiencies, including Owner's expenses and compensation for the Architect's additional services made necessary by such default, neglect or failure. Such action by the Owner and amounts charged to the Contractor are both subject to prior approval of the Architect. If payments then or thereafter due the Contractor are not sufficient to cover such amounts, the Contractor shall pay the difference to the Owner.

ARTICLE 3 CONTRACTOR

§ 3.1 GENERAL

§ 3.1.1 The Contractor is the person or entity identified as such in the Agreement and is referred to throughout the Contract Documents as if singular in number. The Contractor shall be lawfully licensed, if required in the jurisdiction where the Project is located. The Contractor shall designate in writing a representative who shall have express authority to bind the Contractor with respect to all matters under this Contract. The term "Contractor" means the Contractor or the Contractor's authorized representative.

§ 3.1.2 The Contractor shall perform the Work in accordance with the Contract Documents.

§ 3.1.3 The Contractor shall not be relieved of obligations to perform the Work in accordance with the Contract Documents either by activities or duties of the Architect in the Architect's administration of the Contract, or by tests, inspections or approvals required or performed by persons or entities other than the Contractor.

§ 3.2 REVIEW OF CONTRACT DOCUMENTS AND FIELD CONDITIONS BY CONTRACTOR

§ 3.2.1 Execution of the Contract by the Contractor is a representation that the Contractor has visited the site, become generally familiar with local conditions under which the Work is to be performed and correlated personal observations with requirements of the Contract Documents.

§ 3.2.2 Because the Contract Documents are complementary, the Contractor shall, before starting each portion of the Work, carefully study and compare the various Contract Documents relative to that portion of the Work, as well as the information furnished by the Owner pursuant to Section 2.2.3, shall take field measurements of any existing conditions related to that portion of the Work, and shall observe any conditions at the site affecting it. These obligations are for the purpose of facilitating coordination and construction by the Contractor and are not for the purpose of discovering errors, omissions, or inconsistencies in the Contract Documents; however, the Contractor shall promptly report to the Architect any errors, inconsistencies or omissions discovered by or made known to the Contractor as a request for information in such form as the Architect may require. It is recognized that the Contractor's review is made in the Contractor's capacity as a contractor and not as a licensed design professional, unless otherwise specifically provided in the Contract Documents.

§ 3.2.3 The Contractor is not required to ascertain that the Contract Documents are in accordance with applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of public authorities, but the Contractor shall promptly report to the Architect any nonconformity discovered by or made known to the Contractor as a request for information in such form as the Architect may require.

§ 3.2.4 If the Contractor believes that additional cost or time is involved because of clarifications or instructions the Architect issues in response to the Contractor's notices or requests for information pursuant to Sections 3.2.2 or 3.2.3, the Contractor shall make Claims as provided in Article 15. If the Contractor fails to perform the obligations of Sections 3.2.2 or 3.2.3, the Contractor shall pay such costs and damages to the Owner as would have been avoided if the Contractor had performed such obligations. If the Contractor performs those obligations, the Contractor shall not be liable to the Owner or Architect for damages resulting from errors, inconsistencies or omissions in the Contract Documents, for differences between field measurements or conditions and the Contract Documents, or for nonconformities of the Contract Documents to applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities.

§ 3.3 SUPERVISION AND CONSTRUCTION PROCEDURES

§ 3.3.1 The Contractor shall supervise and direct the Work, using the Contractor's best skill and attention. The Contractor shall be solely responsible for, and have control over, construction means, methods, techniques, sequences and procedures and for coordinating all portions of the Work under the Contract, unless the Contract Documents give other specific instructions concerning these matters. If the Contract Documents give specific instructions concerning construction means, methods, techniques, sequences or procedures, the Contractor shall evaluate the jobsite safety thereof and, except as stated below, shall be fully and solely responsible for the jobsite safety of such means, methods, techniques, sequences or procedures. If the Contractor determines that such means, methods, techniques, sequences or procedures may not be safe, the Contractor shall give timely written notice to the Owner and Architect and shall not proceed with that portion of the Work without further written instructions from the Architect. If the Contractor is then instructed to proceed with the required means, methods, techniques, sequences or procedures without acceptance of changes proposed by the Contractor, the Owner shall be solely responsible for any loss or damage arising solely from those Owner-required means, methods, techniques, sequences or procedures.

§ 3.3.2 The Contractor shall be responsible to the Owner for acts and omissions of the Contractor's employees, Subcontractors and their agents and employees, and other persons or entities performing portions of the Work for, or on behalf of, the Contractor or any of its Subcontractors.

§ 3.3.3 The Contractor shall be responsible for inspection of portions of Work already performed to determine that such portions are in proper condition to receive subsequent Work.

§ 3.4 LABOR AND MATERIALS

§ 3.4.1 Unless otherwise provided in the Contract Documents, the Contractor shall provide and pay for labor, materials, equipment, tools, construction equipment and machinery, water, heat, utilities, transportation, and other facilities and services necessary for proper execution and completion of the Work, whether temporary or permanent and whether or not incorporated or to be incorporated in the Work.

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§ 3.4.2 Except in the case of minor changes in the Work authorized by the Architect in accordance with Sections 3.12.8 or 7.4, the Contractor may make substitutions only with the consent of the Owner, after evaluation by the Architect and in accordance with a Change Order or Construction Change Directive.

§ 3.4.3 The Contractor shall enforce strict discipline and good order among the Contractor's employees and other persons carrying out the Work. The Contractor shall not permit employment of unfit persons or persons not properly skilled in tasks assigned to them.

§ 3.5 WARRANTY

The Contractor warrants to the Owner and Architect that materials and equipment furnished under the Contract will be of good quality and new unless the Contract Documents require or permit otherwise. The Contractor further warrants that the Work will conform to the requirements of the Contract Documents and will be free from defects, except for those inherent in the quality of the Work the Contract Documents require or permit. Work, materials, or equipment not conforming to these requirements may be considered defective. The Contractor's warranty excludes remedy for damage or defect caused by abuse, alterations to the Work not executed by the Contractor, improper or insufficient maintenance, improper operation, or normal wear and tear and normal usage. If required by the Architect, the Contractor shall furnish satisfactory evidence as to the kind and quality of materials and equipment.

§ 3.6 TAXES

The Contractor shall pay sales, consumer, use and similar taxes for the Work provided by the Contractor that are legally enacted when bids are received or negotiations concluded, whether or not yet effective or merely scheduled to go into effect.

§ 3.7 PERMITS, FEES, NOTICES AND COMPLIANCE WITH LAWS

§ 3.7.1 Unless otherwise provided in the Contract Documents, the Contractor shall secure and pay for the building permit as well as for other permits, fees, licenses, and inspections by government agencies necessary for proper execution and completion of the Work that are customarily secured after execution of the Contract and legally required at the time bids are received or negotiations concluded.

§ 3.7.2 The Contractor shall comply with and give notices required by applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities applicable to performance of the Work.

§ 3.7.3 If the Contractor performs Work knowing it to be contrary to applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of public authorities, the Contractor shall assume appropriate responsibility for such Work and shall bear the costs attributable to correction.

§ 3.7.4 Concealed or Unknown Conditions. If the Contractor encounters conditions at the site that are (1) subsurface or otherwise concealed physical conditions that differ materially from those indicated in the Contract Documents or (2) unknown physical conditions of an unusual nature, that differ materially from those ordinarily found to exist and generally recognized as inherent in construction activities of the character provided for in the Contract Documents, the Contractor shall promptly provide notice to the Owner and the Architect before conditions are disturbed and in no event later than 21 days after first observance of the conditions. The Architect will promptly investigate such conditions and, if the Architect determines that they differ materially and cause an increase or decrease in the Contractor's cost of, or time required for, performance of any part of the Work, will recommend an equitable adjustment in the Contract Sum or Contract Time, or both. If the Architect determines that the conditions at the site are not materially different from those indicated in the Contract Documents and that no change in the terms of the Contract is justified, the Architect shall promptly notify the Owner and Contractor in writing, stating the reasons. If either party disputes the Architect's determination or recommendation, that party may proceed as provided in Article 15.

§ 3.7.5 If, in the course of the Work, the Contractor encounters human remains or recognizes the existence of burial markers, archaeological sites or wetlands not indicated in the Contract Documents, the Contractor shall immediately suspend any operations that would affect them and shall notify the Owner and Architect. Upon receipt of such notice, the Owner shall promptly take any action necessary to obtain governmental authorization required to resume the operations. The Contractor shall continue to suspend such operations until otherwise instructed by the Owner but shall

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continue with all other operations that do not affect those remains or features. Requests for adjustments in the Contract Sum and Contract Time arising from the existence of such remains or features may be made as provided in Article 15.

§ 3.8 ALLOWANCES

§ 3.8.1 The Contractor shall include in the Contract Sum all allowances stated in the Contract Documents. Items covered by allowances shall be supplied for such amounts and by such persons or entities as the Owner may direct, but the Contractor shall not be required to employ persons or entities to whom the Contractor has reasonable objection.

§ 3.8.2 Unless otherwise provided in the Contract Documents,

- .1 Allowances shall cover the cost to the Contractor of materials and equipment delivered at the site and all required taxes, less applicable trade discounts;
- .2 Contractor's costs for unloading and handling at the site, labor, installation costs, overhead, profit and other expenses contemplated for stated allowance amounts shall be included in the Contract Sum but not in the allowances; and
- .3 Whenever costs are more than or less than allowances, the Contract Sum shall be adjusted accordingly by Change Order. The amount of the Change Order shall reflect (1) the difference between actual costs and the allowances under Section 3.8.2.1 and (2) changes in Contractor's costs under Section 3.8.2.2.

§ 3.8.3 Materials and equipment under an allowance shall be selected by the Owner with reasonable promptness.

§ 3.9 SUPERINTENDENT

§ 3.9.1 The Contractor shall employ a competent superintendent and necessary assistants who shall be in attendance at the Project site during performance of the Work. The superintendent shall represent the Contractor, and communications given to the superintendent shall be as binding as if given to the Contractor.

§ 3.9.2 The Contractor, as soon as practicable after award of the Contract, shall furnish in writing to the Owner through the Architect the name and qualifications of a proposed superintendent. The Architect may reply within 14 days to the Contractor in writing stating (1) whether the Owner or the Architect has reasonable objection to the proposed superintendent or (2) that the Architect requires additional time to review. Failure of the Architect to reply within the 14 day period shall constitute notice of no reasonable objection.

§ 3.9.3 The Contractor shall not employ a proposed superintendent to whom the Owner or Architect has made reasonable and timely objection. The Contractor shall not change the superintendent without the Owner's consent, which shall not unreasonably be withheld or delayed.

§ 3.10 CONTRACTOR'S CONSTRUCTION SCHEDULES

§ 3.10.1 The Contractor, promptly after being awarded the Contract, shall prepare and submit for the Owner's and Architect's information a Contractor's construction schedule for the Work. The schedule shall not exceed time limits current under the Contract Documents, shall be revised at appropriate intervals as required by the conditions of the Work and Project, shall be related to the entire Project to the extent required by the Contract Documents, and shall provide for expeditious and practicable execution of the Work.

§ 3.10.2 The Contractor shall prepare a submittal schedule, promptly after being awarded the Contract and thereafter as necessary to maintain a current submittal schedule, and shall submit the schedule(s) for the Architect's approval. The Architect's approval shall not unreasonably be delayed or withheld. The submittal schedule shall (1) be coordinated with the Contractor's construction schedule, and (2) allow the Architect reasonable time to review submittals. If the Contractor fails to submit a submittal schedule, the Contractor shall not be entitled to any increase in Contract Sum or extension of Contract Time based on the time required for review of submittals.

§ 3.10.3 The Contractor shall perform the Work in general accordance with the most recent schedules submitted to the Owner and Architect.

§ 3.11 DOCUMENTS AND SAMPLES AT THE SITE

The Contractor shall maintain at the site for the Owner one copy of the Drawings, Specifications, Addenda, Change Orders and other Modifications, in good order and marked currently to indicate field changes and selections made during construction, and one copy of approved Shop Drawings, Product Data, Samples and similar required

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submittals. These shall be available to the Architect and shall be delivered to the Architect for submittal to the Owner upon completion of the Work as a record of the Work as constructed.

§ 3.12 SHOP DRAWINGS, PRODUCT DATA AND SAMPLES

§ 3.12.1 Shop Drawings are drawings, diagrams, schedules and other data specially prepared for the Work by the Contractor or a Subcontractor, Sub-subcontractor, manufacturer, supplier or distributor to illustrate some portion of the Work.

§ 3.12.2 Product Data are illustrations, standard schedules, performance charts, instructions, brochures, diagrams and other information furnished by the Contractor to illustrate materials or equipment for some portion of the Work.

§ 3.12.3 Samples are physical examples that illustrate materials, equipment or workmanship and establish standards by which the Work will be judged.

§ 3.12.4 Shop Drawings, Product Data, Samples and similar submittals are not Contract Documents. Their purpose is to demonstrate the way by which the Contractor proposes to conform to the information given and the design concept expressed in the Contract Documents for those portions of the Work for which the Contract Documents require submittals. Review by the Architect is subject to the limitations of Section 4.2.7. Informational submittals upon which the Architect is not expected to take responsive action may be so identified in the Contract Documents. Submittals that are not required by the Contract Documents may be returned by the Architect without action.

§ 3.12.5 The Contractor shall review for compliance with the Contract Documents, approve and submit to the Architect Shop Drawings, Product Data, Samples and similar submittals required by the Contract Documents in accordance with the submittal schedule approved by the Architect or, in the absence of an approved submittal schedule, with reasonable promptness and in such sequence as to cause no delay in the Work or in the activities of the Owner or of separate contractors.

§ 3.12.6 By submitting Shop Drawings, Product Data, Samples and similar submittals, the Contractor represents to the Owner and Architect that the Contractor has (1) reviewed and approved them, (2) determined and verified materials, field measurements and field construction criteria related thereto, or will do so and (3) checked and coordinated the information contained within such submittals with the requirements of the Work and of the Contract Documents.

§ 3.12.7 The Contractor shall perform no portion of the Work for which the Contract Documents require submittal and review of Shop Drawings, Product Data, Samples or similar submittals until the respective submittal has been approved by the Architect.

§ 3.12.8 The Work shall be in accordance with approved submittals except that the Contractor shall not be relieved of responsibility for deviations from requirements of the Contract Documents by the Architect's approval of Shop Drawings, Product Data, Samples or similar submittals unless the Contractor has specifically informed the Architect in writing of such deviation at the time of submittal and (1) the Architect has given written approval to the specific deviation as a minor change in the Work, or (2) a Change Order or Construction Change Directive has been issued authorizing the deviation. The Contractor shall not be relieved of responsibility for errors or omissions in Shop Drawings, Product Data, Samples or similar submittals by the Architect's approval thereof.

§ 3.12.9 The Contractor shall direct specific attention, in writing or on resubmitted Shop Drawings, Product Data, Samples or similar submittals, to revisions other than those requested by the Architect on previous submittals. In the absence of such written notice, the Architect's approval of a resubmission shall not apply to such revisions.

§ 3.12.10 The Contractor shall not be required to provide professional services that constitute the practice of architecture or engineering unless such services are specifically required by the Contract Documents for a portion of the Work or unless the Contractor needs to provide such services in order to carry out the Contractor's responsibilities for construction means, methods, techniques, sequences and procedures. The Contractor shall not be required to provide professional services in violation of applicable law. If professional design services or certifications by a design professional related to systems, materials or equipment are specifically required of the Contractor by the Contract Documents, the Owner and the Architect will specify all performance and design criteria that such services must satisfy. The Contractor shall cause such services or certifications to be provided by a properly licensed design professional, whose signature and seal shall appear on all drawings, calculations, specifications, certifications, Shop

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Drawings and other submittals prepared by such professional. Shop Drawings and other submittals related to the Work designed or certified by such professional, if prepared by others, shall bear such professional's written approval when submitted to the Architect. The Owner and the Architect shall be entitled to rely upon the adequacy, accuracy and completeness of the services, certifications and approvals performed or provided by such design professionals, provided the Owner and Architect have specified to the Contractor all performance and design criteria that such services must satisfy. Pursuant to this Section 3.12.10, the Architect will review, approve or take other appropriate action on submittals only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents. The Contractor shall not be responsible for the adequacy of the performance and design criteria specified in the Contract Documents.

§ 3.13 USE OF SITE

The Contractor shall confine operations at the site to areas permitted by applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities and the Contract Documents and shall not unreasonably encumber the site with materials or equipment.

§ 3.14 CUTTING AND PATCHING

§ 3.14.1 The Contractor shall be responsible for cutting, fitting or patching required to complete the Work or to make its parts fit together properly. All areas requiring cutting, fitting and patching shall be restored to the condition existing prior to the cutting, fitting and patching, unless otherwise required by the Contract Documents.

§ 3.14.2 The Contractor shall not damage or endanger a portion of the Work or fully or partially completed construction of the Owner or separate contractors by cutting, patching or otherwise altering such construction, or by excavation. The Contractor shall not cut or otherwise alter such construction by the Owner or a separate contractor except with written consent of the Owner and of such separate contractor; such consent shall not be unreasonably withheld. The Contractor shall not unreasonably withhold from the Owner or a separate contractor the Contractor's consent to cutting or otherwise altering the Work.

§ 3.15 CLEANING UP

§ 3.15.1 The Contractor shall keep the premises and surrounding area free from accumulation of waste materials or rubbish caused by operations under the Contract. At completion of the Work, the Contractor shall remove waste materials, rubbish, the Contractor's tools, construction equipment, machinery and surplus materials from and about the Project.

§ 3.15.2 If the Contractor fails to clean up as provided in the Contract Documents, the Owner may do so and Owner shall be entitled to reimbursement from the Contractor.

§ 3.16 ACCESS TO WORK

The Contractor shall provide the Owner and Architect access to the Work in preparation and progress wherever located.

§ 3.17 ROYALTIES, PATENTS AND COPYRIGHTS

The Contractor shall pay all royalties and license fees. The Contractor shall defend suits or claims for infringement of copyrights and patent rights and shall hold the Owner and Architect harmless from loss on account thereof, but shall not be responsible for such defense or loss when a particular design, process or product of a particular manufacturer or manufacturers is required by the Contract Documents, or where the copyright violations are contained in Drawings, Specifications or other documents prepared by the Owner or Architect. However, if the Contractor has reason to believe that the required design, process or product is an infringement of a copyright or a patent, the Contractor shall be responsible for such loss unless such information is promptly furnished to the Architect.

§ 3.18 INDEMNIFICATION

§ 3.18.1 To the fullest extent permitted by law the Contractor shall indemnify and hold harmless the Owner, Architect, Architect's consultants, and agents and employees of any of them from and against claims, damages, losses and expenses, including but not limited to attorneys' fees, arising out of or resulting from performance of the Work, provided that such claim, damage, loss or expense is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than the Work itself), but only to the extent caused by the negligent acts or omissions of the Contractor, a Subcontractor, anyone directly or indirectly employed by them or anyone for whose acts they may be liable, regardless of whether or not such claim, damage, loss or expense is caused in part by a

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party indemnified hereunder. Such obligation shall not be construed to negate, abridge, or reduce other rights or obligations of indemnity that would otherwise exist as to a party or person described in this Section 3.18.

§ 3.18.2 In claims against any person or entity indemnified under this Section 3.18 by an employee of the Contractor, a Subcontractor, anyone directly or indirectly employed by them or anyone for whose acts they may be liable, the indemnification obligation under Section 3.18.1 shall not be limited by a limitation on amount or type of damages, compensation or benefits payable by or for the Contractor or a Subcontractor under workers' compensation acts, disability benefit acts or other employee benefit acts.

ARTICLE 4 ARCHITECT

§ 4.1 GENERAL

§ 4.1.1 The Owner shall retain an architect lawfully licensed to practice architecture or an entity lawfully practicing architecture in the jurisdiction where the Project is located. That person or entity is identified as the Architect in the Agreement and is referred to throughout the Contract Documents as if singular in number.

§ 4.1.2 Duties, responsibilities and limitations of authority of the Architect as set forth in the Contract Documents shall not be restricted, modified or extended without written consent of the Owner, Contractor and Architect. Consent shall not be unreasonably withheld.

§ 4.1.3 If the employment of the Architect is terminated, the Owner shall employ a successor architect as to whom the Contractor has no reasonable objection and whose status under the Contract Documents shall be that of the Architect.

§ 4.2 ADMINISTRATION OF THE CONTRACT

§ 4.2.1 The Architect will provide administration of the Contract as described in the Contract Documents and will be an Owner's representative during construction until the date the Architect issues the final Certificate for Payment. The Architect will have authority to act on behalf of the Owner only to the extent provided in the Contract Documents.

§ 4.2.2 The Architect will visit the site at intervals appropriate to the stage of construction, or as otherwise agreed with the Owner, to become generally familiar with the progress and quality of the portion of the Work completed, and to determine in general if the Work observed is being performed in a manner indicating that the Work, when fully completed, will be in accordance with the Contract Documents. However, the Architect will not be required to make exhaustive or continuous on-site inspections to check the quality or quantity of the Work. The Architect will not have control over, charge of, or responsibility for, the construction means, methods, techniques, sequences or procedures, or for the safety precautions and programs in connection with the Work, since these are solely the Contractor's rights and responsibilities under the Contract Documents, except as provided in Section 3.3.1.

§ 4.2.3 On the basis of the site visits, the Architect will keep the Owner reasonably informed about the progress and quality of the portion of the Work completed, and report to the Owner (1) known deviations from the Contract Documents and from the most recent construction schedule submitted by the Contractor, and (2) defects and deficiencies observed in the Work. The Architect will not be responsible for the Contractor's failure to perform the Work in accordance with the requirements of the Contract Documents. The Architect will not have control over or charge of and will not be responsible for acts or omissions of the Contractor, Subcontractors, or their agents or employees, or any other persons or entities performing portions of the Work.

§ 4.2.4 COMMUNICATIONS FACILITATING CONTRACT ADMINISTRATION

Except as otherwise provided in the Contract Documents or when direct communications have been specially authorized, the Owner and Contractor shall endeavor to communicate with each other through the Architect about matters arising out of or relating to the Contract. Communications by and with the Architect's consultants shall be through the Architect. Communications by and with Subcontractors and material suppliers shall be through the Contractor. Communications by and with separate contractors shall be through the Owner.

§ 4.2.5 Based on the Architect's evaluations of the Contractor's Applications for Payment, the Architect will review and certify the amounts due the Contractor and will issue Certificates for Payment in such amounts.

§ 4.2.6 The Architect has authority to reject Work that does not conform to the Contract Documents. Whenever the Architect considers it necessary or advisable, the Architect will have authority to require inspection or testing of the Work in accordance with Sections 13.5.2 and 13.5.3, whether or not such Work is fabricated, installed or completed.

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However, neither this authority of the Architect nor a decision made in good faith either to exercise or not to exercise such authority shall give rise to a duty or responsibility of the Architect to the Contractor, Subcontractors, material and equipment suppliers, their agents or employees, or other persons or entities performing portions of the Work.

§ 4.2.7 The Architect will review and approve, or take other appropriate action upon, the Contractor's submittals such as Shop Drawings, Product Data and Samples, but only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents. The Architect's action will be taken in accordance with the submittal schedule approved by the Architect or, in the absence of an approved submittal schedule, with reasonable promptness while allowing sufficient time in the Architect's professional judgment to permit adequate review. Review of such submittals is not conducted for the purpose of determining the accuracy and completeness of other details such as dimensions and quantities, or for substantiating instructions for installation or performance of equipment or systems, all of which remain the responsibility of the Contractor as required by the Contract Documents. The Architect's review of the Contractor's submittals shall not relieve the Contractor of the obligations under Sections 3.3, 3.5 and 3.12. The Architect's review shall not constitute approval of safety precautions or, unless otherwise specifically stated by the Architect, of any construction means, methods, techniques, sequences or procedures. The Architect's approval of a specific item shall not indicate approval of an assembly of which the item is a component.

§ 4.2.8 The Architect will prepare Change Orders and Construction Change Directives, and may authorize minor changes in the Work as provided in Section 7.4. The Architect will investigate and make determinations and recommendations regarding concealed and unknown conditions as provided in Section 3.7.4.

§ 4.2.9 The Architect will conduct inspections to determine the date or dates of Substantial Completion and the date of final completion; issue Certificates of Substantial Completion pursuant to Section 9.8; receive and forward to the Owner, for the Owner's review and records, written warranties and related documents required by the Contract and assembled by the Contractor pursuant to Section 9.10; and issue a final Certificate for Payment pursuant to Section 9.10.

§ 4.2.10 If the Owner and Architect agree, the Architect will provide one or more project representatives to assist in carrying out the Architect's responsibilities at the site. The duties, responsibilities and limitations of authority of such project representatives shall be as set forth in an exhibit to be incorporated in the Contract Documents.

§ 4.2.11 The Architect will interpret and decide matters concerning performance under, and requirements of, the Contract Documents on written request of either the Owner or Contractor. The Architect's response to such requests will be made in writing within any time limits agreed upon or otherwise with reasonable promptness.

§ 4.2.12 Interpretations and decisions of the Architect will be consistent with the intent of, and reasonably inferable from, the Contract Documents and will be in writing or in the form of drawings. When making such interpretations and decisions, the Architect will endeavor to secure faithful performance by both Owner and Contractor, will not show partiality to either and will not be liable for results of interpretations or decisions rendered in good faith.

§ 4.2.13 The Architect's decisions on matters relating to aesthetic effect will be final if consistent with the intent expressed in the Contract Documents.

§ 4.2.14 The Architect will review and respond to requests for information about the Contract Documents. The Architect's response to such requests will be made in writing within any time limits agreed upon or otherwise with reasonable promptness. If appropriate, the Architect will prepare and issue supplemental Drawings and Specifications in response to the requests for information.

ARTICLE 5 SUBCONTRACTORS

§ 5.1 DEFINITIONS

§ 5.1.1 A Subcontractor is a person or entity who has a direct contract with the Contractor to perform a portion of the Work at the site. The term "Subcontractor" is referred to throughout the Contract Documents as if singular in number and means a Subcontractor or an authorized representative of the Subcontractor. The term "Subcontractor" does not include a separate contractor or subcontractors of a separate contractor.

§ 5.1.2 A Sub-subcontractor is a person or entity who has a direct or indirect contract with a Subcontractor to perform a portion of the Work at the site. The term "Sub-subcontractor" is referred to throughout the Contract Documents as if singular in number and means a Sub-subcontractor or an authorized representative of the Sub-subcontractor.

§ 5.2 AWARD OF SUBCONTRACTS AND OTHER CONTRACTS FOR PORTIONS OF THE WORK

§ 5.2.1 Unless otherwise stated in the Contract Documents or the bidding requirements, the Contractor, as soon as practicable after award of the Contract, shall furnish in writing to the Owner through the Architect the names of persons or entities (including those who are to furnish materials or equipment fabricated to a special design) proposed for each principal portion of the Work. The Architect may reply within 14 days to the Contractor in writing stating (1) whether the Owner or the Architect has reasonable objection to any such proposed person or entity or (2) that the Architect requires additional time for review. Failure of the Owner or Architect to reply within the 14-day period shall constitute notice of no reasonable objection.

§ 5.2.2 The Contractor shall not contract with a proposed person or entity to whom the Owner or Architect has made reasonable and timely objection. The Contractor shall not be required to contract with anyone to whom the Contractor has made reasonable objection.

§ 5.2.3 If the Owner or Architect has reasonable objection to a person or entity proposed by the Contractor, the Contractor shall propose another to whom the Owner or Architect has no reasonable objection. If the proposed but rejected Subcontractor was reasonably capable of performing the Work, the Contract Sum and Contract Time shall be increased or decreased by the difference, if any, occasioned by such change, and an appropriate Change Order shall be issued before commencement of the substitute Subcontractor's Work. However, no increase in the Contract Sum or Contract Time shall be allowed for such change unless the Contractor has acted promptly and responsively in submitting names as required.

§ 5.2.4 The Contractor shall not substitute a Subcontractor, person or entity previously selected if the Owner or Architect makes reasonable objection to such substitution.

§ 5.3 SUBCONTRACTUAL RELATIONS

By appropriate agreement, written where legally required for validity, the Contractor shall require each Subcontractor, to the extent of the Work to be performed by the Subcontractor, to be bound to the Contractor by terms of the Contract Documents, and to assume toward the Contractor all the obligations and responsibilities, including the responsibility for safety of the Subcontractor's Work, which the Contractor, by these Documents, assumes toward the Owner and Architect. Each subcontract agreement shall preserve and protect the rights of the Owner and Architect under the Contract Documents with respect to the Work to be performed by the Subcontractor so that subcontracting thereof will not prejudice such rights, and shall allow to the Subcontractor, unless specifically provided otherwise in the subcontract agreement, the benefit of all rights, remedies and redress against the Contractor that the Contractor, by the Contract Documents, has against the Owner. Where appropriate, the Contractor shall require each Subcontractor to enter into similar agreements with Sub-subcontractors. The Contractor shall make available to each proposed Subcontractor, prior to the execution of the subcontract agreement, copies of the Contract Documents to which the Subcontractor will be bound, and, upon written request of the Subcontractor, identify to the Subcontractor terms and conditions of the proposed subcontract agreement that may be at variance with the Contract Documents. Subcontractors will similarly make copies of applicable portions of such documents available to their respective proposed Sub-subcontractors.

§ 5.4 CONTINGENT ASSIGNMENT OF SUBCONTRACTS

§ 5.4.1 Each subcontract agreement for a portion of the Work is assigned by the Contractor to the Owner, provided that

- .1 assignment is effective only after termination of the Contract by the Owner for cause pursuant to Section 14.2 and only for those subcontract agreements that the Owner accepts by notifying the Subcontractor and Contractor in writing; and
- .2 assignment is subject to the prior rights of the surety, if any, obligated under bond relating to the Contract.

When the Owner accepts the assignment of a subcontract agreement, the Owner assumes the Contractor's rights and obligations under the subcontract.

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§ 5.4.2 Upon such assignment, if the Work has been suspended for more than 30 days, the Subcontractor's compensation shall be equitably adjusted for increases in cost resulting from the suspension.

§ 5.4.3 Upon such assignment to the Owner under this Section 5.4, the Owner may further assign the subcontract to a successor contractor or other entity. If the Owner assigns the subcontract to a successor contractor or other entity, the Owner shall nevertheless remain legally responsible for all of the successor contractor's obligations under the subcontract.

ARTICLE 6 CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS

§ 6.1 OWNER'S RIGHT TO PERFORM CONSTRUCTION AND TO AWARD SEPARATE CONTRACTS

§ 6.1.1 The Owner reserves the right to perform construction or operations related to the Project with the Owner's own forces, and to award separate contracts in connection with other portions of the Project or other construction or operations on the site under Conditions of the Contract identical or substantially similar to these including those portions related to insurance and waiver of subrogation. If the Contractor claims that delay or additional cost is involved because of such action by the Owner, the Contractor shall make such Claim as provided in Article 15.

§ 6.1.2 When separate contracts are awarded for different portions of the Project or other construction or operations on the site, the term "Contractor" in the Contract Documents in each case shall mean the Contractor who executes each separate Owner-Contractor Agreement.

§ 6.1.3 The Owner shall provide for coordination of the activities of the Owner's own forces and of each separate contractor with the Work of the Contractor, who shall cooperate with them. The Contractor shall participate with other separate contractors and the Owner in reviewing their construction schedules. The Contractor shall make any revisions to the construction schedule deemed necessary after a joint review and mutual agreement. The construction schedules shall then constitute the schedules to be used by the Contractor, separate contractors and the Owner until subsequently revised.

§ 6.1.4 Unless otherwise provided in the Contract Documents, when the Owner performs construction or operations related to the Project with the Owner's own forces, the Owner shall be deemed to be subject to the same obligations and to have the same rights that apply to the Contractor under the Conditions of the Contract, including, without excluding others, those stated in Article 3, this Article 6 and Articles 10, 11 and 12.

§ 6.2 MUTUAL RESPONSIBILITY

§ 6.2.1 The Contractor shall afford the Owner and separate contractors reasonable opportunity for introduction and storage of their materials and equipment and performance of their activities, and shall connect and coordinate the Contractor's construction and operations with theirs as required by the Contract Documents.

§ 6.2.2 If part of the Contractor's Work depends for proper execution or results upon construction or operations by the Owner or a separate contractor, the Contractor shall, prior to proceeding with that portion of the Work, promptly report to the Architect apparent discrepancies or defects in such other construction that would render it unsuitable for such proper execution and results. Failure of the Contractor so to report shall constitute an acknowledgment that the Owner's or separate contractor's completed or partially completed construction is fit and proper to receive the Contractor's Work, except as to defects not then reasonably discoverable.

§ 6.2.3 The Contractor shall reimburse the Owner for costs the Owner incurs that are payable to a separate contractor because of the Contractor's delays, improperly timed activities or defective construction. The Owner shall be responsible to the Contractor for costs the Contractor incurs because of a separate contractor's delays, improperly timed activities, damage to the Work or defective construction.

§ 6.2.4 The Contractor shall promptly remedy damage the Contractor wrongfully causes to completed or partially completed construction or to property of the Owner or separate contractors as provided in Section 10.2.5.

§ 6.2.5 The Owner and each separate contractor shall have the same responsibilities for cutting and patching as are described for the Contractor in Section 3.14.

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§ 6.3 OWNER'S RIGHT TO CLEAN UP

If a dispute arises among the Contractor, separate contractors and the Owner as to the responsibility under their respective contracts for maintaining the premises and surrounding area free from waste materials and rubbish, the Owner may clean up and the Architect will allocate the cost among those responsible.

ARTICLE 7 CHANGES IN THE WORK

§ 7.1 GENERAL

§ 7.1.1 Changes in the Work may be accomplished after execution of the Contract, and without invalidating the Contract, by Change Order, Construction Change Directive or order for a minor change in the Work, subject to the limitations stated in this Article 7 and elsewhere in the Contract Documents.

§ 7.1.2 A Change Order shall be based upon agreement among the Owner, Contractor and Architect; a Construction Change Directive requires agreement by the Owner and Architect and may or may not be agreed to by the Contractor; an order for a minor change in the Work may be issued by the Architect alone.

§ 7.1.3 Changes in the Work shall be performed under applicable provisions of the Contract Documents, and the Contractor shall proceed promptly, unless otherwise provided in the Change Order, Construction Change Directive or order for a minor change in the Work.

§ 7.2 CHANGE ORDERS

§ 7.2.1 A Change Order is a written instrument prepared by the Architect and signed by the Owner, Contractor and Architect stating their agreement upon all of the following:

- .1 The change in the Work;
- .2 The amount of the adjustment, if any, in the Contract Sum; and
- .3 The extent of the adjustment, if any, in the Contract Time.

§ 7.3 CONSTRUCTION CHANGE DIRECTIVES

§ 7.3.1 A Construction Change Directive is a written order prepared by the Architect and signed by the Owner and Architect, directing a change in the Work prior to agreement on adjustment, if any, in the Contract Sum or Contract Time, or both. The Owner may by Construction Change Directive, without invalidating the Contract, order changes in the Work within the general scope of the Contract consisting of additions, deletions or other revisions, the Contract Sum and Contract Time being adjusted accordingly.

§ 7.3.2 A Construction Change Directive shall be used in the absence of total agreement on the terms of a Change Order.

§ 7.3.3 If the Construction Change Directive provides for an adjustment to the Contract Sum, the adjustment shall be based on one of the following methods:

- .1 Mutual acceptance of a lump sum properly itemized and supported by sufficient substantiating data to permit evaluation;
- .2 Unit prices stated in the Contract Documents or subsequently agreed upon;
- .3 Cost to be determined in a manner agreed upon by the parties and a mutually acceptable fixed or percentage fee; or
- .4 As provided in Section 7.3.7.

§ 7.3.4 If unit prices are stated in the Contract Documents or subsequently agreed upon, and if quantities originally contemplated are materially changed in a proposed Change Order or Construction Change Directive so that application of such unit prices to quantities of Work proposed will cause substantial inequity to the Owner or Contractor, the applicable unit prices shall be equitably adjusted.

§ 7.3.5 Upon receipt of a Construction Change Directive, the Contractor shall promptly proceed with the change in the Work involved and advise the Architect of the Contractor's agreement or disagreement with the method, if any, provided in the Construction Change Directive for determining the proposed adjustment in the Contract Sum or Contract Time.

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§ 7.3.6 A Construction Change Directive signed by the Contractor indicates the Contractor's agreement therewith, including adjustment in Contract Sum and Contract Time or the method for determining them. Such agreement shall be effective immediately and shall be recorded as a Change Order.

§ 7.3.7 If the Contractor does not respond promptly or disagrees with the method for adjustment in the Contract Sum, the Architect shall determine the method and the adjustment on the basis of reasonable expenditures and savings of those performing the Work attributable to the change, including, in case of an increase in the Contract Sum, an amount for overhead and profit as set forth in the Agreement, or if no such amount is set forth in the Agreement, a reasonable amount. In such case, and also under Section 7.3.3.3, the Contractor shall keep and present, in such form as the Architect may prescribe, an itemized accounting together with appropriate supporting data. Unless otherwise provided in the Contract Documents, costs for the purposes of this Section 7.3.7 shall be limited to the following:

- .1 Costs of labor, including social security, old age and unemployment insurance, fringe benefits required by agreement or custom, and workers' compensation insurance;
- .2 Costs of materials, supplies and equipment, including cost of transportation, whether incorporated or consumed;
- .3 Rental costs of machinery and equipment, exclusive of hand tools, whether rented from the Contractor or others;
- .4 Costs of premiums for all bonds and insurance, permit fees, and sales, use or similar taxes related to the Work; and
- .5 Additional costs of supervision and field office personnel directly attributable to the change.

§ 7.3.8 The amount of credit to be allowed by the Contractor to the Owner for a deletion or change that results in a net decrease in the Contract Sum shall be actual net cost as confirmed by the Architect. When both additions and credits covering related Work or substitutions are involved in a change, the allowance for overhead and profit shall be figured on the basis of net increase, if any, with respect to that change.

§ 7.3.9 Pending final determination of the total cost of a Construction Change Directive to the Owner, the Contractor may request payment for Work completed under the Construction Change Directive in Applications for Payment. The Architect will make an interim determination for purposes of monthly certification for payment for those costs and certify for payment the amount that the Architect determines, in the Architect's professional judgment, to be reasonably justified. The Architect's interim determination of cost shall adjust the Contract Sum on the same basis as a Change Order, subject to the right of either party to disagree and assert a Claim in accordance with Article 15.

§ 7.3.10 When the Owner and Contractor agree with a determination made by the Architect concerning the adjustments in the Contract Sum and Contract Time, or otherwise reach agreement upon the adjustments, such agreement shall be effective immediately and the Architect will prepare a Change Order. Change Orders may be issued for all or any part of a Construction Change Directive.

§ 7.4 MINOR CHANGES IN THE WORK

The Architect has authority to order minor changes in the Work not involving adjustment in the Contract Sum or extension of the Contract Time and not inconsistent with the intent of the Contract Documents. Such changes will be effected by written order signed by the Architect and shall be binding on the Owner and Contractor.

ARTICLE 8 TIME

§ 8.1 DEFINITIONS

§ 8.1.1 Unless otherwise provided, Contract Time is the period of time, including authorized adjustments, allotted in the Contract Documents for Substantial Completion of the Work.

§ 8.1.2 The date of commencement of the Work is the date established in the Agreement.

§ 8.1.3 The date of Substantial Completion is the date certified by the Architect in accordance with Section 9.8.

§ 8.1.4 The term "day" as used in the Contract Documents shall mean calendar day unless otherwise specifically defined.

§ 8.2 PROGRESS AND COMPLETION

§ 8.2.1 Time limits stated in the Contract Documents are of the essence of the Contract. By executing the Agreement the Contractor confirms that the Contract Time is a reasonable period for performing the Work.

§ 8.2.2 The Contractor shall not knowingly, except by agreement or instruction of the Owner in writing, prematurely commence operations on the site or elsewhere prior to the effective date of insurance required by Article 11 to be furnished by the Contractor and Owner. The date of commencement of the Work shall not be changed by the effective date of such insurance.

§ 8.2.3 The Contractor shall proceed expeditiously with adequate forces and shall achieve Substantial Completion within the Contract Time.

§ 8.3 DELAYS AND EXTENSIONS OF TIME

§ 8.3.1 If the Contractor is delayed at any time in the commencement or progress of the Work by an act or neglect of the Owner or Architect, or of an employee of either, or of a separate contractor employed by the Owner; or by changes ordered in the Work; or by labor disputes, fire, unusual delay in deliveries, unavoidable casualties or other causes beyond the Contractor's control; or by delay authorized by the Owner pending mediation and arbitration; or by other causes that the Architect determines may justify delay, then the Contract Time shall be extended by Change Order for such reasonable time as the Architect may determine.

§ 8.3.2 Claims relating to time shall be made in accordance with applicable provisions of Article 15.

§ 8.3.3 This Section 8.3 does not preclude recovery of damages for delay by either party under other provisions of the Contract Documents.

ARTICLE 9 PAYMENTS AND COMPLETION

§ 9.1 CONTRACT SUM

The Contract Sum is stated in the Agreement and, including authorized adjustments, is the total amount payable by the Owner to the Contractor for performance of the Work under the Contract Documents.

§ 9.2 SCHEDULE OF VALUES

Where the Contract is based on a stipulated sum or Guaranteed Maximum Price, the Contractor shall submit to the Architect, before the first Application for Payment, a schedule of values allocating the entire Contract Sum to the various portions of the Work and prepared in such form and supported by such data to substantiate its accuracy as the Architect may require. This schedule, unless objected to by the Architect, shall be used as a basis for reviewing the Contractor's Applications for Payment.

§ 9.3 APPLICATIONS FOR PAYMENT

§ 9.3.1 At least ten days before the date established for each progress payment, the Contractor shall submit to the Architect an itemized Application for Payment prepared in accordance with the schedule of values, if required under Section 9.2, for completed portions of the Work. Such application shall be notarized, if required, and supported by such data substantiating the Contractor's right to payment as the Owner or Architect may require, such as copies of requisitions from Subcontractors and material suppliers, and shall reflect retainage if provided for in the Contract Documents.

§ 9.3.1.1 As provided in Section 7.3.9, such applications may include requests for payment on account of changes in the Work that have been properly authorized by Construction Change Directives, or by interim determinations of the Architect, but not yet included in Change Orders.

§ 9.3.1.2 Applications for Payment shall not include requests for payment for portions of the Work for which the Contractor does not intend to pay a Subcontractor or material supplier, unless such Work has been performed by others whom the Contractor intends to pay.

§ 9.3.2 Unless otherwise provided in the Contract Documents, payments shall be made on account of materials and equipment delivered and suitably stored at the site for subsequent incorporation in the Work. If approved in advance by the Owner, payment may similarly be made for materials and equipment suitably stored off the site at a location agreed upon in writing. Payment for materials and equipment stored on or off the site shall be conditioned upon

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compliance by the Contractor with procedures satisfactory to the Owner to establish the Owner's title to such materials and equipment or otherwise protect the Owner's interest, and shall include the costs of applicable insurance, storage and transportation to the site for such materials and equipment stored off the site.

§ 9.3.3 The Contractor warrants that title to all Work covered by an Application for Payment will pass to the Owner no later than the time of payment. The Contractor further warrants that upon submittal of an Application for Payment all Work for which Certificates for Payment have been previously issued and payments received from the Owner shall, to the best of the Contractor's knowledge, information and belief, be free and clear of liens, claims, security interests or encumbrances in favor of the Contractor, Subcontractors, material suppliers, or other persons or entities making a claim by reason of having provided labor, materials and equipment relating to the Work.

§ 9.4 CERTIFICATES FOR PAYMENT

§ 9.4.1 The Architect will, within seven days after receipt of the Contractor's Application for Payment, either issue to the Owner a Certificate for Payment, with a copy to the Contractor, for such amount as the Architect determines is properly due, or notify the Contractor and Owner in writing of the Architect's reasons for withholding certification in whole or in part as provided in Section 9.5.1.

§ 9.4.2 The issuance of a Certificate for Payment will constitute a representation by the Architect to the Owner, based on the Architect's evaluation of the Work and the data comprising the Application for Payment, that, to the best of the Architect's knowledge, information and belief, the Work has progressed to the point indicated and that the quality of the Work is in accordance with the Contract Documents. The foregoing representations are subject to an evaluation of the Work for conformance with the Contract Documents upon Substantial Completion, to results of subsequent tests and inspections, to correction of minor deviations from the Contract Documents prior to completion and to specific qualifications expressed by the Architect. The issuance of a Certificate for Payment will further constitute a representation that the Contractor is entitled to payment in the amount certified. However, the issuance of a Certificate for Payment will not be a representation that the Architect has (1) made exhaustive or continuous on-site inspections to check the quality or quantity of the Work, (2) reviewed construction means, methods, techniques, sequences or procedures, (3) reviewed copies of requisitions received from Subcontractors and material suppliers and other data requested by the Owner to substantiate the Contractor's right to payment, or (4) made examination to ascertain how or for what purpose the Contractor has used money previously paid on account of the Contract Sum.

§ 9.5 DECISIONS TO WITHHOLD CERTIFICATION

§ 9.5.1 The Architect may withhold a Certificate for Payment in whole or in part, to the extent reasonably necessary to protect the Owner, if in the Architect's opinion the representations to the Owner required by Section 9.4.2 cannot be made. If the Architect is unable to certify payment in the amount of the Application, the Architect will notify the Contractor and Owner as provided in Section 9.4.1. If the Contractor and Architect cannot agree on a revised amount, the Architect will promptly issue a Certificate for Payment for the amount for which the Architect is able to make such representations to the Owner. The Architect may also withhold a Certificate for Payment or, because of subsequently discovered evidence, may nullify the whole or a part of a Certificate for Payment previously issued, to such extent as may be necessary in the Architect's opinion to protect the Owner from loss for which the Contractor is responsible, including loss resulting from acts and omissions described in Section 3.3.2, because of

- .1 defective Work not remedied;
- .2 third party claims filed or reasonable evidence indicating probable filing of such claims unless security acceptable to the Owner is provided by the Contractor;
- .3 failure of the Contractor to make payments properly to Subcontractors or for labor, materials or equipment;
- .4 reasonable evidence that the Work cannot be completed for the unpaid balance of the Contract Sum;
- .5 damage to the Owner or a separate contractor;
- .6 reasonable evidence that the Work will not be completed within the Contract Time, and that the unpaid balance would not be adequate to cover actual or liquidated damages for the anticipated delay; or
- .7 repeated failure to carry out the Work in accordance with the Contract Documents.

§ 9.5.2 When the above reasons for withholding certification are removed, certification will be made for amounts previously withheld.

§ 9.5.3 If the Architect withholds certification for payment under Section 9.5.1.3, the Owner may, at its sole option, issue joint checks to the Contractor and to any Subcontractor or material or equipment suppliers to whom the

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Contractor failed to make payment for Work properly performed or material or equipment suitably delivered. If the Owner makes payments by joint check, the Owner shall notify the Architect and the Architect will reflect such payment on the next Certificate for Payment.

§ 9.6 PROGRESS PAYMENTS

§ 9.6.1 After the Architect has issued a Certificate for Payment, the Owner shall make payment in the manner and within the time provided in the Contract Documents, and shall so notify the Architect.

§ 9.6.2 The Contractor shall pay each Subcontractor no later than seven days after receipt of payment from the Owner the amount to which the Subcontractor is entitled, reflecting percentages actually retained from payments to the Contractor on account of the Subcontractor's portion of the Work. The Contractor shall, by appropriate agreement with each Subcontractor, require each Subcontractor to make payments to Sub-subcontractors in a similar manner.

§ 9.6.3 The Architect will, on request, furnish to a Subcontractor, if practicable, information regarding percentages of completion or amounts applied for by the Contractor and action taken thereon by the Architect and Owner on account of portions of the Work done by such Subcontractor.

§ 9.6.4 The Owner has the right to request written evidence from the Contractor that the Contractor has properly paid Subcontractors and material and equipment suppliers amounts paid by the Owner to the Contractor for subcontracted Work. If the Contractor fails to furnish such evidence within seven days, the Owner shall have the right to contact Subcontractors to ascertain whether they have been properly paid. Neither the Owner nor Architect shall have an obligation to pay or to see to the payment of money to a Subcontractor, except as may otherwise be required by law.

§ 9.6.5 Contractor payments to material and equipment suppliers shall be treated in a manner similar to that provided in Sections 9.6.2, 9.6.3 and 9.6.4.

§ 9.6.6 A Certificate for Payment, a progress payment, or partial or entire use or occupancy of the Project by the Owner shall not constitute acceptance of Work not in accordance with the Contract Documents.

§ 9.6.7 Unless the Contractor provides the Owner with a payment bond in the full penal sum of the Contract Sum, payments received by the Contractor for Work properly performed by Subcontractors and suppliers shall be held by the Contractor for those Subcontractors or suppliers who performed Work or furnished materials, or both, under contract with the Contractor for which payment was made by the Owner. Nothing contained herein shall require money to be placed in a separate account and not commingled with money of the Contractor, shall create any fiduciary liability or tort liability on the part of the Contractor for breach of trust or shall entitle any person or entity to an award of punitive damages against the Contractor for breach of the requirements of this provision.

§ 9.7 FAILURE OF PAYMENT

If the Architect does not issue a Certificate for Payment, through no fault of the Contractor, within seven days after receipt of the Contractor's Application for Payment, or if the Owner does not pay the Contractor within seven days after the date established in the Contract Documents the amount certified by the Architect or awarded by binding dispute resolution, then the Contractor may, upon seven additional days' written notice to the Owner and Architect, stop the Work until payment of the amount owing has been received. The Contract Time shall be extended appropriately and the Contract Sum shall be increased by the amount of the Contractor's reasonable costs of shut-down, delay and start-up, plus interest as provided for in the Contract Documents.

§ 9.8 SUBSTANTIAL COMPLETION

§ 9.8.1 Substantial Completion is the stage in the progress of the Work when the Work or designated portion thereof is sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or utilize the Work for its intended use.

§ 9.8.2 When the Contractor considers that the Work, or a portion thereof which the Owner agrees to accept separately, is substantially complete, the Contractor shall prepare and submit to the Architect a comprehensive list of items to be completed or corrected prior to final payment. Failure to include an item on such list does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract Documents.

§ 9.8.3 Upon receipt of the Contractor's list, the Architect will make an inspection to determine whether the Work or designated portion thereof is substantially complete. If the Architect's inspection discloses any item, whether or not included on the Contractor's list, which is not sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or utilize the Work or designated portion thereof for its intended use, the Contractor shall, before issuance of the Certificate of Substantial Completion, complete or correct such item upon notification by the Architect. In such case, the Contractor shall then submit a request for another inspection by the Architect to determine Substantial Completion.

§ 9.8.4 When the Work or designated portion thereof is substantially complete, the Architect will prepare a Certificate of Substantial Completion that shall establish the date of Substantial Completion, shall establish responsibilities of the Owner and Contractor for security, maintenance, heat, utilities, damage to the Work and insurance, and shall fix the time within which the Contractor shall finish all items on the list accompanying the Certificate. Warranties required by the Contract Documents shall commence on the date of Substantial Completion of the Work or designated portion thereof unless otherwise provided in the Certificate of Substantial Completion.

§ 9.8.5 The Certificate of Substantial Completion shall be submitted to the Owner and Contractor for their written acceptance of responsibilities assigned to them in such Certificate. Upon such acceptance and consent of surety, if any, the Owner shall make payment of retainage applying to such Work or designated portion thereof. Such payment shall be adjusted for Work that is incomplete or not in accordance with the requirements of the Contract Documents.

§ 9.9 PARTIAL OCCUPANCY OR USE

§ 9.9.1 The Owner may occupy or use any completed or partially completed portion of the Work at any stage when such portion is designated by separate agreement with the Contractor, provided such occupancy or use is consented to by the insurer as required under Section 11.3.1.5 and authorized by public authorities having jurisdiction over the Project. Such partial occupancy or use may commence whether or not the portion is substantially complete, provided the Owner and Contractor have accepted in writing the responsibilities assigned to each of them for payments, retainage, if any, security, maintenance, heat, utilities, damage to the Work and insurance, and have agreed in writing concerning the period for correction of the Work and commencement of warranties required by the Contract Documents. When the Contractor considers a portion substantially complete, the Contractor shall prepare and submit a list to the Architect as provided under Section 9.8.2. Consent of the Contractor to partial occupancy or use shall not be unreasonably withheld. The stage of the progress of the Work shall be determined by written agreement between the Owner and Contractor or, if no agreement is reached, by decision of the Architect.

§ 9.9.2 Immediately prior to such partial occupancy or use, the Owner, Contractor and Architect shall jointly inspect the area to be occupied or portion of the Work to be used in order to determine and record the condition of the Work.

§ 9.9.3 Unless otherwise agreed upon, partial occupancy or use of a portion or portions of the Work shall not constitute acceptance of Work not complying with the requirements of the Contract Documents.

§ 9.10 FINAL COMPLETION AND FINAL PAYMENT

§ 9.10.1 Upon receipt of the Contractor's written notice that the Work is ready for final inspection and acceptance and upon receipt of a final Application for Payment, the Architect will promptly make such inspection and, when the Architect finds the Work acceptable under the Contract Documents and the Contract fully performed, the Architect will promptly issue a final Certificate for Payment stating that to the best of the Architect's knowledge, information and belief, and on the basis of the Architect's on-site visits and inspections, the Work has been completed in accordance with terms and conditions of the Contract Documents and that the entire balance found to be due the Contractor and noted in the final Certificate is due and payable. The Architect's final Certificate for Payment will constitute a further representation that conditions listed in Section 9.10.2 as precedent to the Contractor's being entitled to final payment have been fulfilled.

§ 9.10.2 Neither final payment nor any remaining retained percentage shall become due until the Contractor submits to the Architect (1) an affidavit that payrolls, bills for materials and equipment, and other indebtedness connected with the Work for which the Owner or the Owner's property might be responsible or encumbered (less amounts withheld by Owner) have been paid or otherwise satisfied, (2) a certificate evidencing that insurance required by the Contract Documents to remain in force after final payment is currently in effect and will not be canceled or allowed to expire until at least 30 days' prior written notice has been given to the Owner, (3) a written statement that the Contractor knows of no substantial reason that the insurance will not be renewable to cover the period required by the Contract

Documents, (4) consent of surety, if any, to final payment and (5), if required by the Owner, other data establishing payment or satisfaction of obligations, such as receipts, releases and waivers of liens, claims, security interests or encumbrances arising out of the Contract, to the extent and in such form as may be designated by the Owner. If a Subcontractor refuses to furnish a release or waiver required by the Owner, the Contractor may furnish a bond satisfactory to the Owner to indemnify the Owner against such lien. If such lien remains unsatisfied after payments are made, the Contractor shall refund to the Owner all money that the Owner may be compelled to pay in discharging such lien, including all costs and reasonable attorneys' fees.

§ 9.10.3 If, after Substantial Completion of the Work, final completion thereof is materially delayed through no fault of the Contractor or by issuance of Change Orders affecting final completion, and the Architect so confirms, the Owner shall, upon application by the Contractor and certification by the Architect, and without terminating the Contract, make payment of the balance due for that portion of the Work fully completed and accepted. If the remaining balance for Work not fully completed or corrected is less than retainage stipulated in the Contract Documents, and if bonds have been furnished, the written consent of surety to payment of the balance due for that portion of the Work fully completed and accepted shall be submitted by the Contractor to the Architect prior to certification of such payment. Such payment shall be made under terms and conditions governing final payment, except that it shall not constitute a waiver of claims.

§ 9.10.4 The making of final payment shall constitute a waiver of Claims by the Owner except those arising from

- .1 liens, Claims, security interests or encumbrances arising out of the Contract and unsettled;
- .2 failure of the Work to comply with the requirements of the Contract Documents; or
- .3 terms of special warranties required by the Contract Documents.

§ 9.10.5 Acceptance of final payment by the Contractor, a Subcontractor or material supplier shall constitute a waiver of claims by that payee except those previously made in writing and identified by that payee as unsettled at the time of final Application for Payment.

ARTICLE 10 PROTECTION OF PERSONS AND PROPERTY

§ 10.1 SAFETY PRECAUTIONS AND PROGRAMS

The Contractor shall be responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the performance of the Contract.

§ 10.2 SAFETY OF PERSONS AND PROPERTY

§ 10.2.1 The Contractor shall take reasonable precautions for safety of, and shall provide reasonable protection to prevent damage, injury or loss to

- .1 employees on the Work and other persons who may be affected thereby;
- .2 the Work and materials and equipment to be incorporated therein, whether in storage on or off the site, under care, custody or control of the Contractor or the Contractor's Subcontractors or Sub-subcontractors; and
- .3 other property at the site or adjacent thereto, such as trees, shrubs, lawns, walks, pavements, roadways, structures and utilities not designated for removal, relocation or replacement in the course of construction.

§ 10.2.2 The Contractor shall comply with and give notices required by applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities bearing on safety of persons or property or their protection from damage, injury or loss.

§ 10.2.3 The Contractor shall erect and maintain, as required by existing conditions and performance of the Contract, reasonable safeguards for safety and protection, including posting danger signs and other warnings against hazards, promulgating safety regulations and notifying owners and users of adjacent sites and utilities.

§ 10.2.4 When use or storage of explosives or other hazardous materials or equipment or unusual methods are necessary for execution of the Work, the Contractor shall exercise utmost care and carry on such activities under supervision of properly qualified personnel.

§ 10.2.5 The Contractor shall promptly remedy damage and loss (other than damage or loss insured under property insurance required by the Contract Documents) to property referred to in Sections 10.2.1.2 and 10.2.1.3 caused in

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whole or in part by the Contractor, a Subcontractor, a Sub-subcontractor, or anyone directly or indirectly employed by any of them, or by anyone for whose acts they may be liable and for which the Contractor is responsible under Sections 10.2.1.2 and 10.2.1.3, except damage or loss attributable to acts or omissions of the Owner or Architect or anyone directly or indirectly employed by either of them, or by anyone for whose acts either of them may be liable, and not attributable to the fault or negligence of the Contractor. The foregoing obligations of the Contractor are in addition to the Contractor's obligations under Section 3.18.

§ 10.2.6 The Contractor shall designate a responsible member of the Contractor's organization at the site whose duty shall be the prevention of accidents. This person shall be the Contractor's superintendent unless otherwise designated by the Contractor in writing to the Owner and Architect.

§ 10.2.7 The Contractor shall not permit any part of the construction or site to be loaded so as to cause damage or create an unsafe condition.

§ 10.2.8 INJURY OR DAMAGE TO PERSON OR PROPERTY

If either party suffers injury or damage to person or property because of an act or omission of the other party, or of others for whose acts such party is legally responsible, written notice of such injury or damage, whether or not insured, shall be given to the other party within a reasonable time not exceeding 21 days after discovery. The notice shall provide sufficient detail to enable the other party to investigate the matter.

§ 10.3 HAZARDOUS MATERIALS

§ 10.3.1 The Contractor is responsible for compliance with any requirements included in the Contract Documents regarding hazardous materials. If the Contractor encounters a hazardous material or substance not addressed in the Contract Documents and if reasonable precautions will be inadequate to prevent foreseeable bodily injury or death to persons resulting from a material or substance, including but not limited to asbestos or polychlorinated biphenyl (PCB), encountered on the site by the Contractor, the Contractor shall, upon recognizing the condition, immediately stop Work in the affected area and report the condition to the Owner and Architect in writing.

§ 10.3.2 Upon receipt of the Contractor's written notice, the Owner shall obtain the services of a licensed laboratory to verify the presence or absence of the material or substance reported by the Contractor and, in the event such material or substance is found to be present, to cause it to be rendered harmless. Unless otherwise required by the Contract Documents, the Owner shall furnish in writing to the Contractor and Architect the names and qualifications of persons or entities who are to perform tests verifying the presence or absence of such material or substance or who are to perform the task of removal or safe containment of such material or substance. The Contractor and the Architect will promptly reply to the Owner in writing stating whether or not either has reasonable objection to the persons or entities proposed by the Owner. If either the Contractor or Architect has an objection to a person or entity proposed by the Owner, the Owner shall propose another to whom the Contractor and the Architect have no reasonable objection. When the material or substance has been rendered harmless, Work in the affected area shall resume upon written agreement of the Owner and Contractor. By Change Order, the Contract Time shall be extended appropriately and the Contract Sum shall be increased in the amount of the Contractor's reasonable additional costs of shut-down, delay and start-up.

§ 10.3.3 To the fullest extent permitted by law, the Owner shall indemnify and hold harmless the Contractor, Subcontractors, Architect, Architect's consultants and agents and employees of any of them from and against claims, damages, losses and expenses, including but not limited to attorneys' fees, arising out of or resulting from performance of the Work in the affected area if in fact the material or substance presents the risk of bodily injury or death as described in Section 10.3.1 and has not been rendered harmless, provided that such claim, damage, loss or expense is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than the Work itself), except to the extent that such damage, loss or expense is due to the fault or negligence of the party seeking indemnity.

§ 10.3.4 The Owner shall not be responsible under this Section 10.3 for materials or substances the Contractor brings to the site unless such materials or substances are required by the Contract Documents. The Owner shall be responsible for materials or substances required by the Contract Documents, except to the extent of the Contractor's fault or negligence in the use and handling of such materials or substances.

§ 10.3.5 The Contractor shall indemnify the Owner for the cost and expense the Owner incurs (1) for remediation of a material or substance the Contractor brings to the site and negligently handles, or (2) where the Contractor fails to perform its obligations under Section 10.3.1, except to the extent that the cost and expense are due to the Owner's fault or negligence.

§ 10.3.6 If, without negligence on the part of the Contractor, the Contractor is held liable by a government agency for the cost of remediation of a hazardous material or substance solely by reason of performing Work as required by the Contract Documents, the Owner shall indemnify the Contractor for all cost and expense thereby incurred.

§ 10.4 EMERGENCIES

In an emergency affecting safety of persons or property, the Contractor shall act, at the Contractor's discretion, to prevent threatened damage, injury or loss. Additional compensation or extension of time claimed by the Contractor on account of an emergency shall be determined as provided in Article 15 and Article 7.

ARTICLE 11 INSURANCE AND BONDS

§ 11.1 CONTRACTOR'S LIABILITY INSURANCE

§ 11.1.1 The Contractor shall purchase from and maintain in a company or companies lawfully authorized to do business in the jurisdiction in which the Project is located such insurance as will protect the Contractor from claims set forth below which may arise out of or result from the Contractor's operations and completed operations under the Contract and for which the Contractor may be legally liable, whether such operations be by the Contractor or by a Subcontractor or by anyone directly or indirectly employed by any of them, or by anyone for whose acts any of them may be liable:

- .1 Claims under workers' compensation, disability benefit and other similar employee benefit acts that are applicable to the Work to be performed;
- .2 Claims for damages because of bodily injury, occupational sickness or disease, or death of the Contractor's employees;
- .3 Claims for damages because of bodily injury, sickness or disease, or death of any person other than the Contractor's employees;
- .4 Claims for damages insured by usual personal injury liability coverage;
- .5 Claims for damages, other than to the Work itself, because of injury to or destruction of tangible property, including loss of use resulting therefrom;
- .6 Claims for damages because of bodily injury, death of a person or property damage arising out of ownership, maintenance or use of a motor vehicle;
- .7 Claims for bodily injury or property damage arising out of completed operations; and
- .8 Claims involving contractual liability insurance applicable to the Contractor's obligations under Section 3.18.

§ 11.1.2 The insurance required by Section 11.1.1 shall be written for not less than limits of liability specified in the Contract Documents or required by law, whichever coverage is greater. Coverages, whether written on an occurrence or claims-made basis, shall be maintained without interruption from the date of commencement of the Work until the date of final payment and termination of any coverage required to be maintained after final payment, and, with respect to the Contractor's completed operations coverage, until the expiration of the period for correction of Work or for such other period for maintenance of completed operations coverage as specified in the Contract Documents.

§ 11.1.3 Certificates of insurance acceptable to the Owner shall be filed with the Owner prior to commencement of the Work and thereafter upon renewal or replacement of each required policy of insurance. These certificates and the insurance policies required by this Section 11.1 shall contain a provision that coverages afforded under the policies will not be canceled or allowed to expire until at least 30 days' prior written notice has been given to the Owner. An additional certificate evidencing continuation of liability coverage, including coverage for completed operations, shall be submitted with the final Application for Payment as required by Section 9.10.2 and thereafter upon renewal or replacement of such coverage until the expiration of the time required by Section 11.1.2. Information concerning reduction of coverage on account of revised limits or claims paid under the General Aggregate, or both, shall be furnished by the Contractor with reasonable promptness.

§ 11.1.4 The Contractor shall cause the commercial liability coverage required by the Contract Documents to include (1) the Owner, the Architect and the Architect's consultants as additional insureds for claims caused in whole or in part by the Contractor's negligent acts or omissions during the Contractor's operations; and (2) the Owner as an additional

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insured for claims caused in whole or in part by the Contractor's negligent acts or omissions during the Contractor's completed operations.

§ 11.2 OWNER'S LIABILITY INSURANCE

The Owner shall be responsible for purchasing and maintaining the Owner's usual liability insurance.

§ 11.3 PROPERTY INSURANCE

§ 11.3.1 Unless otherwise provided, the Owner shall purchase and maintain, in a company or companies lawfully authorized to do business in the jurisdiction in which the Project is located, property insurance written on a builder's risk "all-risk" or equivalent policy form in the amount of the initial Contract Sum, plus value of subsequent Contract Modifications and cost of materials supplied or installed by others, comprising total value for the entire Project at the site on a replacement cost basis without optional deductibles. Such property insurance shall be maintained, unless otherwise provided in the Contract Documents or otherwise agreed in writing by all persons and entities who are beneficiaries of such insurance, until final payment has been made as provided in Section 9.10 or until no person or entity other than the Owner has an insurable interest in the property required by this Section 11.3 to be covered, whichever is later. This insurance shall include interests of the Owner, the Contractor, Subcontractors and Sub-subcontractors in the Project.

§ 11.3.1.1 Property insurance shall be on an "all-risk" or equivalent policy form and shall include, without limitation, insurance against the perils of fire (with extended coverage) and physical loss or damage including, without duplication of coverage, theft, vandalism, malicious mischief, collapse, earthquake, flood, windstorm, falsework, testing and startup, temporary buildings and debris removal including demolition occasioned by enforcement of any applicable legal requirements, and shall cover reasonable compensation for Architect's and Contractor's services and expenses required as a result of such insured loss.

§ 11.3.1.2 If the Owner does not intend to purchase such property insurance required by the Contract and with all of the coverages in the amount described above, the Owner shall so inform the Contractor in writing prior to commencement of the Work. The Contractor may then effect insurance that will protect the interests of the Contractor, Subcontractors and Sub-subcontractors in the Work, and by appropriate Change Order the cost thereof shall be charged to the Owner. If the Contractor is damaged by the failure or neglect of the Owner to purchase or maintain insurance as described above, without so notifying the Contractor in writing, then the Owner shall bear all reasonable costs properly attributable thereto.

§ 11.3.1.3 If the property insurance requires deductibles, the Owner shall pay costs not covered because of such deductibles.

§ 11.3.1.4 This property insurance shall cover portions of the Work stored off the site, and also portions of the Work in transit.

§ 11.3.1.5 Partial occupancy or use in accordance with Section 9.9 shall not commence until the insurance company or companies providing property insurance have consented to such partial occupancy or use by endorsement or otherwise. The Owner and the Contractor shall take reasonable steps to obtain consent of the insurance company or companies and shall, without mutual written consent, take no action with respect to partial occupancy or use that would cause cancellation, lapse or reduction of insurance.

§ 11.3.2 BOILER AND MACHINERY INSURANCE

The Owner shall purchase and maintain boiler and machinery insurance required by the Contract Documents or by law, which shall specifically cover such insured objects during installation and until final acceptance by the Owner; this insurance shall include interests of the Owner, Contractor, Subcontractors and Sub-subcontractors in the Work, and the Owner and Contractor shall be named insureds.

§ 11.3.3 LOSS OF USE INSURANCE

The Owner, at the Owner's option, may purchase and maintain such insurance as will insure the Owner against loss of use of the Owner's property due to fire or other hazards, however caused. The Owner waives all rights of action against the Contractor for loss of use of the Owner's property, including consequential losses due to fire or other hazards however caused.

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§ 11.3.4 If the Contractor requests in writing that insurance for risks other than those described herein or other special causes of loss be included in the property insurance policy, the Owner shall, if possible, include such insurance, and the cost thereof shall be charged to the Contractor by appropriate Change Order.

§ 11.3.5 If during the Project construction period the Owner insures properties, real or personal or both, at or adjacent to the site by property insurance under policies separate from those insuring the Project, or if after final payment property insurance is to be provided on the completed Project through a policy or policies other than those insuring the Project during the construction period, the Owner shall waive all rights in accordance with the terms of Section 11.3.7 for damages caused by fire or other causes of loss covered by this separate property insurance. All separate policies shall provide this waiver of subrogation by endorsement or otherwise.

§ 11.3.6 Before an exposure to loss may occur, the Owner shall file with the Contractor a copy of each policy that includes insurance coverages required by this Section 11.3. Each policy shall contain all generally applicable conditions, definitions, exclusions and endorsements related to this Project. Each policy shall contain a provision that the policy will not be canceled or allowed to expire, and that its limits will not be reduced, until at least 30 days' prior written notice has been given to the Contractor.

§ 11.3.7 WAIVERS OF SUBROGATION

The Owner and Contractor waive all rights against (1) each other and any of their subcontractors, sub-subcontractors, agents and employees, each of the other, and (2) the Architect, Architect's consultants, separate contractors described in Article 6, if any, and any of their subcontractors, sub-subcontractors, agents and employees, for damages caused by fire or other causes of loss to the extent covered by property insurance obtained pursuant to this Section 11.3 or other property insurance applicable to the Work, except such rights as they have to proceeds of such insurance held by the Owner as fiduciary. The Owner or Contractor, as appropriate, shall require of the Architect, Architect's consultants, separate contractors described in Article 6, if any, and the subcontractors, sub-subcontractors, agents and employees of any of them, by appropriate agreements, written where legally required for validity, similar waivers each in favor of other parties enumerated herein. The policies shall provide such waivers of subrogation by endorsement or otherwise. A waiver of subrogation shall be effective as to a person or entity even though that person or entity would otherwise have a duty of indemnification, contractual or otherwise, did not pay the insurance premium directly or indirectly, and whether or not the person or entity had an insurable interest in the property damaged.

§ 11.3.8 A loss insured under the Owner's property insurance shall be adjusted by the Owner as fiduciary and made payable to the Owner as fiduciary for the insureds, as their interests may appear, subject to requirements of any applicable mortgagee clause and of Section 11.3.10. The Contractor shall pay Subcontractors their just shares of insurance proceeds received by the Contractor, and by appropriate agreements, written where legally required for validity, shall require Subcontractors to make payments to their Sub-subcontractors in similar manner.

§ 11.3.9 If required in writing by a party in interest, the Owner as fiduciary shall, upon occurrence of an insured loss, give bond for proper performance of the Owner's duties. The cost of required bonds shall be charged against proceeds received as fiduciary. The Owner shall deposit in a separate account proceeds so received, which the Owner shall distribute in accordance with such agreement as the parties in interest may reach, or as determined in accordance with the method of binding dispute resolution selected in the Agreement between the Owner and Contractor. If after such loss no other special agreement is made and unless the Owner terminates the Contract for convenience, replacement of damaged property shall be performed by the Contractor after notification of a Change in the Work in accordance with Article 7.

§ 11.3.10 The Owner as fiduciary shall have power to adjust and settle a loss with insurers unless one of the parties in interest shall object in writing within five days after occurrence of loss to the Owner's exercise of this power; if such objection is made, the dispute shall be resolved in the manner selected by the Owner and Contractor as the method of binding dispute resolution in the Agreement. If the Owner and Contractor have selected arbitration as the method of binding dispute resolution, the Owner as fiduciary shall make settlement with insurers or, in the case of a dispute over distribution of insurance proceeds, in accordance with the directions of the arbitrators.

§ 11.4 PERFORMANCE BOND AND PAYMENT BOND

§ 11.4.1 The Owner shall have the right to require the Contractor to furnish bonds covering faithful performance of the Contract and payment of obligations arising thereunder as stipulated in bidding requirements or specifically required in the Contract Documents on the date of execution of the Contract.

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§ 11.4.2 Upon the request of any person or entity appearing to be a potential beneficiary of bonds covering payment of obligations arising under the Contract, the Contractor shall promptly furnish a copy of the bonds or shall authorize a copy to be furnished.

ARTICLE 12 UNCOVERING AND CORRECTION OF WORK

§ 12.1 UNCOVERING OF WORK

§ 12.1.1 If a portion of the Work is covered contrary to the Architect's request or to requirements specifically expressed in the Contract Documents, it must, if requested in writing by the Architect, be uncovered for the Architect's examination and be replaced at the Contractor's expense without change in the Contract Time.

§ 12.1.2 If a portion of the Work has been covered that the Architect has not specifically requested to examine prior to its being covered, the Architect may request to see such Work and it shall be uncovered by the Contractor. If such Work is in accordance with the Contract Documents, costs of uncovering and replacement shall, by appropriate Change Order, be at the Owner's expense. If such Work is not in accordance with the Contract Documents, such costs and the cost of correction shall be at the Contractor's expense unless the condition was caused by the Owner or a separate contractor in which event the Owner shall be responsible for payment of such costs.

§ 12.2 CORRECTION OF WORK

§ 12.2.1 BEFORE OR AFTER SUBSTANTIAL COMPLETION

The Contractor shall promptly correct Work rejected by the Architect or failing to conform to the requirements of the Contract Documents, whether discovered before or after Substantial Completion and whether or not fabricated, installed or completed. Costs of correcting such rejected Work, including additional testing and inspections, the cost of uncovering and replacement, and compensation for the Architect's services and expenses made necessary thereby, shall be at the Contractor's expense.

§ 12.2.2 AFTER SUBSTANTIAL COMPLETION

§ 12.2.2.1 In addition to the Contractor's obligations under Section 3.5, if, within one year after the date of Substantial Completion of the Work or designated portion thereof or after the date for commencement of warranties established under Section 9.9.1, or by terms of an applicable special warranty required by the Contract Documents, any of the Work is found to be not in accordance with the requirements of the Contract Documents, the Contractor shall correct it promptly after receipt of written notice from the Owner to do so unless the Owner has previously given the Contractor a written acceptance of such condition. The Owner shall give such notice promptly after discovery of the condition. During the one-year period for correction of Work, if the Owner fails to notify the Contractor and give the Contractor an opportunity to make the correction, the Owner waives the rights to require correction by the Contractor and to make a claim for breach of warranty. If the Contractor fails to correct nonconforming Work within a reasonable time during that period after receipt of notice from the Owner or Architect, the Owner may correct it in accordance with Section 2.4.

§ 12.2.2.2 The one-year period for correction of Work shall be extended with respect to portions of Work first performed after Substantial Completion by the period of time between Substantial Completion and the actual completion of that portion of the Work.

§ 12.2.2.3 The one-year period for correction of Work shall not be extended by corrective Work performed by the Contractor pursuant to this Section 12.2.

§ 12.2.3 The Contractor shall remove from the site portions of the Work that are not in accordance with the requirements of the Contract Documents and are neither corrected by the Contractor nor accepted by the Owner.

§ 12.2.4 The Contractor shall bear the cost of correcting destroyed or damaged construction, whether completed or partially completed, of the Owner or separate contractors caused by the Contractor's correction or removal of Work that is not in accordance with the requirements of the Contract Documents.

§ 12.2.5 Nothing contained in this Section 12.2 shall be construed to establish a period of limitation with respect to other obligations the Contractor has under the Contract Documents. Establishment of the one-year period for correction of Work as described in Section 12.2.2 relates only to the specific obligation of the Contractor to correct the Work, and has no relationship to the time within which the obligation to comply with the Contract Documents may be

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sought to be enforced, nor to the time within which proceedings may be commenced to establish the Contractor's liability with respect to the Contractor's obligations other than specifically to correct the Work.

§ 12.3 ACCEPTANCE OF NONCONFORMING WORK

If the Owner prefers to accept Work that is not in accordance with the requirements of the Contract Documents, the Owner may do so instead of requiring its removal and correction, in which case the Contract Sum will be reduced as appropriate and equitable. Such adjustment shall be effected whether or not final payment has been made.

ARTICLE 13 MISCELLANEOUS PROVISIONS

§ 13.1 GOVERNING LAW

The Contract shall be governed by the law of the place where the Project is located except that, if the parties have selected arbitration as the method of binding dispute resolution, the Federal Arbitration Act shall govern Section 15.4.

§ 13.2 SUCCESSORS AND ASSIGNS

§ 13.2.1 The Owner and Contractor respectively bind themselves, their partners, successors, assigns and legal representatives to covenants, agreements and obligations contained in the Contract Documents. Except as provided in Section 13.2.2, neither party to the Contract shall assign the Contract as a whole without written consent of the other. If either party attempts to make such an assignment without such consent, that party shall nevertheless remain legally responsible for all obligations under the Contract.

§ 13.2.2 The Owner may, without consent of the Contractor, assign the Contract to a lender providing construction financing for the Project, if the lender assumes the Owner's rights and obligations under the Contract Documents. The Contractor shall execute all consents reasonably required to facilitate such assignment.

§ 13.3 WRITTEN NOTICE

Written notice shall be deemed to have been duly served if delivered in person to the individual, to a member of the firm or entity, or to an officer of the corporation for which it was intended; or if delivered at, or sent by registered or certified mail or by courier service providing proof of delivery to, the last business address known to the party giving notice.

§ 13.4 RIGHTS AND REMEDIES

§ 13.4.1 Duties and obligations imposed by the Contract Documents and rights and remedies available thereunder shall be in addition to and not a limitation of duties, obligations, rights and remedies otherwise imposed or available by law.

§ 13.4.2 No action or failure to act by the Owner, Architect or Contractor shall constitute a waiver of a right or duty afforded them under the Contract, nor shall such action or failure to act constitute approval of or acquiescence in a breach there under, except as may be specifically agreed in writing.

§ 13.5 TESTS AND INSPECTIONS

§ 13.5.1 Tests, inspections and approvals of portions of the Work shall be made as required by the Contract Documents and by applicable laws, statutes, ordinances, codes, rules and regulations or lawful orders of public authorities. Unless otherwise provided, the Contractor shall make arrangements for such tests, inspections and approvals with an independent testing laboratory or entity acceptable to the Owner, or with the appropriate public authority, and shall bear all related costs of tests, inspections and approvals. The Contractor shall give the Architect timely notice of when and where tests and inspections are to be made so that the Architect may be present for such procedures. The Owner shall bear costs of (1) tests, inspections or approvals that do not become requirements until after bids are received or negotiations concluded, and (2) tests, inspections or approvals where building codes or applicable laws or regulations prohibit the Owner from delegating their cost to the Contractor.

§ 13.5.2 If the Architect, Owner or public authorities having jurisdiction determine that portions of the Work require additional testing, inspection or approval not included under Section 13.5.1, the Architect will, upon written authorization from the Owner, instruct the Contractor to make arrangements for such additional testing, inspection or approval by an entity acceptable to the Owner, and the Contractor shall give timely notice to the Architect of when and where tests and inspections are to be made so that the Architect may be present for such procedures. Such costs, except as provided in Section 13.5.3, shall be at the Owner's expense.

§ 13.5.3 If such procedures for testing, inspection or approval under Sections 13.5.1 and 13.5.2 reveal failure of the portions of the Work to comply with requirements established by the Contract Documents, all costs made necessary by such failure including those of repeated procedures and compensation for the Architect's services and expenses shall be at the Contractor's expense.

§ 13.5.4 Required certificates of testing, inspection or approval shall, unless otherwise required by the Contract Documents, be secured by the Contractor and promptly delivered to the Architect.

§ 13.5.5 If the Architect is to observe tests, inspections or approvals required by the Contract Documents, the Architect will do so promptly and, where practicable, at the normal place of testing.

§ 13.5.6 Tests or inspections conducted pursuant to the Contract Documents shall be made promptly to avoid unreasonable delay in the Work.

§ 13.6 INTEREST

Payments due and unpaid under the Contract Documents shall bear interest from the date payment is due at such rate as the parties may agree upon in writing or, in the absence thereof, at the legal rate prevailing from time to time at the place where the Project is located.

§ 13.7 TIME LIMITS ON CLAIMS

The Owner and Contractor shall commence all claims and causes of action, whether in contract, tort, breach of warranty or otherwise, against the other arising out of or related to the Contract in accordance with the requirements of the final dispute resolution method selected in the Agreement within the time period specified by applicable law, but in any case not more than 10 years after the date of Substantial Completion of the Work. The Owner and Contractor waive all claims and causes of action not commenced in accordance with this Section 13.7.

ARTICLE 14 TERMINATION OR SUSPENSION OF THE CONTRACT

§ 14.1 TERMINATION BY THE CONTRACTOR

§ 14.1.1 The Contractor may terminate the Contract if the Work is stopped for a period of 30 consecutive days through no act or fault of the Contractor or a Subcontractor, Sub-subcontractor or their agents or employees or any other persons or entities performing portions of the Work under direct or indirect contract with the Contractor, for any of the following reasons:

- .1 Issuance of an order of a court or other public authority having jurisdiction that requires all Work to be stopped;
- .2 An act of government, such as a declaration of national emergency that requires all Work to be stopped;
- .3 Because the Architect has not issued a Certificate for Payment and has not notified the Contractor of the reason for withholding certification as provided in Section 9.4.1, or because the Owner has not made payment on a Certificate for Payment within the time stated in the Contract Documents; or
- .4 The Owner has failed to furnish to the Contractor promptly, upon the Contractor's request, reasonable evidence as required by Section 2.2.1.

§ 14.1.2 The Contractor may terminate the Contract if, through no act or fault of the Contractor or a Subcontractor, Sub-subcontractor or their agents or employees or any other persons or entities performing portions of the Work under direct or indirect contract with the Contractor, repeated suspensions, delays or interruptions of the entire Work by the Owner as described in Section 14.3 constitute in the aggregate more than 100 percent of the total number of days scheduled for completion, or 120 days in any 365-day period, whichever is less.

§ 14.1.3 If one of the reasons described in Section 14.1.1 or 14.1.2 exists, the Contractor may, upon seven days' written notice to the Owner and Architect, terminate the Contract and recover from the Owner payment for Work executed, including reasonable overhead and profit, costs incurred by reason of such termination, and damages.

§ 14.1.4 If the Work is stopped for a period of 60 consecutive days through no act or fault of the Contractor or a Subcontractor or their agents or employees or any other persons performing portions of the Work under contract with the Contractor because the Owner has repeatedly failed to fulfill the Owner's obligations under the Contract Documents with respect to matters important to the progress of the Work, the Contractor may, upon seven additional days' written notice to the Owner and the Architect, terminate the Contract and recover from the Owner as provided in Section 14.1.3.

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§ 14.2 TERMINATION BY THE OWNER FOR CAUSE

§ 14.2.1 The Owner may terminate the Contract if the Contractor

- .1 repeatedly refuses or fails to supply enough properly skilled workers or proper materials;
- .2 fails to make payment to Subcontractors for materials or labor in accordance with the respective agreements between the Contractor and the Subcontractors;
- .3 repeatedly disregards applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of a public authority; or
- .4 otherwise is guilty of substantial breach of a provision of the Contract Documents.

§ 14.2.2 When any of the above reasons exist, the Owner, upon certification by the Initial Decision Maker that sufficient cause exists to justify such action, may without prejudice to any other rights or remedies of the Owner and after giving the Contractor and the Contractor's surety, if any, seven days' written notice, terminate employment of the Contractor and may, subject to any prior rights of the surety:

- .1 Exclude the Contractor from the site and take possession of all materials, equipment, tools, and construction equipment and machinery thereon owned by the Contractor;
- .2 Accept assignment of subcontracts pursuant to Section 5.4; and
- .3 Finish the Work by whatever reasonable method the Owner may deem expedient. Upon written request of the Contractor, the Owner shall furnish to the Contractor a detailed accounting of the costs incurred by the Owner in finishing the Work.

§ 14.2.3 When the Owner terminates the Contract for one of the reasons stated in Section 14.2.1, the Contractor shall not be entitled to receive further payment until the Work is finished.

§ 14.2.4 If the unpaid balance of the Contract Sum exceeds costs of finishing the Work, including compensation for the Architect's services and expenses made necessary thereby, and other damages incurred by the Owner and not expressly waived, such excess shall be paid to the Contractor. If such costs and damages exceed the unpaid balance, the Contractor shall pay the difference to the Owner. The amount to be paid to the Contractor or Owner, as the case may be, shall be certified by the Initial Decision Maker, upon application, and this obligation for payment shall survive termination of the Contract.

§ 14.3 SUSPENSION BY THE OWNER FOR CONVENIENCE

§ 14.3.1 The Owner may, without cause, order the Contractor in writing to suspend, delay or interrupt the Work in whole or in part for such period of time as the Owner may determine.

§ 14.3.2 The Contract Sum and Contract Time shall be adjusted for increases in the cost and time caused by suspension, delay or interruption as described in Section 14.3.1. Adjustment of the Contract Sum shall include profit. No adjustment shall be made to the extent

- .1 that performance is, was or would have been so suspended, delayed or interrupted by another cause for which the Contractor is responsible; or
- .2 that an equitable adjustment is made or denied under another provision of the Contract.

§ 14.4 TERMINATION BY THE OWNER FOR CONVENIENCE

§ 14.4.1 The Owner may, at any time, terminate the Contract for the Owner's convenience and without cause.

§ 14.4.2 Upon receipt of written notice from the Owner of such termination for the Owner's convenience, the Contractor shall

- .1 cease operations as directed by the Owner in the notice;
- .2 take actions necessary, or that the Owner may direct, for the protection and preservation of the Work; and
- .3 except for Work directed to be performed prior to the effective date of termination stated in the notice, terminate all existing subcontracts and purchase orders and enter into no further subcontracts and purchase orders.

§ 14.4.3 In case of such termination for the Owner's convenience, the Contractor shall be entitled to receive payment for Work executed, and costs incurred by reason of such termination, along with reasonable overhead and profit on the Work not executed.

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ARTICLE 15 CLAIMS AND DISPUTES

§ 15.1 CLAIMS

§ 15.1.1 DEFINITION

A Claim is a demand or assertion by one of the parties seeking, as a matter of right, payment of money, or other relief with respect to the terms of the Contract. The term "Claim" also includes other disputes and matters in question between the Owner and Contractor arising out of or relating to the Contract. The responsibility to substantiate Claims shall rest with the party making the Claim.

§ 15.1.2 NOTICE OF CLAIMS

Claims by either the Owner or Contractor must be initiated by written notice to the other party and to the Initial Decision Maker with a copy sent to the Architect, if the Architect is not serving as the Initial Decision Maker. Claims by either party must be initiated within 21 days after occurrence of the event giving rise to such Claim or within 21 days after the claimant first recognizes the condition giving rise to the Claim, whichever is later.

§ 15.1.3 CONTINUING CONTRACT PERFORMANCE

Pending final resolution of a Claim, except as otherwise agreed in writing or as provided in Section 9.7 and Article 14, the Contractor shall proceed diligently with performance of the Contract and the Owner shall continue to make payments in accordance with the Contract Documents. The Architect will prepare Change Orders and issue Certificates for Payment in accordance with the decisions of the Initial Decision Maker.

§ 15.1.4 CLAIMS FOR ADDITIONAL COST

If the Contractor wishes to make a Claim for an increase in the Contract Sum, written notice as provided herein shall be given before proceeding to execute the Work. Prior notice is not required for Claims relating to an emergency endangering life or property arising under Section 10.4.

§ 15.1.5 CLAIMS FOR ADDITIONAL TIME

§ 15.1.5.1 If the Contractor wishes to make a Claim for an increase in the Contract Time, written notice as provided herein shall be given. The Contractor's Claim shall include an estimate of cost and of probable effect of delay on progress of the Work. In the case of a continuing delay, only one Claim is necessary.

§ 15.1.5.2 If adverse weather conditions are the basis for a Claim for additional time, such Claim shall be documented by data substantiating that weather conditions were abnormal for the period of time, could not have been reasonably anticipated and had an adverse effect on the scheduled construction.

§ 15.1.6 CLAIMS FOR CONSEQUENTIAL DAMAGES

The Contractor and Owner waive Claims against each other for consequential damages arising out of or relating to this Contract. This mutual waiver includes

- .1 damages incurred by the Owner for rental expenses, for losses of use, income, profit, financing, business and reputation, and for loss of management or employee productivity or of the services of such persons; and
- .2 damages incurred by the Contractor for principal office expenses including the compensation of personnel stationed there, for losses of financing, business and reputation, and for loss of profit except anticipated profit arising directly from the Work.

This mutual waiver is applicable, without limitation, to all consequential damages due to either party's termination in accordance with Article 14. Nothing contained in this Section 15.1.6 shall be deemed to preclude an award of liquidated damages, when applicable, in accordance with the requirements of the Contract Documents.

§ 15.2 INITIAL DECISION

§ 15.2.1 Claims, excluding those arising under Sections 10.3, 10.4, 11.3.9, and 11.3.10, shall be referred to the Initial Decision Maker for initial decision. The Architect will serve as the Initial Decision Maker, unless otherwise indicated in the Agreement. Except for those Claims excluded by this Section 15.2.1, an initial decision shall be required as a condition precedent to mediation of any Claim arising prior to the date final payment is due, unless 30 days have passed after the Claim has been referred to the Initial Decision Maker with no decision having been rendered. Unless the Initial Decision Maker and all affected parties agree, the Initial Decision Maker will not decide disputes between the Contractor and persons or entities other than the Owner.

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§ 15.2.2 The Initial Decision Maker will review Claims and within ten days of the receipt of a Claim take one or more of the following actions: (1) request additional supporting data from the claimant or a response with supporting data from the other party, (2) reject the Claim in whole or in part, (3) approve the Claim, (4) suggest a compromise, or (5) advise the parties that the Initial Decision Maker is unable to resolve the Claim if the Initial Decision Maker lacks sufficient information to evaluate the merits of the Claim or if the Initial Decision Maker concludes that, in the Initial Decision Maker's sole discretion, it would be inappropriate for the Initial Decision Maker to resolve the Claim.

§ 15.2.3 In evaluating Claims, the Initial Decision Maker may, but shall not be obligated to, consult with or seek information from either party or from persons with special knowledge or expertise who may assist the Initial Decision Maker in rendering a decision. The Initial Decision Maker may request the Owner to authorize retention of such persons at the Owner's expense.

§ 15.2.4 If the Initial Decision Maker requests a party to provide a response to a Claim or to furnish additional supporting data, such party shall respond, within ten days after receipt of such request, and shall either (1) provide a response on the requested supporting data, (2) advise the Initial Decision Maker when the response or supporting data will be furnished or (3) advise the Initial Decision Maker that no supporting data will be furnished. Upon receipt of the response or supporting data, if any, the Initial Decision Maker will either reject or approve the Claim in whole or in part.

§ 15.2.5 The Initial Decision Maker will render an initial decision approving or rejecting the Claim, or indicating that the Initial Decision Maker is unable to resolve the Claim. This initial decision shall (1) be in writing; (2) state the reasons therefor; and (3) notify the parties and the Architect, if the Architect is not serving as the Initial Decision Maker, of any change in the Contract Sum or Contract Time or both. The initial decision shall be final and binding on the parties but subject to mediation and, if the parties fail to resolve their dispute through mediation, to binding dispute resolution.

§ 15.2.6 Either party may file for mediation of an initial decision at any time, subject to the terms of Section 15.2.6.1.

§ 15.2.6.1 Either party may, within 30 days from the date of an initial decision, demand in writing that the other party file for mediation within 60 days of the initial decision. If such a demand is made and the party receiving the demand fails to file for mediation within the time required, then both parties waive their rights to mediate or pursue binding dispute resolution proceedings with respect to the initial decision.

§ 15.2.7 In the event of a Claim against the Contractor, the Owner may, but is not obligated to, notify the surety, if any, of the nature and amount of the Claim. If the Claim relates to a possibility of a Contractor's default, the Owner may, but is not obligated to, notify the surety and request the surety's assistance in resolving the controversy.

§ 15.2.8 If a Claim relates to or is the subject of a mechanic's lien, the party asserting such Claim may proceed in accordance with applicable law to comply with the lien notice or filing deadlines.

§ 15.3 MEDIATION

§ 15.3.1 Claims, disputes, or other matters in controversy arising out of or related to the Contract except those waived as provided for in Sections 9.10.4, 9.10.5, and 15.1.6 shall be subject to mediation as a condition precedent to binding dispute resolution.

§ 15.3.2 The parties shall endeavor to resolve their Claims by mediation which, unless the parties mutually agree otherwise, shall be administered by the American Arbitration Association in accordance with its Construction Industry Mediation Procedures in effect on the date of the Agreement. A request for mediation shall be made in writing, delivered to the other party to the Contract, and filed with the person or entity administering the mediation. The request may be made concurrently with the filing of binding dispute resolution proceedings but, in such event, mediation shall proceed in advance of binding dispute resolution proceedings, which shall be stayed pending mediation for a period of 60 days from the date of filing, unless stayed for a longer period by agreement of the parties or court order. If an arbitration is stayed pursuant to this Section 15.3.2, the parties may nonetheless proceed to the selection of the arbitrator(s) and agree upon a schedule for later proceedings.

§ 15.3.3 The parties shall share the mediator's fee and any filing fees equally. The mediation shall be held in the place where the Project is located, unless another location is mutually agreed upon. Agreements reached in mediation shall be enforceable as settlement agreements in any court having jurisdiction thereof.

§ 15.4 ARBITRATION

§ 15.4.1 If the parties have selected arbitration as the method for binding dispute resolution in the Agreement, any Claim subject to, but not resolved by, mediation shall be subject to arbitration which, unless the parties mutually agree otherwise, shall be administered by the American Arbitration Association in accordance with its Construction Industry Arbitration Rules in effect on the date of the Agreement. A demand for arbitration shall be made in writing, delivered to the other party to the Contract, and filed with the person or entity administering the arbitration. The party filing a notice of demand for arbitration must assert in the demand all Claims then known to that party on which arbitration is permitted to be demanded.

§ 15.4.1.1 A demand for arbitration shall be made no earlier than concurrently with the filing of a request for mediation, but in no event shall it be made after the date when the institution of legal or equitable proceedings based on the Claim would be barred by the applicable statute of limitations. For statute of limitations purposes, receipt of a written demand for arbitration by the person or entity administering the arbitration shall constitute the institution of legal or equitable proceedings based on the Claim.

§ 15.4.2 The award rendered by the arbitrator or arbitrators shall be final, and judgment may be entered upon it in accordance with applicable law in any court having jurisdiction thereof.

§ 15.4.3 The foregoing agreement to arbitrate and other agreements to arbitrate with an additional person or entity duly consented to by parties to the Agreement shall be specifically enforceable under applicable law in any court having jurisdiction thereof.

§ 15.4.4 CONSOLIDATION OR JOINDER

§ 15.4.4.1 Either party, at its sole discretion, may consolidate an arbitration conducted under this Agreement with any other arbitration to which it is a party provided that (1) the arbitration agreement governing the other arbitration permits consolidation, (2) the arbitrations to be consolidated substantially involve common questions of law or fact, and (3) the arbitrations employ materially similar procedural rules and methods for selecting arbitrator(s).

§ 15.4.4.2 Either party, at its sole discretion, may include by joinder persons or entities substantially involved in a common question of law or fact whose presence is required if complete relief is to be accorded in arbitration, provided that the party sought to be joined consents in writing to such joinder. Consent to arbitration involving an additional person or entity shall not constitute consent to arbitration of any claim, dispute or other matter in question not described in the written consent.

§ 15.4.4.3 The Owner and Contractor grant to any person or entity made a party to an arbitration conducted under this Section 15.4, whether by joinder or consolidation, the same rights of joinder and consolidation as the Owner and Contractor under this Agreement.

GENERAL

A. RELATED DOCUMENTS

AIA Document A 201 "General Conditions of the Contract for Construction", (Sixteenth Edition, Copyright 2007, The American Institute of Architects, Articles 1 through 15) and the Town of West Hartford's Supplementary General Conditions (Section 00402 Articles 1-15) are bound herein, and are hereby made a part of the Contract Bidding Documents and shall apply to all Contractors and Subcontractors.

B. AMENDMENTS TO THE GENERAL CONDITIONS

- a. The Supplementary General Conditions include:
 1. Any and all revisions to, deletions from, replacement of, and additions to portions of the AIA General Conditions, Articles 1 through 15.
 2. Such additional articles beyond Article 15 as may be included herein.
- b. Certain articles of the AIA General Conditions, or portions thereof, are revised by, are deleted, are replaced by, or are supplemented by the requirements of the following Supplementary Conditions. Such revisions, deletions, replacements, or additions shall take precedence over the AIA General Conditions.
- c. Where any such Article is revised, deleted, or replaced, the provisions of such Article not so specifically revised, deleted or replaced shall remain in effect.
- d. The following paragraphs are numbered in sequence corresponding to those of the General Conditions. Revised paragraphs and clauses have the same numerical designations occurring in the General Conditions. Additions to paragraphs, subparagraphs and clauses are numbered in sequence.

ARTICLE 1 – GENERAL PROVISIONS

- 1.1.1 Delete the word "not" on line 7 so that the sentence begins "The Contract Documents do include."
- 1.1.3 Add the following words after the word "obligations" in line 3:

or to be provided by Subcontractors, material suppliers, or any other entity for whom the Contractor is responsible under or pursuant to the Contract Documents.
- 1.2.4 Add new subparagraph 1.2.4 as follows:

TOWN OF WEST HARTFORD
SUPPLEMENTARY GENERAL CONDITIONS

In case of any conflict or inconsistency among the Contract Documents, the Architect's decision shall govern. If there is any inconsistency in the Drawings, or between the Drawings and the Specifications, unless otherwise ordered in writing by the Architect or the Owner, the Contractor shall provide the better quality of, or the greater quantity of, work or materials.

1.2.5 Add new subparagraph 1.2.5 as follows:

Where a typical or representative detail is shown on the Drawings, such detail shall constitute the standard of workmanship and materials throughout corresponding portions of the Work. Where necessary, the Contractor shall adopt such detail for use in said corresponding portions of the Work in a manner that is satisfactory to the Architect.

1.5.1 Add the following after the first sentence:

Such drawings, specifications, other documents and copies thereof are and shall remain the joint property of the Architect and Owner.

ARTICLE 2 - OWNER

2.2.1 Delete third and fourth sentences.

2.2.2 Add the following at the end of 2.2.2 "unless otherwise provided in the contract documents."

2.2.3 Delete the words "and utility locations" on line 1.

2.2.4 Delete the second sentence of 2.2.4.

2.2.5 Delete subparagraph 2.2.5 in its' entirety and substitute with the following:

The Contractor will be furnished up to fifteen (15) sets of the Contract Bidding Documents at no charge.

2.3 Change subparagraph 2.3 as follows:

Delete the word "repeatedly" in line 2.
Add the following at the end of 2.3:

The Owner's right to order the Contractor to stop the Work shall not relieve the Contractor of any of his responsibilities and obligations under or pursuant to the Contract Documents.

2.5 Add new paragraph 2.5 as follows:

2.5 - Additional Rights

The rights stated in Article 2 shall be in addition to and shall not be in limitation of any other rights of the Owner granted in the Contract Documents or at law or in equity.

ARTICLE 3 - CONTRACTOR

3.2.2 Delete subparagraph 3.2.2 in its' entirety and substitute with the following:

The Contractor shall carefully study and compare the Contract Documents with each other and with information furnished by the Owner pursuant to subparagraph 2.2.3 and 3.2.3 and shall at once report to the Architect errors, inconsistencies or omissions discovered, or any variance from applicable laws, statutes, ordinances, building codes, rules, regulations or any lawful orders of any governmental body, or public or quasi-public authority. The Contractor shall not be liable to the Owner or Architect for damage resulting from errors, inconsistencies or omissions in the Contract Documents unless the Contractor recognized or should have recognized such error, inconsistency or omission and failed to report it to the Architect. If the Contractor performs any construction activity knowing it involves a recognized error, inconsistency or omission in the Contract Documents without such notice to the Architect, the Contractor shall assume responsibility for such performance and shall bear an appropriate amount of the attributable costs for correction.

3.2.3 Delete subparagraph 3.2.3 in its' entirety and substitute with the following:

The Contractor shall take field measurements and verify field conditions and shall carefully compare such field measurements and conditions and other information known to the Contractor with the Contract Documents before commencing activities. Errors, inconsistencies or omissions discovered shall be reported to the Architect at once. After reporting to the Architect any error, inconsistency or omission the Contractor may discover in the Contract Documents, the Contractor shall not proceed with any work so affected without the Architect's written modifications to the Contract Documents.

3.2.4 Delete subparagraph 3.2.4 in its' entirety and substitute with the following:

The Contractor shall fully comply, or assure full compliance by Subcontractors or others under his direction, with Connecticut General Statutes Section 16-345, et seq. ("Call Before You Dig") and the regulations pertaining thereto. The Contractor shall be responsible to make certain of the exact location of the public and private mains, ducts, poles and utility services prior to excavation. The utility mains, ducts,

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poles and services in the construction area where referred to on the Project plans or elsewhere in the Contract Documents are at the approximate locations furnished by various Utilities concerned. These locations are subject to possible errors in the source of the information and also errors in transcription. Connecticut General Statutes Section 16-349, as amended, makes it mandatory to notify Utilities of any proposed excavation, discharge of explosives, or demolition within the purview of Connecticut General Statutes Section 16-345, et seq. The Contractor shall call 1-800-922-4455 (toll free), 7:00 A.M. to 6:00 P.M., Monday through Friday, at least forty-eight hours prior to beginning the excavation, discharge of explosives, or demolition. The Owner shall be notified in a similar manner. This "Call Before You Dig" service is provided by the Utility companies. Once the call is made, it is the utilities' responsibility to analyze the site and identify and mark their underground facilities. Privately or Town-owned utility mains, ducts, poles and services may be located in the construction area and the Contractor shall contact the Architect to verify their existence and location.

3.3.1 Delete the last sentence of subparagraph 3.3.1 and add the following:

Should the Contractor fail to perform his work to the satisfaction of the Architect and Owner, the Architect and Owner have the right to order that all work must stop until the work is rectified.

3.3.4 Add new subparagraph 3.3.4 as follows:

The Contractor will be required to attend weekly Project Meetings from the time the Agreement is executed until Final Acceptance.

3.4.4 Add new subparagraph 3.4.4 as follows:

The Contractor is encouraged to use local labor where feasible, but not when it is at the expense of poor workmanship and/or higher costs. The Contractor shall not discriminate or permit discrimination in employment or in the award of sub-contracts or in the selection of materials suppliers, in any manner prohibited by the laws and regulations of the United States, the State of Connecticut or the Town of West Hartford.

3.5 Add the words "or Owner" after the word "Architect" in line 8.

3.6 Delete subparagraph 3.6 in its' entirety and substitute the following:

No amount shall be included in the Bid for Connecticut Sales or Service Taxes or for Federal Excise Tax on materials or supplies purchased for this project. If applicable, the owner shall provide tax exempt documentation for the contractor's records.

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3.7.2 Add the following sentence: A copy of the State license for general and major Subcontractors issued in accordance with C.G.S Section 20-341gg shall be furnished to the Owner upon request.

3.7.4 Add the following before the word "If" on line 1: "Except as in regards to claims relating to hazardous materials which are discussed in Article 3.7.8.."

Line 6, place a period after disturbed and delete rest of sentence.

If the Contractor performs work contrary to laws, statutes, ordinances, building codes, and rules and regulations, the Contractor shall assume responsibility for such work and shall bear the costs attributable to correction.

3.7.6 Add new subparagraph 3.7.6 as follows:

The requirements of subparagraphs preceding do not waive the Contractor's responsibility of complying with the requirements of the contract documents, when such regulations and requirements exceed those of any laws, ordinances, rules, regulations, and orders of any public authority bearing on the work.

3.7.7 Add new subparagraph 3.7.7 as follows:

The Town of West Hartford Building Permit Fee will be waived, however, the General Contractor must apply for the Building Permit, and in all other ways comply with procedures of the office of the Building Official for the Town of West Hartford.

3.7.8 Add new subparagraph 3.7.8 as follows:

The Owner and Architect shall bear no responsibility to the Contractor, or sub-contractor(s) for any delay damages claimed to have resulted from activities claimed to relate to the detection, abatement, or handling of hazardous materials known to exist or subsequently discovered upon the premises. The sole remedy of the Contractor under such circumstances shall be an appropriate extension of contract completion time. No damages shall be paid by the Architect or Owner, their agents, servants or independent Contractors as a result of any such claim.

3.12.10 Delete the word "properly" in line 9 and substitute the word "Connecticut".

3.17 Delete subparagraph 3.17 and substitute with the following:

The Contractor shall pay all royalties and license fees. The Contractor shall defend all suits or claims for infringement of any copyrights and patent rights and shall hold the Owner harmless from loss (including, but not limited to, attorneys' fees and any litigation expenses) unless a particular design, process or the product of a particular

manufacturer or manufacturers is specified in the Contract Documents or where copyright violations are contained in Drawings, Specifications or other documents prepared by the Owner or Architect; provided, however, that if the Contractor has reason to believe that the design, process or product specified is an infringement of a copyright or a patent, the Contractor shall be responsible for such loss unless the Contractor promptly gives such information to the Architect and Owner.

- 3.18.1 Delete subparagraph 3.18.1 in its entirety and replace the original language with the attached Indemnification and Insurance Exhibit which shall be fully incorporated by reference into this Agreement:

ARTICLE 4 - ARCHITECT

- 4.1.2 Delete subparagraph 4.1.2 in its' entirety and substitute the following:

Duties, responsibilities and limitations of authority of the Architect as set forth in the Contract Documents shall not be restricted, modified or extended without written agreement of the Owner and Architect. The Contractor shall be notified of such restriction, modification or extension in writing.

- 4.1.3 Delete the words "as to whom the Contractor makes no reasonable objection and".

ARTICLE 5 - SUB-CONTRACTORS

- 5.2.1 Delete the word "after" on the second line and substitute with the words "prior to" award.

- 5.2.3 Delete subparagraph 5.2.3 in its entirety and substitute the following:

If the Owner or Architect has reasonable objection to a person or entity proposed by the Contractor, the Contractor shall propose another to whom the Owner or Architect has no reasonable objection. If no suitable substitute is agreed upon, the Owner will allow the Contractor to withdraw its bid without penalty.

ARTICLE 6 - CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS

- 6.1.1 Add the word "unreasonable" before the word "delay" in the last sentence, line 4.

- 6.1.4 Delete subparagraph 6.1.4 in its' entirety.

- 6.2.3 Delete the second sentence of subparagraph 6.2.3.

6.2.4 Delete the word "wrongfully" on line 1.

ARTICLE 7 - CHANGES IN THE WORK

7.3.3 Delete subparagraph 7.3.3.1 - 7.3.3.4 and substitute with the following:

- .1 Unit prices stated in the Contract Documents or subsequently agreed upon.
- .2 In the absence of unit prices, the mutual acceptance of a lump sum properly itemized and supported by sufficient substantiating data to permit evaluation, to be determined as follows:
 - A. The cost of labor performed and material used by the Contractor with his own forces.
 - B. The cost of Worker's Compensation, Federal Social Security, and Connecticut Unemployment Compensation at established rates, actual additional cost of payment and performance bonds.
 - C. Actual cost of rental rates for equipment (exclusive of hand tools) employed and used directly on the work.
 - D. Fifteen percent (15%) of (A), (B), and (C) above mentioned for overhead, superintendence and profit. However, if the work to be performed results in a credit to the Owner, no percentage of overhead and profit will apply.
 - E. On work to be performed by a Subcontractor, the Contractor's allowance, for overhead superintendence and profit, is to be ten percent (10%) applied to total cost of Subcontractor's work, including his allowance as per paragraph G.
 - F. On any changes involving the Contractor, Subcontractor or any Contractor of theirs, their total cost and/or omissions shall be combined as one before the application of the percentage allowed for the Contractor's overhead, superintendence and profit in accordance with paragraph E above.
 - G. On work to be performed by a Subcontractor, the Subcontractor's allowance is to be fifteen percent (15%) for his overhead, superintendence and profit applied to paragraphs A, B, and C.

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- H. The Contractor, when performing the work under A, B and C above shall, when requested, promptly furnish in a form satisfactory to the Owner, itemized statements of the cost of the work so ordered, including but not limited to, certified payrolls and copies of accounts, bills and vouchers to substantiate the above estimates.

7.3.4 Delete the word "shall" in line 4 and substitute the word "may".

7.3.7 Delete subparagraph 7.3.7 and substitute with the following:

If the Contractor does not respond promptly or disagrees with the method of adjustment in the Contract Sum, the method and adjustment shall be determined by the Architect in accordance with subparagraph 7.3.3. Under subparagraph 7.3.3 the Contractor shall keep and present, in such form as the Architect may prescribe, an itemized accounting together with appropriate supporting data.

7.3.8 Add the following sentence at the beginning of subparagraph 7.3.8:

"Pending final determination of cost to the Owner, amounts not in dispute may be included in Application for Payment."

7.3.9 Delete subparagraph 7.3.9 in its' entirety and substitute the following:

"If the Owner and Contractor do not agree with the adjustment in Contract Time or the method for determining it, the adjustment or the method shall be referred to the Architect for determination."

ARTICLE 8 - TIME

8.2.1 Delete second sentence only and change to read as follows:

By executing the Agreement the Contractor confirms that the Contract Time is a reasonable period for performing the Work and that he is capable of properly completing the Work within the Contract Time.

8.3.1 Delete the words "and arbitration" on line 4 and substitute with the words "or resolution of claims or disputes".

ARTICLE 9 – PAYMENTS AND COMPLETION

9.2 Add the words "and the Owner" after the word Architect on line 2 and add the words "or the Owner" after the word Architect on line 4.

9.2.1 Add subparagraph 9.2.1 as follows:

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The Schedule of Values to be submitted by the Contractor, will include, as a minimum, a separate line item for each Division of the Specifications. Any allowances called for in the Drawings and Specifications will be shown as a separate line item. Additional items to be listed may be required by the Architect.

9.3.1 Delete subparagraph 9.3.1 in its' entirety and substitute with the following:

Not later than the first day of each calendar month, the Contractor shall submit to the Architect an itemized Application for Payment for work performed during the previous month, notarized, supported by such data substantiating the Contractor's

right to payment as the Owner or the Architect may require, and reflecting retainage, if any, as provided elsewhere in the Contract Documents.

9.3.1.1 Delete 9.3.1.1 in its' entirety and substitute with the following:

In order to expedite monthly payments during the course of the project, the Contractor shall, no later than the first day of the month, review with the Architect and Owner a preliminary draft of the Application for Payment to assure agreement with the Contractor before final copies of the Application are typed and formally submitted. The Architect shall then review the Contractor's formal Application for Payment and certify in writing in accordance with Section 9.4, the total value of work done, including an allowance for the value of materials delivered and suitably stored at the site to the time of such estimate. The Owner shall retain five (5) percent of such estimated value until a maximum of five (5) percent of the Agreement sum has been retained, said retainage to be held by the Owner as part security for the fulfillment of the Agreement by the Contractor. Final payment, including the retainage, shall be due thirty (30) days after final completion of the work, provided the work be then fully completed and the Agreement fully performed.

9.3.3 Delete subparagraph 9.3.3 in its' entirety and substitute with the following:

The Contractor warrants that title to all work covered by an Application for Payment, except materials and equipment suitably stored on or off the site, will pass to the Owner no later than the time of payment. However, title to materials and equipment suitably stored on or off site shall not pass to the Owner until such time as said materials and equipment are properly installed by the Contractor even though payment for such materials and equipment may have been previously effected. The Contractor further warrants that upon submittal of an Application for Payment all Work for which Certificates for Payment have been previously issued and payments received from the Owner shall, to the best of the Contractor's knowledge, information and belief, be free and clear of liens, claims, security interests or encumbrances in favor of the Contractor, Subcontractors, material suppliers, or other persons or entities making a claim by reason of having provided labor,

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materials and equipment relating to the Work. This provision may not be explained, supplemented, or modified by a course of dealing, a usage of trade, a course of performance or other interpretation that may arise out of the commercial context in which this provision is used.

9.4.1 Delete subparagraph 9.4.1 in its' entirety and substitute with the following:

The Architect, will, not later than the seventh (7th) day of each calendar month, either issue and deliver to the Owner a Certificate for Payment, with a copy to the Contractor, for such amount as the Architect determined is properly due, or notify the Contractor and Owner in writing the Architect's reasons for withholding a Certificate as provided in sub-paragraph 9.5.1.

9.4.3 Add new subparagraph 9.4.3 as follows:

If the Application for Payment discloses any problems, the Architect shall immediately bring such problems to the Owner's attention.

9.5.1 Delete the word "reasonably" in line 1; delete the words "in the Architect's opinion" in lines 2 and 8; delete the word "repeated" in sub-subparagraph 9.5.1.7.

9.5.2 Add the following to subparagraph 9.5.2:

The Owner shall not be deemed in default by reason of withholding payment while any of the above grounds remain uncured as stated in paragraph 9.5.1.

9.5.4 Add new subparagraph 9.5.4 as follows:

No interest is to be allowed or paid by the Owner upon any monies retained under the provisions of this Contract.

9.6.1 Delete subparagraph 9.6.1 in its' entirety and substitute with the following:

After the Architect has issued a Certificate for Payments, the Owner shall make payment to the Contractor not later than the first Friday after the 15th day of the calendar month during which the Application has been submitted. Delays in submitting the application for payment in accordance with subparagraph 9.3.1 above will result in a corresponding delay in payment.

9.7 Delete the word "seven" on lines 1, 2 and 4 and replace with the word "fourteen" on both lines. Delete the words "plus interest as provided for in the Contract Documents" on line 7.

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9.8.2 Change subparagraph 9.8.2 as follows:

In line 1, add the words "and Architect" after the word "Owner" and change the word "agrees" to "agree" in line 1. Add the words "and Owner" after the word "Architect" on line 3.

9.8.3 Insert the words "and Owner" after the word "Architect" on lines 1 and 6. Insert the words "and Owner's" after the word "Architect's" on line 2.

9.8.5 Delete subparagraph 9.8.5 in its' entirety and substitute the following:

"The Certificate of Substantial Completion shall be submitted to the Owner and Contractor for their written acceptance of responsibilities assigned to them in such Certificate. Upon Substantial Completion of the Work or designated portion thereof and upon application by the Contractor and certification by the Architect, the Owner shall make payment reflecting adjustments in retainage, if any, for such work or portion thereof as provided in the Contract Documents."

9.10.1 Add the words "and Owner" on both lines 2 and 3 after the word "Architect".

9.10.2 Delete subparagraph 9.10.2 in its' entirety and substitute with the following:

Neither final payment nor any remaining retained percentage shall become due until the Contractor submits to the Architect in a form satisfactory to the Owner (1) an affidavit that payrolls, bills for materials and equipment, and other indebtedness connected with the Work for which the Owner or the Owner's property might be responsible or encumbered (less amounts withheld by Owner) have been paid or otherwise satisfied, (2) a certificate evidencing that insurance required by the Contract Documents to remain in force after final payment is currently in effect and will not be canceled or allowed to expire until at least 30 days after written notice has been given to the Owner, (3) a written statement that the Contractor knows of no substantial reason that the insurance will not be renewable to cover the period required by the Contract Documents, (4) consent of surety, if any, to final payment, (5) final prints for record drawing use marked by the Contractor with record information as set forth in the Contract Documents, (6) a final sworn statement from the Contractor duly executed and acknowledged showing all Subcontractors to be fully paid and similar sworn statements from Subcontractors and, where appropriate, from Sub-Subcontractors, (7) if required by the Owner, other data establishing payment or satisfaction of obligations, such as receipts, releases and waivers of liens, claims, security interests or encumbrances arising out of the Contract, to the extent and in such form as may be designated by the Owner. If a Subcontractor or Sub-Subcontractor refuses to furnish a release or waiver required by the Owner, the Contractor may furnish a bond satisfactory to the Owner to indemnify the Owner against such lien. If such lien remains unsatisfied after payments are made, or is not bonded over as provided in the preceding sentence, the Contractor shall promptly

pay to the Owner all money that the Owner may be compelled to pay in discharging such lien, including all costs and reasonable attorneys' fees.

ARTICLE 10 - PROTECTION OF PERSONS AND PROPERTY

10.2.1.4 Add the following as new sub-subparagraph 10.2.1.4:

the environment, including, without limitation, air, water, land, including wetlands, and other natural resources, and plant and animal life of all types.

10.2.2 Delete subparagraph 10.2.2 in its' entirety and substitute with the following:

The Contractor shall give notices and comply with applicable laws (including, without limitation, the requirements of Connecticut General Statutes Section 31-40m relating to toxic substances and the requirements of the Occupational Safety and Health Act and the Construction Safety Act of 1969, as amended, and regulations and standards promulgated thereunder), ordinances, rules, regulations and lawful orders of public authorities bearing on safety of persons or property or the environment or their protection from damage, injury, destruction, pollution or loss. Said laws, ordinances, rules, regulations, standards, and lawful orders are incorporated herein by reference.

10.2.2.1 Add new sub-subparagraph 10.2.2.1 as follows:

The Contractor shall be directly responsible for compliance therewith on the part of its agents, employees, materialmen and Subcontractors and shall directly receive and be responsible for all citations, assessments, fines or penalties which may be incurred by reason of its agents', employees', materialmen's or Subcontractors' failure to so comply.

10.2.4 Add the following to subparagraph 10.2.4:

The Contractor shall comply fully and require compliance with all applicable laws, including Connecticut General Statutes Sec. 16-345, et. seq., and the regulations promulgated thereunder, relating to discharge of explosives.

10.2.5 Add the number "10.2.1.4" after the number "10.2.1.3" on lines 2 and 5.

10.2.8 Delete the number "21" in line 4 and replace with the number "10".

10.2.9 Delete the number "21" in line 4 and replace with the number "10".

Add new subparagraph 10.2.9 as follows:

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The Contractor shall be responsible for the adequate strength and safety of all scaffolding, staging and hoisting equipment and for temporary shoring, bracing and tying.

10.2.10 Add new subparagraph 10.2.10 as follows:

The Contractor shall protect all streets, roads and sidewalks and shall make all necessary repairs at his own expense, and shall maintain these reasonably clean of dirt, mud or other debris that is due to the construction operation.

10.2.11 Add new subparagraph 10.2.11 as follows:

It shall be the Contractor's responsibility to protect finished sidewalks and curbs against damage caused by trucks, etc., driving over them. If they are damaged they must be replaced by the Contractor without cost to the Owner.

10.2.12 Add new subparagraph 10.2.12 as follows:

The Contractor shall furnish approved hard hats, other personal protective equipment as required, approved first aid supplies, name of first aid attendant and a posted list of emergency facilities.

10.3.2 Delete subparagraph 10.3.2 in its' entirety and substitute with the following:

The Owner shall obtain the services of a licensed laboratory to verify the presence of absence of the material or substance reported by the Contractor and, in the event such material or substance is found to be present, to verify that it has been rendered harmless. When the material or substance has been rendered harmless, work in the affected area shall resume. The Contract Time may be extended appropriately.

10.3.3 Delete subparagraph 10.3.3 in its' entirety.

10.3.4 Insert a period after the word "Site" on line 2 and delete the rest of the paragraph.

10.3.6 Delete paragraph 10.3.6 in its' entirety.

ARTICLE 11 - INSURANCE AND BONDS

11.1.2 – 11.3.10 Delete subparagraphs 11.1.2 through 11.3.10 in their entirety and replace them with the attached Indemnification and Insurance Exhibit which shall be fully incorporated by reference into this Agreement.

11.4.3 Add new subparagraph 11.4.3 as follows:

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The Contractor shall increase the principal amount of the performance and labor and materials payments bond(s) in direct proportion to any increase in the value of the Contract resulting from such change orders.

11.4.4 Add new subparagraph 11.4.4 as follows:

Bonds furnished by the Contractor shall comply with all relevant Connecticut statutes including Conn. Gen. Stat. Sec. 49-41.

ARTICLE 12 - UNCOVERING AND CORRECTION OF WORK

12.1.1 Add the words "or Owner's" after the word "Architect's" in lines 1 and 3. Add the words "or Owner" after the word "Architect" in line 2.

12.1.2 Add the words "or Owner" after the word "Architect" on lines 1 and 2.

12.2.2 Delete sub-subparagraphs 12.2.2.1, 12.2.2.2 and 12.2.2.3 in their entirety and substitute with the following:

12.2.2 If, within one year after the date of final completion of the Work or designated portion thereof, or after the date for commencement of warranties established under subparagraph 9.9.1, or by terms of any applicable special warranty required by the Contract Documents, any of the Work is found to be not in accordance with the requirements of the Contract Documents, the Contractor shall correct it promptly at the Contractor's sole expense after receipt of written notice from the Owner to do so unless the Owner has previously given the Contractor a written acceptance of such condition. This period of one year shall be extended with respect to portions of Work first performed after final completion, by the period of time between final completion and the actual performance of the Work. This obligation under this subparagraph 12.2.2 shall survive acceptance of the Work under the Contract and termination of the Contract. The Owner shall give such notice promptly after discovery of the condition.

ARTICLE 13 - MISCELLANEOUS PROVISIONS

13.1 Add the following to the end of subparagraph 13.1:

The Work shall comply with all applicable laws, statutes, ordinances, codes, rules, regulations or orders during its performance and its completion.

13.4.1 Delete the words "by law" in line 3 and substitute with the words "at law or in equity".

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13.4.3 Add new subparagraph 13.4.3 as follows:

No provision contained in the Contract Documents shall create or give to third parties any claim or right of action against the Owner or the Contractor except as specifically provided herein.

13.5.1 Delete subparagraph 13.5.1 in its' entirety and substitute with the following:

If the Contract Documents, or any laws, ordinances, building codes, rules, regulations or orders of any governmental body or public or quasi-public authority having jurisdiction over the Work or the site of the Project require any portion of the Work to be inspected, tested or approved, the Contractor shall give the Architect and the Owner timely notice thereof so Architect and Owner may observe such inspection, testing or approval. The Contractor shall bear all costs of such inspections, test or approvals except where the Contract Documents provide otherwise.

13.6 Delete subparagraph 13.6 in its' entirety.

13.7 Delete paragraph 13.7 in its' entirety.

13.8 CAPTIONS

13.8. The captions and headings of various Articles and Paragraphs in the Contract Documents are for convenience only and are not to be construed as defining or limiting, in any way, the scope or intent of the provisions hereof.

13.9 Add a new Paragraph 13.9 as follows:

13.9 SEVERABILITY

13.9 The invalidity of any covenant, restriction, condition, limitation in any other part or provision of the Contract Documents shall not impair or affect in any manner the validity, enforceability or effect of the remainder of the Contract Documents.

13.10 Add a new Paragraph 13.10 as follows:

In the event of any unavoidable cause beyond the control of the parties, whether natural or man-made, which renders the performance of this contract impossible, the contract shall be terminated. Such occurrences shall include, without limitation, death of the Contractor (in the event that the Contractor is a sole proprietor); destruction of all, or a major portion of the Contractor's equipment; legal order by a court of competent jurisdiction, or referendum barring performance of the contract;

war, famine, flood, plague, pestilence or act of God. Any amounts due to either party by the other as the result of actions taken pursuant to the contract prior to the occurrence which renders performance impossible shall be paid, but no further sums shall be due from either party to the other, by way of damages for the termination of the contract.

13.11 Add new paragraph 13.11 as follows:

The Contractor shall comply with Section 12-43 of the Connecticut General Statutes as may be amended.

Sec. 12-43. Property of nonresidents. All owners of real estate, or of tangible personal property located in any town for three months or more during the assessment year immediately preceding any assessment day, who are nonresidents of such town, shall file lists of such real estate and personal property with the assessors of the town in which the same is located on such assessment day, if located in such town for three months or more in such year, otherwise, in the town in which such property is located for the three months or more in such year nearest to such assessment day, under the same provisions as apply to residents, and such personal property shall not be liable to taxation in any other town in this state. The list of each nonresident taxpayer shall contain his post-office and street address. The assessors shall mail to each nonresident, or to his attorney or agent having custody of his taxable property, at least fifteen days before the expiration of the time for filing lists, blank forms for filing lists of such property. The lists of taxable property of nonresidents shall be arranged in alphabetical order and separate from the lists of residents, provided no such separation shall be necessary in any town the board of assessors of which, upon the request of its property tax collector, has made rules and regulations approved by the secretary of the office of policy and management setting up an alternative method of arrangement.

ARTICLE 14 - TERMINATION OR SUSPENSION OF THE CONTRACT

14.1.1 Delete the number "30" on line 1 and substitute with the number "60".

14.1.3 Delete subparagraph 14.1.3 in its entirety and substitute with the following:

If one of the reasons described in subparagraph 14.1.1 or 14.1.2 exists, the Contractor may, upon seven additional days written notice to the Owner and Architect, terminate the Contract and recover from the Owner payment for work executed.

14.2.1 Delete subparagraph 14.2.1 in its' entirety and substitute with the following:

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- 14.2.1 The Owner may terminate the Contract for any of the following causes:
- 14.2.1.1 If the Contractor shall institute or consent to proceedings requesting relief or arrangement under the Federal Bankruptcy Act or any similar or applicable federal or state law or if a petition under any federal or state bankruptcy or insolvency law is filed against the Contractor and such petition is not dismissed within sixty (60) days from the date of said filing, or if the Contractor admits in writing his inability to pay his debts generally as they become due, or if he makes a general assignment for the benefit of his creditors, or if a receiver, liquidator, trustee or assignee is appointed on account of his bankruptcy or insolvency; or
- 14.2.1.2 If a receiver of all or any substantial portion of the Contractor's properties is appointed; or
- 14.2.1.3 If the Contractor abandons the Works; or
- 14.2.1.4 If the Contractor fails to prosecute the Work promptly and diligently; or
- 14.2.1.5 If the Contractor fails or refuses to supply enough properly skilled workers or proper materials for the Work; or
- 14.2.1.6 If the Contractor submits an Application for Payment, sworn statement, waiver of lien, affidavit or document of any nature whatsoever which is intentionally falsified; or
- 14.2.1.7 If the Contractor fails to make prompt payment to Subcontractors or for materials or labor or otherwise breaches his obligations under any Subcontract with a Subcontractor; or
- 14.2.1.8 If a mechanic's or materialman's lien or notice of lien is filed against any part of the Work or the site of the Project and not promptly bonded or insured over by the Contractor in a manner satisfactory to the Owner; or
- 14.2.1.9 If the Contractor disregards any laws, statutes, ordinances, rules, regulations or orders of any governmental body or public or quasi-public authority having jurisdiction of the Work or the site of the Project; or

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14.2.1.10 If the Contractor otherwise substantively violates any provision of the Contract Documents.

14.2.2.1 Delete the semicolon after "Contractor" in line 2 and add:

and may request that the Contractor remove any part or all of his equipment, machinery, and supplies from the site of the Project within seven (7) days from the date of such request, and in the event of Contractor's failure to do so, may remove or store such equipment, machinery and supplies at the Contractor's expense;

14.2.4 Delete subparagraph 14.2.4 in its' entirety and substitute with the following:

If the unpaid balance of the Contract Sum exceeds all costs to the Owner of completing the Work, then the Contractor shall be paid for all Work performed by the Contractor to the date of termination. If such costs to the Owner of completing the Work exceed such unpaid balance, the Contractor shall pay the difference to the Owner immediately upon the Owner's demand. The costs to the Owner of completing the Work shall include (but not be limited to) the cost of any additional architectural, managerial and administrative services required thereby, any costs incurred in retaining another Contractor or other Subcontractors, any additional interest or fees which the Owner must pay by reason of a delay in completion of the Work, attorney's fees and expenses, and any other damages, costs and expenses the Owner may incur by reason of completing the Work or any delay thereof. The amount, if any, to be paid to the Owner or Contractor shall be certified by the Architect, upon application, in the manner provided in Paragraph 9.4, and this obligation for payment shall survive the termination of the Contract".

14.3.2 In line 1, delete "shall" and insert "may".

14.4.3 On line 2, insert a period after the word "termination" and delete the remaining words on lines 2 and 3.

ARTICLE 15 – CLAIMS AND DISPUTES

15.1.2 Delete the number "21" in line 4 and replace with the number "10".

15.2.1 Delete subparagraph 15.2.1 and substitute the following:

Decision of Architect. Claims, including those alleging an error or omission by the Architect, shall be referred initially to the Architect for decision. A decision by the Architect shall be required as a condition precedent to mediation, litigation or other formal method of dispute resolution of all Claims between the Contractor and the Owner arising prior to the date final payment is due, unless no decision has been

TOWN OF WEST HARTFORD
SUPPLEMENTARY GENERAL CONDITIONS

rendered by the Architect within 45 days of referral of the Claim to the Architect or the Architect fails to provide a decision as scheduled in subparagraphs 15.2.2 through 15.2.5, whichever is later.

15.2.2 On line 4 add the word "or" after the word "Claim," and add a period after the word "compromise." Delete the balance of the paragraph after the word "compromise".

15.2.3 On lines 3 and 4 replace the words "Owner" and "Owner's" with "claimant" and "claimant's".

15.2.4 Delete the last sentence of subparagraph 15.2.4 and substitute the following:

"Within 10 days of receipt of the response or supporting data, if any, the Architect will either reject or approve the claims in whole or in part, or suggest a compromise."

15.2.5 Delete the second sentence of subparagraph 15.2.5.

15.2.9 Add new subparagraph 15.2.9 as follows:

If a claim has not been resolved after consideration of steps described in subparagraphs 15.2.1 through 15.2.5, then the parties shall make an additional good faith effort to resolve the claim through an informal dispute resolution process mutually agreeable to the parties. If the claim is still not capable of resolution within ten days or such other time period that is mutually agreed upon, the parties may proceed to arbitration, litigation, or formal alternate dispute resolution.

15.2.10 Add new subparagraph 15.2.10 as follows:

If no form of dispute resolution is mutually agreed upon, no party may compel arbitration, mediation or alternate dispute resolution, and the parties may pursue whatever legal remedies are available to them.

15.3 (15.3.1 – 15.3.3) Delete in its' entirety.

15.4 (15.4.1 – 15.4.3) Delete in its' entirety.

END OF SUPPLEMENTARY GENERAL CONDITIONS

PROJECT MANUAL
TOWN OF WEST HARTFORD
CONNECTICUT

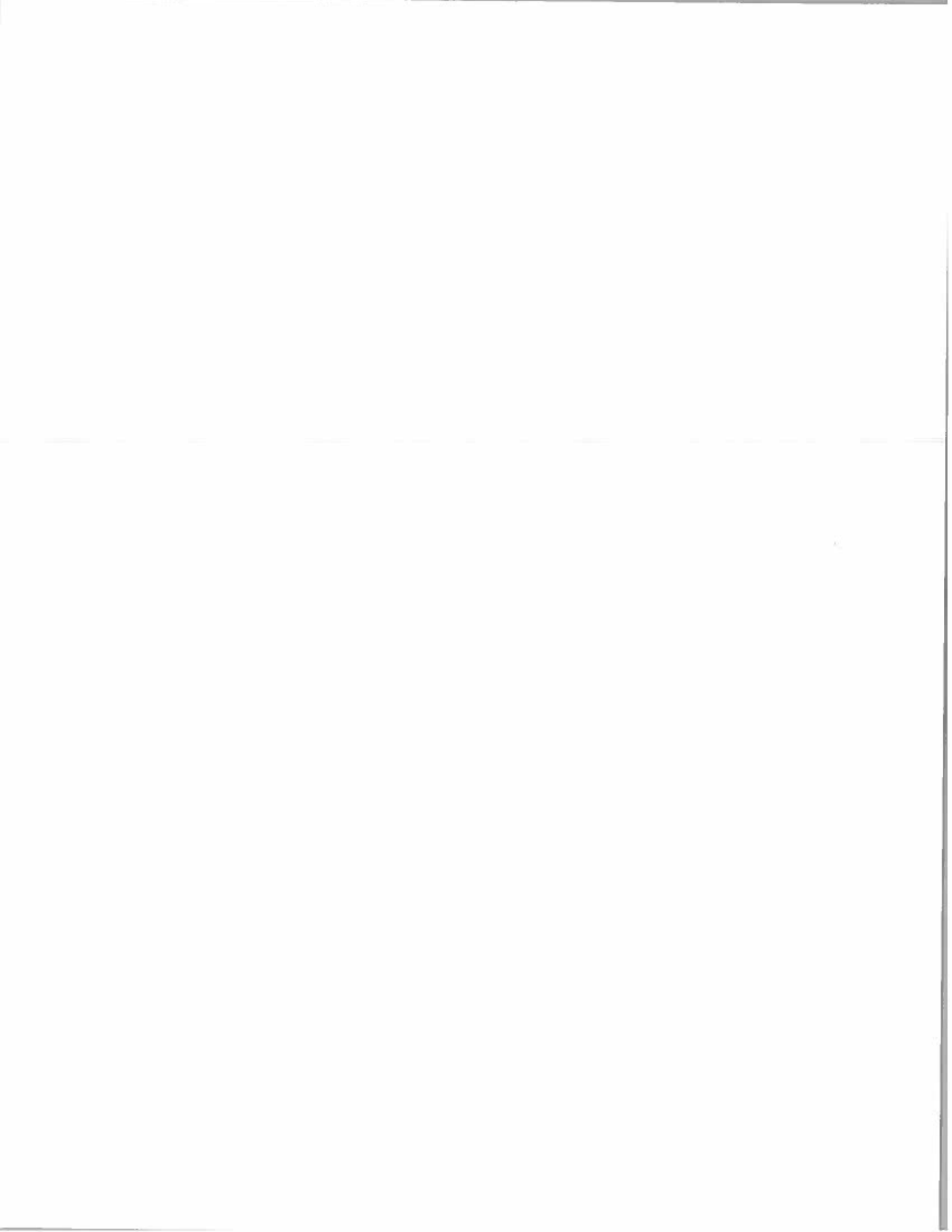
Roof Replacement
KING PHILIP MIDDLE SCHOOL
Phase 3 of 3

100 KING PHILIP DRIVE
WEST HARTFORD, CT 06117

CD Submission: December 1, 2017
Issued for Bid: May 4, 2018



Architect/Engineers/Interior Designers
Silver/Petrucci + Associates, Inc.
3190 Whitney Avenue
Hamden, Connecticut 06518



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ROOF REPLACEMENT – PHASE 3

**TOWN OF WEST HARTFORD
KING PHILIP MIDDLE SCHOOL
100 KING PHILIP DRIVE
WEST HARTFORD, CT 06117**

S/P+A PROJECT NO. 10.277

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END OF SECTION

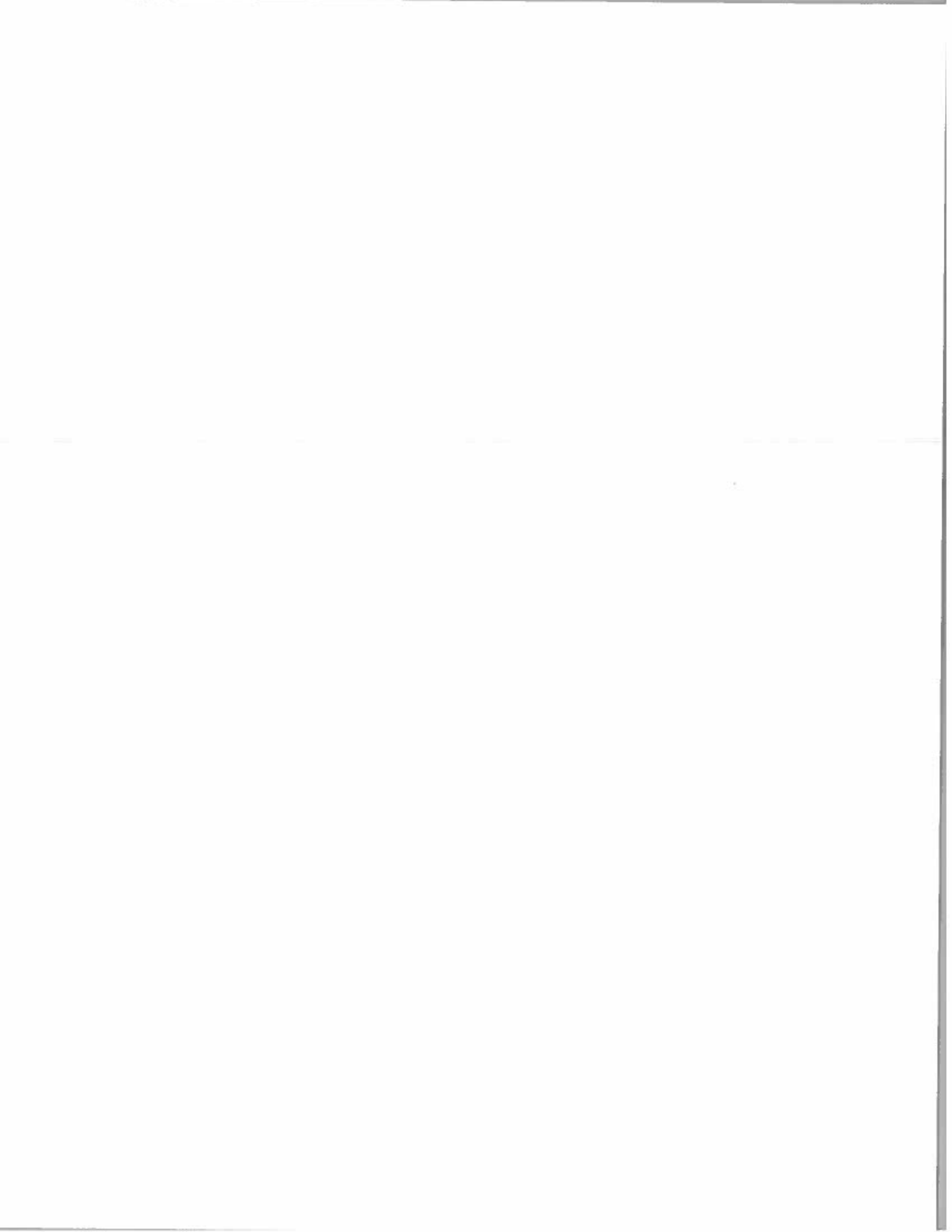
ROOF REPLACEMENT – PHASE 3

**TOWN OF WEST HARTFORD
KING PHILIP MIDDLE SCHOOL
100 KING PHILIP DRIVE
WEST HARTFORD, CT 06117**

S/P+A PROJECT NO. 10.277

<u>Drawing Number</u>	<u>Drawing Name</u>
C1	COVER SHEET
A1	CODE INFORMATION
A2	OVERALL ROOF PLAN
A3	ROOF PLAN PART '1'
	ROOF DETAILS
RP-1	ROOF ASBESTOS & PCB ABATEMENT PLAN

END OF DRAWING LIST



1 PART 1 – GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 PROJECT DESCRIPTION

- A. The Project generally includes, but is not necessary limited to the following major elements:
 - 1. Removal and disposal of asbestos containing and other hazardous materials.
 - 2. Removal of existing membrane roofing, insulation, cant strips and tapered edges, flashings, termination bars, scuppers, gravel stops, collection boxes, and metal caps.
 - 3. Off-site disposal of all removed materials.
 - 4. Removal and replacement of deteriorated wood blocking and concrete deck.
 - 5. Removal of existing and installation of new brick masonry, through-wall flashing and weep vents where indicated on the Drawings.
 - 6. Installation of EPDM sheet roofing, adhered underlayment, flashings, flat and tapered insulations.
 - 7. New flashings, caps, fasciae, manufactured edges, gutters, downspouts and other trim metal work as detailed and specified and sealants.
 - 8. Painting of existing ladders and exterior soffits.
 - 9. Removal of existing and installation of new roof drains and related piping and pipe insulation as indicated in the construction documents.
 - 10. Removal and reinstallation of mechanical units as indicated in Drawings.
 - 11. Provide cutting/boring and patching/firesafing for any new mechanical and electrical penetrations up to 6 inches in diameter.

1.3 CONTRACTOR USE OF PREMISES

- A. General: Limit use of the premises to construction activities in areas indicated; allow for Owner occupancy and use by the public.
- B. Confine operations to as small work areas and accessways as possible. As much as possible and without damage to the finishes, doors and related building systems, access the project area via the service doors designated by the Owner for the small portion of interior work.
- C. Keep driveways and entrances serving the premises clear and available to the Owner and the occupants at all times. Do not use these areas for parking or storage of materials. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on site.

- D. Maintain existing egress patterns, exit doors and means of egress during construction, which will include the provision of temporary walkways, sidewalks or other means necessary to provide adequate life safety for the building occupants, particularly at exitways which must continue to be open and serviceable while adjacent construction activity occurs.
- E. Use of the Existing Building: Maintain the existing building in a weathertight condition throughout the construction period. Repair damage caused by construction operations. Take all precautions necessary to protect the building and its occupants during the construction period.

1.4 OWNER OCCUPANCY

- A. Full Owner Occupancy: The Owner will occupy the site and existing building during the entire construction period, with children on site during the school year. Cooperate with the Owner during construction operations to minimize conflicts and facilitate Owner usage. Perform the Work so as not to interfere with the Owner's operations. Pre-schedule construction operations with the Owner for areas that must be evacuated for extended periods, giving the Owner the opportunity to relocate operations to non-affected areas.
 - 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 seventy-two (72) hours in advance of activities that will affect Owner's operations.

1.5 SPECIAL REQUIREMENTS

- A. The Contractor shall insure that all work performed is done so in a safe manner and that all of his/her employees shall adhere to all applicable safety procedures and practices at all times. The Contractor shall be aware at all times that additional safety considerations should be taken. Particular care shall be taken by the Contractor, Subcontractors and all those in their employ, that all tools, equipment, ladders, etc. are never left unsupervised.
- B. Under no circumstances shall the students or buildings' occupants be subjected to fumes or other deleterious effects of the operation on days that school is in session. Should material delivery, demolition or construction operations, inclement weather or related schedule conditions produce this situation (as determined by the Principal), the Contractor shall be required to suspend operations that produce the offending effects until such time as the building is not occupied, or as approved by the Owner.

SUMMARY OF WORK

1. **Meaningful Instruction:** Meaningful instruction (as determined by the Principal) must be facilitated and possible within the building at all times. This requirement may limit the Contractor's demolition and construction operations as the distraction represented by hammering, material movement, etc. may disrupt classes. No down time or mobilization charges will be permitted should the meaningful instruction requirement suspend the Contractor's operations for any length of time.
 2. **Mastery and SBAC Tests:** During the latter part of March and into April, Connecticut Mastery and SBAC Tests may be administered to portions of the student population, which requires absolute concentration on the part of the students. The Principal may prohibit construction operations during the administration of these tests. Cooperate with the principal to determine the schedule, locations of the testing and where operations may proceed with disrupting classroom or roofing operations.
- C. Smoking will not be permitted inside the building or on the grounds. Strict adherence to the smoking regulations will be enforced for the entire duration of the construction.
- D. There will be absolutely **no** fraternizing with the students by construction personnel. Anyone caught doing so will be required to leave the jobsite and will not be permitted to return. Such dismissal shall not give the contractor grounds for default on any other contract requirements, including the construction schedule.
- E. **Site Security – Identification Badges**
1. The Contractor shall provide a list of all contact persons. The list shall include each trade, name of Contractor, contact person(s), phone numbers, fax numbers, Federal Employer Identification Number (FEIN), social security number if FEIN is not available, and Connecticut Tax Registration number.
 2. **Prior to the start** of work all Contractor and Sub-Contractor personnel assigned to perform work shall be required to fill out and submit to a background check at a cost provided by the Contractor. All information shall be submitted to the Town of West Hartford. Information for background check includes the following:
 - a. Identity Verification
 - b. Criminal Background
 - c. Additional checks as deemed warranted
 3. Security badges will be worn by all project personnel during construction activities. The Contractor will provide badges at no cost to the Owner. The Contractor will be responsible for monitoring the display of badges, including those of the personnel of all subcontractors and visitors to the

project site. Badges shall be issued in a contrasting color from school employees, with photo and name plainly visible.

- F. **Preconstruction Meeting:** Prior to any work on site, the Contractor(s) must convene, attend and document a preconstruction meeting with the Architect, General Contractor's staff and School personnel to determine the delivery and installation coordination requirements and the expectations for the execution and completion of the project. The meeting must produce a comprehensive, cooperatively produced schedule for the contractor's operations during the course of the work.

2 PART 2 – PRODUCTS

Not Used

3 PART 3 – EXECUTION

Not Used

END OF SECTION

1 PART 1 – GENERAL

1.1 SECTION INCLUDES

- A. Quantity Allowances
- B. Schedule of Values
- C. Application for Payment
- D. Change procedures
- E. Measurement and Payment – Unit Prices
- F. Alternates

1.2 RELATED SECTIONS

- A. Section 01300 – Submittals: Schedule of Values
- B. Section 01600 – Material and Equipment: Product substitutions

1.3 QUANTITY AND UNIT COST ALLOWANCES

- A. Costs Included in Allowances: Cost of Product to Contractor or Subcontractor, less applicable trade discounts; delivery to site and applicable taxes.
- B. Architect Responsibilities:
 - 1. Consult with Contractor in consideration and selection of Products, suppliers and installers.
 - 2. Select Products in consultation with Owner and transmit decision to Contractor.
 - 3. Prepare Change Order.
- C. Contractor Responsibilities:
 - 1. Assist Architect in determination of scope of work, selection of Products, suppliers and installers.
 - 2. Obtain proposals from suppliers and installers and offer recommendations.
 - 3. On notification of selection by Architect execute purchase agreement with designated supplier and installer.
 - 4. Arrange for and process shop drawings, product data and samples. Arrange for delivery.
 - 5. Promptly inspect Products upon delivery for completeness, damage and defects. Submit claims for transportation damage.
- D. Funds will be drawn from Allowances only by Change Order.
- E. Allowances listed are to be included in the base bid proposal and alternate proposal, for the "Base Bid" as listed on the Bid Form. Their values will be tracked during the course of the project, with deletions from the contract price by

CONTRACT CONSIDERATIONS

change order should the listed quantities not be removed or installed; or added to the contract price by change order should quantities exceeding those referenced in the Allowances be required by field conditions.

F. Allowances:

1. **Allowance No. 1 – Concrete Deck Replacement:** As it is impractical to quantify the amount of concrete roof decking that may be deteriorated under the existing roof membranes at the time of bid, the Contractor shall include the cost based on the Contractor's unit price an allowance of the concrete roof decking area indicated in the construction documents, as indicated in Section 03500. Should concrete decking be encountered that at the Architect's direction require removal, the Contractor shall do so, deducting the amount of the affected installation or installations from the allowance amount referenced below. Removal and replacement shall include all fasteners, accessories, removal and disposal (including all manpower, tools and materials). The concrete deck replacement allowance shall be 2,000 square feet of the total concrete roof deck area for which membranes are being removed and replaced, as indicated in the construction documents.
2. Allowances that are unused, partially unused or omitted from the Contract shall be credited to the Owner at the full Unit Price value with no proration.

1.4 SCHEDULE OF VALUES

- A. Submit typed schedule on AIA Form G703 – Application and Certificate for Payment Continuation Sheet.
- B. Submit Schedule of Values in duplicate within fifteen (15) days after date of Owner-Contractor Agreement established in Notice to Proceed.
- C. Format: Utilize the Table of Contents of this Project Manual. Identify each line item with number and title of the major specification Section. Identify site mobilization, bonds and insurance. Elevations should be broken down by area into material and labor costs.
- D. Include within each line item, a direct proportional amount of Contractor's overhead and profit.
- E. Revise schedule to list approved Change Orders, with each Application for Payment.
- F. If work is to be scheduled during overtime or weekend hours, it will be the Contractor's responsibility to cover the cost for custodians.

1.5 APPLICATIONS FOR PAYMENT

- A. Submit three (3) copies of each application on AIA Form G702 – Application and Certificate for Payment.
- B. Content and Format: Utilize Schedule of Values for listing items in Application for Payment.
- C. Provide insurance certificates and verification of material in storage included in the application for payment.

1.6 CHANGE PROCEDURES

- A. The Architect will advise of minor changes in the Work not involving an adjustment to Contract Sum/Price or Contract Time as authorized by AIA A201, 2007 Edition, Article 7.4 by issuing supplemental instructions on AIA Form G710.
- B. The Architect may issue a Proposal Request or Notice of Change which includes a detailed description of a proposed change with supplementary or revised Drawings and Specifications, a change in Contract Time for executing the change with a stipulation of any overtime work required and the period of time during which the requested price will be considered valid. Contractor will prepare and submit an estimate within seven (7) calendar days.
- C. The Contractor may propose changes by submitting a request for change to the Architect, describing the proposed change and its full effect on the Work. Include a statement describing the reason for the change, and the effect on the Contract Sum/Price and Contract Time with full documentation and a statement describing the effect on Work by separate or other contractors. Document any requested substitutions in accordance with Section 01600.
- D. Stipulated Sum/Price Change Order: Based on Proposal Request and Contractor's fixed or maximum price quotation or Contractor's request for a Change Order as approved by Architect.
- E. Unit Price Change Order: For pre-determined unit prices and quantities, the Change Order will be executed on a fixed unit price basis. For unit costs or quantities of units of work which are not pre-determined, execute Work under a Construction Change Authorization. Changes in Contract Sum/Price or Contract Time will be computed as specified for Time and Material Change Order.
- F. Construction Change Authorization: Architect may issue a directive, on AIA Form G714 Construction Change Directive, instructing the Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order. Document will describe changes in the Work, and designate method of

CONTRACT CONSIDERATIONS

determining any change in Contract Sum/Price or Contract Time. Promptly execute the change.

- G. Time and Material Change Order: Submit itemized account and supporting data after completion of change, within time limits indicated in the Conditions of the Contract. Architect will determine the change allowable in Contract Sum/Price and Contract Time as provided in the Contract Documents.
- H. Maintain detailed records of work done on Time and Material basis. Provide full information required for evaluation of proposed changes, and to substantiate costs for changes in the Work.
- I. Change Order Forms: AIA G701 Change Order.
- J. Execution of Change Orders: Architect will issue Change Orders for signatures of parties as provided in the Conditions of the Contract.

1.7 MEASUREMENT AND PAYMENT – UNIT PRICES

- A. Authority: Measurement methods are delineated in the individual specification sections.
- B. Take all measurements and compute quantities. The Architect will verify measurements and quantities.
- C. Payment Includes: Full compensation for all required labor, Products, tools, equipment, plant, transportation, services and incidentals; erection, application or installation of an item of the Work; overhead and profit.

1.8 ALTERNATES

- A. Voluntary alternates quoted on Bid Forms will be reviewed and accepted or rejected at the Owner's option. Accepted Alternates will be identified in Owner-Contractor Agreement.
- B. Coordinate related work and modify work as required.

2 PART 2 – PRODUCTS

Not Used

3 PART 3 – EXECUTION

Not Used

END OF SECTION

1 PART 1 – GENERAL

1.1 SECTION INCLUDES

- A. Requirements and limitations for cutting and patching of Work

1.2 RELATED SECTIONS

- A. Section 01010 – Summary of Work: Work by Owner or by separate contractors
- B. Section 01300 – Submittals
- C. Section 01600 – Materials and Equipment: Product Options and Substitutions
- D. Individual Product Specification Sections:
 - 1. Cutting and patching incidental to work of the Section
 - 2. Advance notification to other Sections of openings required in work of those Sections
 - 3. Limitations on cutting mechanical or electrical systems

1.3 SUBMITTALS

- A. Submit written request in advance of cutting or alteration which affects:
 - 1. Structural integrity of any element of Project.
 - 2. Integrity of weather-exposed or moisture-resistant element.
 - 3. Efficiency, maintenance, or safety of any operational element.
 - 4. Visual qualities of sight exposed elements.
 - 5. Work of Owner or separate contractor.
- B. Include in request:
 - 1. Location and description of affected work.
 - 2. Necessity for cutting or alteration.
 - 3. Description of proposed work, and products to be used.
 - 4. Alternatives to cutting and patching.
 - 5. Effect on work of Owner or separate contractor.
 - 6. Written permission of affected separate contractor.
 - 7. Date and time work will be executed.

2 PART 2 – PRODUCTS

2.1 MATERIALS

- A. Primary Products: Those required for original installation.
- B. Product Substitution: For any proposed change in materials, submit request for substitution under provisions of Section 01600.

3 PART 3 – EXECUTION

3.1 EXAMINATION

- A. Inspect existing conditions prior to commencing Work, including elements subject to damage or movement during cutting and patching.
- B. After uncovering existing work, inspect conditions affecting performance of work.
- C. Beginning of cutting or patching means acceptance of existing conditions.

3.2 PREPARATION

- A. Provide temporary supports to ensure structural integrity of the Work. Provide devices and methods to protect other portions of Project from damage.
- B. Provide protection from elements for areas which may be exposed by uncovering work.

3.3 CUTTING AND PATCHING

- A. Execute cutting, fitting, and patching to complete work.
- B. Fit products together, to integrate with other work.
- C. Uncover work to install ill-timed work.
- D. Remove and replace defective or non-conforming work.
- E. Remove samples of installed work for testing when requested.
- F. Provide openings in the work for penetration of mechanical and electrical work.

3.4 PERFORMANCE

- A. Execute work by methods to avoid damage to other Work, and which will provide appropriate surfaces to receive patching and finishing.
- B. Employ original installer to perform cutting and patching for weather exposed and moisture resistant elements, and sight-exposed surfaces.
- C. Cut rigid materials using masonry saw or core drill. Pneumatic tools not allowed without prior approval.
- D. Restore work with new products in accordance with requirements of Contract Documents.
- E. Fit work air tight to pipes, sleeves, ducts, conduit and other penetrations through surfaces.

CUTTING AND PATCHING

- F. Refinish surfaces to match adjacent finish. For continuous surfaces, refinish to nearest intersection or natural break. For an assembly, refinish entire unit.

END OF SECTION

1 PART I – GENERAL

1.1 SECTION INCLUDES

- A. Submittal procedures
- B. Construction progress schedules
- C. Proposed products list
- D. Shop drawings
- E. Product data
- F. Samples
- G. Manufacturers' instructions
- H. Manufacturers' certificates

1.2 RELATED SECTIONS

- A. Section 01019 – Schedule of Values
- B. Section 01700 – Contract Closeout: Contract warranty and manufacturer's certificates and related closeout submittals
- C. Section 01740 – Warranties and Bonds: Special warranties and guarantees issues by sub-contractors, manufacturers and others

1.3 SUBMITTAL PROCEDURES

- A. Transmit each submittal with Architect accepted form.
- B. Sequentially number the transmittal forms. Re-submittals to have original number with an alphabetic suffix.
- C. Identify Project, Contractor, Subcontractor or supplier; pertinent Drawing sheet and detail number(s), and specification Section number, as appropriate.
- D. Apply Contractor's stamp, signed or initialed certifying that review, verification of Products required, field dimensions, adjacent construction Work and coordination of information, is in accordance with the requirements of the Work and Contract Documents.
- E. Schedule submittals to expedite the Project, and deliver to Architect at business address. Coordinate submission of related items.
- F. Identify variations from Contract Documents and Product or system limitations which may be detrimental to successful performance of the completed Work.
- G. Provide space for Contractor and Architect review stamps.

- H. Revise and resubmit submittals as required, identify all changes made since previous submittal.
- I. Distribute copies of reviewed submittals to concerned parties. Instruct parties to promptly report any inability to comply with provisions.

1.4 CONSTRUCTION PROGRESS SCHEDULES

- A. Submit initial progress schedule in duplicate within fifteen (15) days after date established in Notice to Proceed or Contract Award for Architect review.
- B. Revise and resubmit as required.
- C. Submit revised schedules every two (2) weeks identifying changes since previous version. This will be closely tracked to assure that the schedule is being maintained.
- D. Submit a horizontal bar chart with separate line for each major section of Work or operation identifying first work day of each week.
- E. Show complete sequence of construction by activity, identifying Work of separate stages and other logically grouped activities. Indicate the early and late start, early and late finish, float dates and duration.
- F. Indicate estimated percentage of completion for each item of Work at each submission.
- G. Indicate submittal dates required for shop drawings, product data, samples and product delivery dates, including those furnished by Owner and under Allowances.

1.5 PROPOSED PRODUCTS LIST

- A. Within fifteen (15) days after date of Notice to Proceed, submit complete list of major products proposed for use, with name of manufacturer, trade name and model number of each product.
- B. For products specified only by reference standards, give manufacturer, trade name, model or catalog designation and reference standards.

1.6 SHOP DRAWINGS

- A. Submit in the form of one (1) reproducible transparency and two (2) opaque reproductions. The reproducible transparency will be returned for the Contractor's distribution.

- B. After review, reproduce and distribute in accordance with Article on Procedures above and for Record Documents described in Section 01700 – Contract Closeout.

1.7 PRODUCT DATA

- A. Submit the number of copies which the Contractor requires, plus two (2) copies which will be retained by the Architect.
- B. Mark each copy to identify applicable products, models, options and other data. Supplement manufacturers' standard data to provide information unique to this Project.
- C. After review, distribute in accordance with Article on Procedures above and provide copies for Record Documents described in Section 01700 – Contract Closeout.

1.8 SAMPLES

- A. Submit samples to illustrate functional and aesthetic characteristics of the Product, with integral parts and attachment devices. Coordinate sample submittals for interfacing work.
- B. Submit samples of finishes from the full range of manufacturers' colors for Architect's and Owner's selection.
- C. Include identification on each sample, with full Project information.
- D. Submit the number or samples specified in individual specification Sections; one (1) of which will be retained by Architect.
- E. Reviewed samples which may be used in the Work are indicated in individual specification Sections.

1.9 MANUFACTURER'S INSTRUCTIONS

- A. When specified in individual specification Sections, submit manufacturers' printed instructions for delivery, storage, assembly, installation and finishing, in quantities specified for Product Data.
- B. Identify conflicts between manufacturers' instructions and Contract Documents.

1.10 MANUFACTURER'S CERTIFICATES

- A. When specified in individual specification Sections, submit manufacturers' certificate to Architect for review, in quantities specified for Product Data.

- B. Indicate material or product conforms to or exceeds specified requirements. Submit supporting reference data, affidavits and certifications as appropriate.
- C. Certificates may be recent or previous test results on material or Product, but must be acceptable to Architect.

2 PART 2 – PRODUCTS

Not Used

3 PART 3 – EXECUTION

Not Used

END OF SECTION

1 PART 1 – GENERAL

1.1 SECTION INCLUDES

- A. Products
- B. Transportation and handling
- C. Storage and protection
- D. Product options
- E. Substitutions

1.2 RELATED SECTIONS

- A. General Conditions – Instructions to Bidders: Product options and substitution procedures

1.3 PRODUCTS

- A. Products: Means new material, components and systems forming the Work. Does not include machinery and equipment used for preparation, fabrication, conveying and erection of the Work. Products may also include existing materials or components required for reuse.
- B. Do not use materials and equipment removed from existing premises, except as specifically permitted by the Contract Documents.
- C. Provide interchangeable components of the same manufacturer, for similar components.

1.4 TRANSPORTATION AND HANDLING

- A. Transport and handle products in accordance with manufacturer's instructions.
- B. Promptly inspect shipments to assure that products comply with requirements, quantities are correct and products are undamaged.
- C. Provide equipment and personnel to handle products by methods to prevent soiling, disfigurement or damage.

1.5 STORAGE AND PROTECTION

- A. Store and protect products in accordance with manufacturer's instructions, with seals and labels intact and legible. Store sensitive products in weather-tight, climate controlled enclosures.
- B. For exterior storage of fabricated products, place on sloped supports, above ground.

- C. Provide off-site storage and protection when site conditions, limitations of space or interference with the Owner's operation does not permit on-site storage or protection.
- D. Cover products subject to deterioration with impervious sheet covering. Provide ventilation to avoid condensation.
- E. Provide equipment and personnel to store products by methods to prevent soiling, disfigurement or damage.
- F. Arrange storage of products to permit access for inspection. Periodically inspect to assure products are undamaged and are maintained under specified conditions.

1.6 PRODUCT OPTIONS

- A. Products Specified by Reference Standards or by Description Only: Any product meeting those standards or description.
- B. Products Specified by Naming One (1) or More Manufacturers: Products of manufacturers named and meeting specifications, no options or substitutions allowed.
- C. Products Specified by Naming One (1) or More Manufacturers with a Provision for Substitutions: Submit a request for substitution for any manufacturer not named.

1.7 SUBSTITUTIONS

- A. Architect will consider requests for Substitutions only within fifteen (15) days after date established in Notice to Proceed.
- B. Substitutions may be considered when a product becomes unavailable through no fault of the Contractor.
- C. Document each request with complete data substantiating compliance of proposed Substitution with Contract Documents.
- D. A request constitutes a representation that the Contractor:
 - 1. Has investigated proposed product and determined that it meets or exceeds the quality level of the specified product.
 - 2. Will provide the same warranty for the Substitution as for the specified product.
 - 3. Will coordinate installation and make changes to other Work which may be required for the Work to be complete with no additional cost to Owner.

MATERIAL AND EQUIPMENT

4. Waives claims for additional costs or time extension which may subsequently become apparent.
 5. Will reimburse Architect for review or redesign services associated with re-approval by authorities.
- E. Substitutions will not be considered when they are indicated or implied on shop drawing or product data submittals, without separate written request, or when acceptance will require revision to the Contract Documents.
- F. Substitution Submittal Procedure:
1. Submit three (3) copies of request for Substitution for consideration. Limit each request to one proposed Substitution.
 2. Submit shop drawings, product data and certified test results attesting to the proposed product equivalence.
 3. The Architect will notify Contractor, in writing, of decision to accept or reject request.

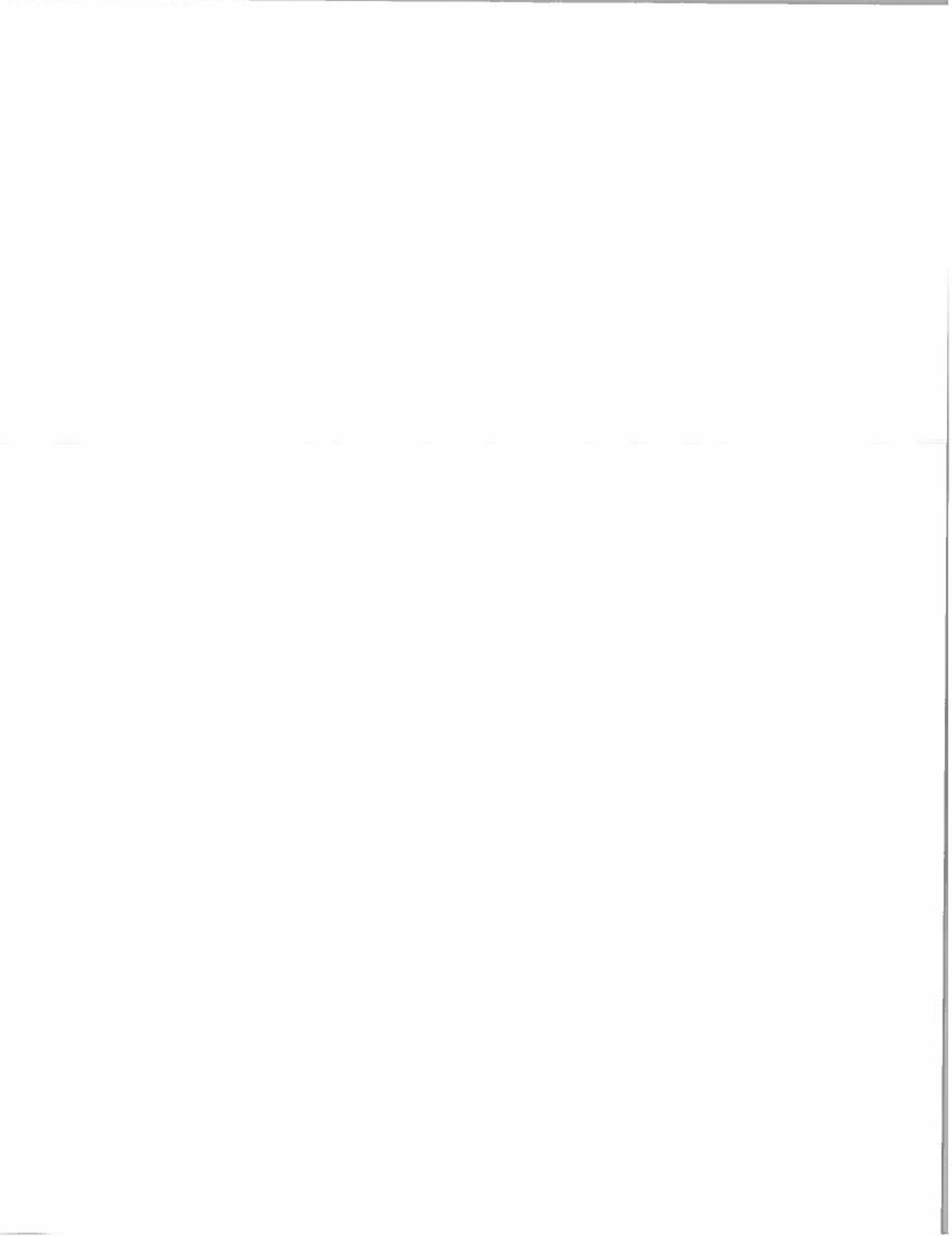
2 PART 2 – PRODUCTS

Not Used

3 PART 3 – EXECUTION

Not Used

END OF SECTION



1 PART 1 – GENERAL

1.1 SECTION INCLUDES

- A. Closeout procedures
- B. Final cleaning
- C. Adjusting
- D. Project record documents

1.2 RELATED SECTIONS

- A. Section 01730 – Operation and Maintenance Data
- B. Section 01740 – Warranties and Bonds

1.3 CLOSEOUT PROCEDURES

- A. Submit written certification that Contract Documents have been reviewed, Work has been inspected and that Work is complete in accordance with Contract Documents and ready for Architect's inspection.
- B. Provide submittals to Architect and Owner that are required by governing or other authorities.
- C. Submit final Application for Payment identifying total adjusted Contract Sum, previous payments and sum remaining due.
- D. Owner will occupy all portions of the building as specified in Section 01010.

1.4 FINAL CLEANING

- A. Execute final cleaning prior to final inspection.
- B. Clean equipment and fixtures to a sanitary condition, which includes removal of dust and construction debris from existing furniture, equipment and finishes.
- C. Clean filters of operating equipment contaminated by project operations.
- D. Clean debris from roofs and drainage systems.
- E. Clean site; sweep paved areas, rake clean landscaped surfaces.
- F. Remove waste and surplus materials, rubbish and construction facilities from the site.

1.5 PROJECT RECORD DOCUMENTS

- A. Maintain on site, one (1) set of the following record documents; record actual revisions to the Work:
 - 1. Contract Drawings.
 - 2. Specifications.
 - 3. Addenda.
 - 4. Change Orders and other Modifications to the Contract.
 - 5. Reviewed shop drawings, product data and samples.
- B. Store Record Documents separate from documents used for construction.
- C. Record information concurrent with construction progress.
- D. Specifications: Legibly mark and record at each Product section description of actual Products installed, including the following:
 - 1. Manufacturer's name and product model and number.
 - 2. Product substitutions or alternates utilized.
 - 3. Changes made by Addenda and Modifications.
- E. Record Documents and Shop Drawings: Legibly mark each item to record actual construction including:
 - 1. Field changes of dimension and detail.
 - 2. Details not on original Contract Drawings.
- F. Delete Architect title block and seal from all documents.
- G. Submit documents to Architect one (1) week prior to requesting Certificate of Occupancy from the Town of West Hartford to enable the Architect to complete the as-built transposition for submittal to the Fire Marshal at the Certificate of Occupancy inspection.

2 PART 2 – PRODUCTS

Not Used

3 PART 3 – EXECUTION

Not Used

END OF SECTION

1 PART 1 – GENERAL

1.1 SECTION INCLUDES

- A. Format and content of manuals
- B. Schedule of submittals

1.2 RELATED SECTIONS

- A. Section 01300 – Submittals: Submittals procedures, shop drawings, product data, and samples
- B. Section 01700 – Contract Closeout: Contract Closeout Procedures
- C. Individual Specifications Sections: Specific requirements for operation and maintenance data

1.3 QUALITY ASSURANCE

- A. Prepare instructions and data by personnel experienced in maintenance and operation of described products.

1.4 FORMAT

- A. Prepare data in the form of an instructional manual.
- B. Binders: Commercial quality, 8½ x 11 inch three-ring binders with hardback, cleanable, plastic covers; one inch maximum ring size. When multiple binders are used, correlate data into related consistent groupings.
- C. Cover: Identify each binder with typed or printed title OPERATION AND MAINTENANCE INSTRUCTIONS; list title of Project; identify subject matter of contents.
- D. Arrange content by systems under section numbers and sequence of Table of Contents of this Project Manual.
- E. Provide tabbed fly leaf for each separate product and system, with typed description of product and major component parts the systems.
- F. Text: Manufacturer's printed data, or typewritten data on 20 pound paper.
- G. Drawings: Provide with reinforced punched binder tab. Bind in with text; fold larger drawings to size of text pages and insert in oversized sleeve, bound into the manual for ease of storage and reference.

1.5 CONTENTS, EACH VOLUME

- A. Table of Contents: Provide title of Project; names, addresses and telephone numbers of Construction Manager, Architect/Engineer, sub-consultants and Contractor with name of responsible parties; schedule of products and systems, indexed to content of the volume.
- B. For Each Product or System: List names, addresses and telephone numbers of Subcontractors and suppliers, including local source of supplies and replacement parts.
- C. Product Data: Mark each sheet to clearly identify specific products and component parts, and data applicable to installation. Delete inapplicable information.
- D. Drawings: Supplement product data to illustrate relations of component parts of equipment and systems, to show control and flow diagrams.
- E. Type Text: As required to supplement product data. Provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions.
- F. Warranties and Bonds: Bind in copy of each and provide as specified in Section 01740.

1.6 MANUAL FOR MATERIALS AND FINISHES

- A. Building Products, Applied Materials and Finishes: Include product data, with catalog number, size, composition and color and texture designations.
- B. Instructions for Care and Maintenance: Include manufacturer's recommendations for cleaning agents and methods, precautions against detrimental agents and methods and recommended schedule for cleaning and maintenance.
- C. Moisture Protection and Weather Exposed Products: Include product data listing applicable reference standards, chemical composition and details of installation. Provide recommendations for inspections, maintenance and repair.
- D. Additional Requirements: As specified in individual product specification Sections.
- E. Provide a listing in Table of Contents for design data, with tabbed fly sheet and space for insertion of data.

1.7 MANUAL FOR EQUIPMENT AND SYSTEMS

- A. Each Item of Each System: Include description of unit or system, and component parts. Identify function, normal operating characteristics and limiting conditions.
- B. Maintenance Requirements: Include routine procedures and guide for trouble-shooting; repair and alignment, adjusting and checking instructions.
- C. Include manufacturer's printed operation and maintenance instructions.
- D. Provide list of original manufacturer's spare parts, or roofing components, current prices and recommended quantities to be maintained in storage.
- E. Additional Requirements: As specified in individual product specification Sections.
- F. Provide a listing in Table of Contents for design data, with tabbed fly sheet and space for insertion of data.

1.8 SUBMITTALS

- A. Submit two (2) copies of preliminary draft or proposed formats and outlines of contents before start of Work. Construction Manager and Architect/Engineer will review draft and return one (1) copy with comments.
- B. Submit one (1) copy of completed volumes in final form fifteen (15) days prior to final inspection. Copy will be returned after final inspection, with Construction Manager and Architect/Engineer comments. Revise content of documents as required prior to final submittal.
- C. Submit three (3) copies of revised volumes of data in final form within ten (10) days after final inspection.

1.9 SCHEDULE OF SUBMITTALS

- A. As a minimum, the following systems, or subsystems within each of the listed sections, shall be submitted in the manual. Other equipment, systems or materials not listed, but installed shall be included in the manual.
 - 1. Section 04100 Mortar
 - 2. Section 04330 Cavity Wall Masonry System
 - 3. Section 07531 Elastomeric Sheet Roofing
 - 4. Section 07600 Flashing and Sheet Metal
 - 5. Section 07631 Gutters and Downspouts
 - 6. Section 07900 Sealants
 - 7. Section 09900 Painting

OPERATION AND MAINTENANCE DATA

- 8. Section 15183 Refrigerant Piping
- 9. Section 15260 Piping Insulation
- 10. Section 15410 Plumbing Piping
- 11. Section 16130 Raceway and Boxes for Electrical Systems
- 12. Section 16140 Wiring Devices
- 13. Section 16491 Fuses

2 PART 2 – PRODUCTS

Not Used

3 PART 3 – EXECUTION

Not Used

END OF SECTION

1 PART 1 – GENERAL

1.1 SECTION INCLUDES

- A. Preparation and submittal
- B. Time and schedule of submittals

1.2 RELATED SECTIONS

- A. Section 01730 – Operations and Maintenance Data
- B. Individual Specifications Sections: Warranties required for specific products or Work

1.3 FORM OF SUBMITTALS

- A. Bind in commercial quality, 8½ x 11 inch binders with hardback, cleanable, plastic covers.
- B. Label cover of each binder with typed or printed title WARRANTIES AND BONDS, with title of Project; name, address and telephone number of Contractor and name of responsible principal.
- C. Table of Contents: Neatly typed, in the sequence of the Table of Contents of the Project Manual, with each item identified with the number and title of the specification Section in which specified, and the name of the product or work item.
- D. Separate each warranty or bond with index tab sheets keyed to the Table of Contents listing. Provide full information, using separate typed sheets as necessary. List Subcontractor, supplier and manufacturer, with name, address and telephone number of responsible principal.

1.4 PREPARATION OF SUBMITTALS

- A. Obtain warranties and bonds, executed in duplicate by responsible Subcontractors, suppliers and manufacturers, within ten (10) days after completion of the applicable item or work. Except for items put into use with Owner's permission, leave date of beginning of time of warranty until the Date of Substantial Completion is determined.
- B. Verify that documents are in proper form, contain full information and are notarized.
- C. Co-execute submittals when required.
- D. Retain warranties and bonds until time specified for submittal.

1.5 TIME OF SUBMITTALS

- A. Make other submittals within ten (10) days after Date of Substantial Completion, prior to final Application for Payment.
- B. For items of Work when acceptance is delayed beyond Date of Substantial Completion, submit within ten (10) days after acceptance, listing the date of acceptance as the beginning of the warranty period.

1.6 SCHEDULE OF SUBMITTALS

- A. As a minimum, warranties for the following systems, or subsystems within each of the listed sections, shall be submitted. Other warranties for equipment, systems or materials not listed, but installed shall be included in the manual.

- 1. Section 07531 Elastomeric Sheet Roofing
- 2. Section 07600 Flashing and Sheet Metal
- 3. Section 07631 Gutters and Downspouts
- 4. Section 15183 Refrigerant Piping
- 5. Section 15410 Plumbing Piping
- 6. Section 16130 Raceway and Boxes for Electrical Systems
- 7. Section 16140 Wiring Devices
- 8. Section 16491 Fuses

2 PART 2 – PRODUCTS

Not Used

3 PART 3 – EXECUTION

Not Used

END OF SECTION

SECTION 02080 – ASBESTOS ABATEMENT

PART 1.0 – GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and General Provisions of Contract, including General and Supplementary Conditions and Division 1 Specifications Sections, apply to this Section.
- B. Section 02085: PCB Remediation & Disposal Plan
- C. Pre-renovation Roofing Materials Inspection Report
- D. Additional Roofing Materials Inspection Report

1.2 PROJECT DESCRIPTION

- A. The Town of West Hartford has undertaken a roof replacement project at King Philip Middle School at 100 King Philip Drive West Hartford, Connecticut. The first and second phases of the project involving removal and replacement of the roofing materials were performed in the summers of 2015 and 2016. The removal of additional roofs in the third phase as identified in the abatement plan drawing will be performed in the summer of 2018.
- B. The inspection and bulk sampling identified caulking compounds, flashing cement and pitch pockets, which will be impacted by the roof replacement, determined the materials to contain regulated asbestos. The inspection reports are attached as Attachment B and Attachment C. Exterior asbestos abatement work will be necessary in conjunction with this roof replacement project. The Roofing Contractor (RC) shall coordinate their work with the Owner and the Architect.
- C. The Base Bid for this project includes the removal, handling, transportation and proper disposal of asbestos containing caulking at concrete roof deck seams, reglet flashing at roof/wall junction and patch flashing cement located at vents, HVAC bases and repair areas. Refer to the following Scope of Work, Technical Specifications and Abatement Plan Drawing and RP-1 (Attachment A) for site-specific abatement requirements.
- D. The existing roof fields and ground below the roof overhang where the majority of caulking compounds are located are contaminated with caulk which has dislodged from the deck seam. Special attention is required in these areas to ensure all dislodged caulk is cleaned from the underlying surfaces.
- E. Scope of Work: The AAC shall remove the following asbestos-containing materials (ACM). The quantities given below are provided to establish the order of magnitude of the abatement project. Actual quantities may vary. It is the sole responsibility of the roofing contractor (RC) to visit the site, review the Contract Documents and determine the quantities of ACM to be removed when developing their bid.

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LOCATION	MATERIAL	ESTIMATED QUANTITY	FRIABILITY
Roofs 17, 18 and 21	Caulking compound at concrete roof deck seams	450 LF	NF*
Roof 20	Reglet flashing	75 LF	NF*
Roofs 17, 18 and 21	Patch Flashing Cement around Vent Bases and Repair Areas	12 Vents & 210 SF Repair Areas	NF*
Roofs 17, 18 and 21	Pitch Pockets on HVAC Units	8 Units @ 18 SF Each	NF*

* NF means non-friable asbestos-containing materials. If the contractor uses any method that renders this material friable, all portions of the State of Connecticut Standard for Asbestos Abatement shall apply. This includes but is not limited to cutting, grinding, and abrading utilizing a rotary saw to cut the material.

- F. All layers asbestos-containing roofing materials shall be removed and disposed of as ACM. The fiberglass insulation may be disposed of as construction debris as long as it is not contaminated with asbestos containing roofing materials. Any residual ACM adhered to the insulation will render the material as asbestos-contaminated. A visual inspection of all materials shall be performed by the contractor's "Competent Person".
- G. Ashis Roychowdhury of Eagle Environmental, Inc. is the designer of this Specification. Mr. Roychowdhury is a State of Connecticut Department of Public Health (CTDPH) Licensed Asbestos Project Designer (License #000145).

1.3 APPLICABLE CODES

- A. Following a federal court of appeal decision, the Occupational Safety and Health Administration (OSHA) has issued a final rule on June 29, 1998 removing regulation of asbestos containing asphalt roof cements, mastic and coatings from the OSHA standards for occupational exposure in asbestos in construction industry. However, friable roofing materials continue to be regulated by US EPA (no visible emission) and State agencies.
- B. The Roofing Contractor shall be solely responsible for conducting this project and supervising all work in a manner, which will be in conformance with all federal, state and local regulations and guidelines pertaining to this exterior asbestos abatement work. Specifically, the Contractor shall comply with the following:
 1. USEPA NESHAP Regulations (40 CFR Part 61, Subpart M) (If the materials become friable);
 2. Connecticut DEEP Regulations (Section 22a-209-8(I) and Section 22a-220 of the Connecticut General Statutes);
 3. Connecticut DPH Standards for Asbestos Abatement Sections 19a-332a-1 to 19a-332a-22 (If the materials become friable).
 4. Connecticut DPH Asbestos-Containing-Materials in Schools Regulations

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(19a-333-1 through 19a-333-13);

5. Connecticut Basic Building Code (BOCA);
6. Connecticut State Department of Education 10-292a1-10;
7. Connecticut Fire Safety Code (NFPA);
8. National codes and standards including ASTM, ANSI and Underwriter's Laboratories, local health and safety codes, ordinances or regulations pertaining to asbestos remediation and all local ordinances.

1.4 EXEMPTIONS

- A. Any deviation from these specifications requires the written approval and authorization from the Owner/Project Designer.

1.5 FINAL AIR CLEARANCE

- A. Work of this contract will be performed on the exterior of the building and will not require final air clearance sampling.

1.6 NOTIFICATIONS, POSTINGS, AND PERMITS

- A. The RC shall make the following notifications and provide the submittals to the following agencies prior to the commencement of removal work **if the work is going to render the ACM friable**. This notification is required ten (10) days (10 calendar days for CTDPH and 10 business days for USEPA) prior to the start of the abatement project: :

1. USEPA New England Headquarters
5 Post Office Square, Suite 100
Boston, Massachusetts 02109-3912
2. State of Connecticut
Department of Public Health
Indoor Air Program, MS #12 AIR
410 Capitol Avenue
P.O. Box 340308
Hartford, CT 06134-0308
3. State of Connecticut
Department of Energy and Environmental Protection
Health Services and Solid Waste Management Unit
79 Elm St.
Hartford, CT 06106
(Only if asbestos waste is disposed of in Connecticut)

Note: Effective December 14, 2017, EPA needs to be notified directly for all asbestos abatement projects involving >160 square feet or >260 linear feet or >35 cubic feet of ACM.

- B. The minimum information included in the notification to these agencies includes:

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1. Name and address of building owner/operator
2. Building location
3. Building size, age and use
4. Amount of friable and non-friable asbestos
5. Work schedule, including proposed start and completion date
6. Asbestos removal procedure to be used
7. Name and location of disposal site for generated asbestos waste, residue and debris

1.7 SUBMITTALS

- A. The Contractor will submit the following to the owner's representatives seven (7) calendar days prior to the commencement of removal:
 1. Contractor's construction schedule.
 2. Asbestos waste disposal container location
 3. Product Data.
 4. Waste hauling contractor
 5. Landfill to be used.
 6. Copies of all notifications and permits.
 7. Copies of all SDS sheets for materials to be used on site.
 8. Work Site Safety Plan
 9. Negative Exposure Assessment.
 10. Copies of all worker training certificates
- B. The Contractor will submit the following submittals to the owner's representatives five (5) calendar days prior to the commencement of removal:
 1. Contractor's construction schedule.
 2. Asbestos waste disposal container location
 3. Product Data.
 4. Waste hauling contractor
 5. Landfill to be used
 6. Work Site Safety Plan

- C. The Roofing Contractor will retain a licensed Asbestos Abatement Contractor (AAC) and submit additionally the following documents to the owner's representatives five (5) calendar days prior to the commencement of removal where friable ACM will be removed:
1. License, training, medical and respirator fit-test records of each employee who may be on the project site.
 2. The qualifications of the hygiene firm that the asbestos abatement contractor proposes to use for this project to analyze contractor employee OSHA monitoring samples.
 3. Copies of all notifications and permits.
 4. Copies of the written respirator plan
 5. Copies of all SDS sheets for materials to be used on site.
 6. Negative Exposure Assessment
- D. The AAC will submit the following asbestos abatement closeout documents to the owner's representatives no later than thirty (30) calendar days from the completion of the abatement work:
1. Contractor OSHA personal air sampling data (**friable abatement only**)
 2. Supervisor daily logs.
 3. Completed waste shipment records signed by the landfill owner/operator.

1.8 WORK SITE SAFETY PLAN

- A. The RC shall establish a set of emergency procedures and shall post them in a conspicuous place at the work site. The safety plan should include provisions for the following:
1. Evacuation of injured workers
 2. Emergency fire exit routes from all work areas
 3. Emergency first aid treatment
 4. Local telephone numbers for emergency services including ambulance, fire and police.
 5. A method to notify occupants of the building in the event of a fire or other emergency requiring evacuation of the building.
- B. The AAC shall train all workers on these safety procedures.

1.9 CONTRACTOR'S AIR SAMPLING RESPONSIBILITY (**Friable ACM only**)

- A. The AAC shall be required to monitor airborne asbestos concentrations in

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workers' breathing zones and to establish conditions and work procedures for maintaining compliance with the regulatory requirements.

- B. The AAC's air sampling professional shall document all air-sampling results and will have copies of the results on site within 48 hours after sample collection.
- C. All air sampling shall be conducted in accordance with methods described in OSHA standards 29CFR1910.1001 and 1926.1101.
- D. The AAC shall maintain air sampling documentation on site for the duration of the project. All results shall be posted at the worker decontamination chamber.

1.10 PRECONSTRUCTION CONFERENCE

- A. Prior to the start of abatement work, the AAC shall be required to attend a preconstruction conference with the Owner and the Consultant. Contractor's Project Manager and Site Supervisor are also required to attend this meeting. At this time the project schedule and pre-abatement submittals shall be reviewed.

1.11 CONTRACTOR QUALIFICATIONS

- A. All bidders shall submit a Contractor's Qualification Statement on the prescribed forms designated in the Instruction to Bidders. This shall include a record of prior experience in similar projects of similar size and scope. The projects shall also include information on owners, consultants, architects and general contractors.
- B. For roofing projects involving the removal of **friable ACM**, the Asbestos Abatement Contractor selected must appear on the approved list of contractors on file at the State of Connecticut Department of Public Health (CTDPH).
- C. Submit a written statement regarding whether the Contractor has ever been found out-of-compliance with federal or state asbestos regulations pertaining to removal, transport, or disposal. Supply a list of any violations issued or pending against the bidder.

1.13 DEFINITIONS

- A. **ABATEMENT** - Procedures to control fiber release from asbestos-containing materials; includes removal, encapsulation and enclosure.
- B. **AIRLOCK** - A system for permitting ingress and egress while assuring air movement to a contaminated area from an uncontaminated area. Two curtained doorways spaced a minimum of six feet apart can form an airlock.
- C. **AIR MONITORING** - The process of measuring the fiber concentration of an area or of a person.
- D. **AIR SAMPLING PROFESSIONAL** - A professional capable of conducting air monitoring and analysis schemes. This individual should be an industrial hygienist, an environmental scientist, or an engineer with experience in asbestos air monitoring and worker protection equipment and procedures. This individual should have demonstrated proficiency in conducting air sample collection in accordance with 29CFR1910.1001 and 1926.58.

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- E. **AMENDED WATER** - Water to which a surfactant has been added.
- F. **ASBESTOS** - The name given to a number of naturally occurring fibrous silicates. This includes the serpentine forms and the amphiboles and includes chrysotile, amosite, crocidolite, tremolite, anthophyllite, and actinolite, or any of these forms that have been chemically altered.
- G. **ASBESTOS FELT** - A product made by saturating felted asbestos with asphalt or other suitable binding material, such as a synthetic elastomer.
- H. **ASBESTOS FIBERS** - Those particles with a length greater than five (5) microns and a length to diameter ratio of 3:1 or greater.
- I. **ASBESTOS PERMISSIBLE EXPOSURE LIMIT (PEL)** - The maximum airborne concentration of asbestos fibers to which an employee is allowed to be exposed. The current level established by OSHA is 0.1 fibers per cubic centimeter of air as an eight (8) hour time weighted average and 1.0 fibers/cc averaged over a sampling period of 30 minutes as an excursion limit. The Contractor is responsible for maintaining work areas in a manner that this standard is not exceeded.
- J. **BASE FLASHING** - The flashing provided by edges of a watertight membrane on a roof. It may contain metal and associated waterproofing materials at the intersection of horizontal and vertical roofing surfaces such as a built-up roof and a wall or parapet. Also base flashing may be present at the perimeter or around the penetration of a flat roof.
- K. **BUILDING OWNER** - For the specific asbestos removal only, the building owner is the Town of West Hartford or their designated representative.
- L. **BUILT-UP ROOF** - A continuous roof covering made of laminations or plies of saturated or coated roofing felts, alternated with layers of asphalt or tar and covered by gravels, paint or finish coat.
- M. **CATEGORY I NON-FRIABLE ACM** - Asbestos-containing packings, gaskets, resilient floor covering and asphalt roofing material.
- N. **CATEGORY II NON-FRIABLE ACM** - Other non-friable asbestos-containing materials that are not categorized in Category I.
- O. **CLEAN ROOM** - An uncontaminated area or room that is a part of the worker decontamination enclosure with provisions for storage of worker's street clothes and protective equipment.
- P. **COMPETENT PERSON** - A representative of the abatement Contractor who is capable of identifying asbestos and who has the authority to take prompt corrective measures to eliminate hazards during asbestos removal.
- Q. **DECONTAMINATION ENCLOSURE SYSTEM** - A series of connected areas with curtained doorways between any two adjacent areas, for the decontamination of workers and equipment. A decontamination enclosure system always contains at least one airlock and is adjacent and connected to the regulated area, where possible.

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- R. **FRIABLE ASBESTOS MATERIAL** - Any material that contains more than 1% asbestos by weight, than can be crumbled, pulverized or reduced to powder by hand pressure.
- S. **HEPA FILTER** - A high efficiency particulate air (HEPA) filter in compliance with ANSIZ9.2-1979.
- T. **HEPA VACUUM EQUIPMENT** - Vacuum equipment with a HEPA filter system for filtering the effluent air from the unit.
- U. **NESHAP** - National Emissions Standards for Hazardous Air Pollutants regulations enforced by the EPA.
- V. **REMOVAL** - All procedures, specified herein, which are necessary to removal asbestos-containing materials from the designated areas and to dispose of these materials at an acceptable site.
- W. **SHOWER ROOM** - A room between the clean room and the equipment room in the worker decontamination enclosure with hot and cold running water and suitably arranged for employee showering during decontamination. The shower room is located in an airlock between the contaminated area and the clean area.
- X. **SURFACTANT** - A solution added to water to create "amended water" which enables the asbestos-containing materials to absorb water more efficiently.
- Y. **WASHROOM** - A room between the work area and the holding area in the equipment decontamination enclosure with provisions for storage of contaminated clothing and equipment.
- Z. **WORK AREA** - Designated area of a roof that is regulated due to the possibility of the Permissible Exposure Level (PEL) being exceeded.
- AA. **WORKER DECONTAMINATION ENCLOSURE SYSTEM** - That portion of a decontamination enclosure system designated for controlled passage of workers, other personnel, and authorized visitors, typically consisting of a clean room, a shower room and an equipment room.

1.14 CONTROL OVER REMOVAL WORK

- A. The abatement shall be performed during summer when the school is not in session and student or children under eighteen years of age will not be present in the building. **No abatement work shall take place while the school is in session.**
- B. The Owner shall retain an independent Consultant to oversee AAC's work procedures. The Contractor shall ensure that areas outside the designated work locations do not become contaminated. The following controls shall be implemented each working day to help ensure this:
 - 1. Prior to work on any given day, the Contractor's designated competent person shall discuss the day's job tasks with the Project Monitor with respect to safety procedures and requirements specified to prevent

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- contamination of the building or the employees. This includes a visual survey of the work area and the decontamination enclosure systems.
2. The Contractor shall maintain control of and be responsible for access to all work areas to ensure the following requirement:
- a. Nonessential personnel are prohibited from entering the work area;
 - b. All authorized personnel entering the work area shall read the worker protection procedures which are posted at the entry points to the enclosure system, and shall be equipped with properly fitted respirators and protective clothing;
 - c. All personnel who are exiting from the decontamination enclosure system shall be properly decontaminated;
 - d. Asbestos waste that is taken out of the work area must be properly bagged and labeled in accordance with these specifications. The surface of the bags shall be decontaminated. Asbestos leaving the regulated area must be transported off site or immediately placed in locked, posted temporary storage on site, and is removed within 24 hours of the project conclusion.
 - e. Equipment that is taken out of the work area must be decontaminated. The contractor shall wet clean all surfaces of equipment leaving the work area.

PART 2.0 - MATERIALS AND EQUIPMENT

2.1 MATERIALS

- A. Deliver all materials in the original packages, containers, or bundles bearing the name of the manufacturer and the brand name and product technical description.
- B. Damaged or deteriorating materials shall not be used and shall be removed from the premises. Material that becomes contaminated with asbestos shall be decontaminated or disposed of as asbestos waste.
- C. Polyethylene sheet in a roll size to minimize the frequency of joints shall be delivered to the job site with factory label indicating 4 or 6 mil. True mil thickness shall be required of all polyethylene sheeting.
- D. Polyethylene disposable bags shall be true six (6) mil with pre-printed labels. Grain bags shall be nylon mesh.
- E. Tape or adhesive spray will be capable of sealing joints in adjacent polyethylene sheets and for attachment of polyethylene sheets to finished or unfinished surfaces of dissimilar materials and capable of adhering under both dry and wet conditions, including use of amended water.
- F. Surfactant (wetting agent) shall consist of fifty (50) percent polyoxyethylene ether and fifty (50) percent polyoxyethylene ester, or equivalent, and shall be mixed with water to provide a concentration of one (1) ounce surfactant to five (5) gallons of water or as directed by manufacturer.
- G. Removal encapsulant shall be a nonflammable factory prepared penetrating chemical encapsulant found acceptable to Eagle Environmental, Inc. Usage shall

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be in accordance with manufacturer's printed technical data.

- H. The Contractor shall have available spray equipment capable of mixing a wetting agent with water and capable of generating sufficient pressure and volume and having sufficient hose length to reach all areas with asbestos.
- I. Impermeable containers are to be used to receive and retain any asbestos-containing or contaminated materials until disposal at an acceptable disposal site. (The containers shall be labeled in accordance with OSHA Standard 29CFR1926.1001 and 40 CFR Part 61). Containers must be both air and watertight.
- J. Labels and signs, as required by OSHA Standard 29CFR1926.1001 and 40 CFR Part 61 will be used.
- K. Encapsulant shall be bridging or penetrating type which has been found acceptable to Eagle Environmental, Inc. Usage shall be in accordance with manufacturer's printed technical data.
- L. HEPA filtered local exhaust ventilation shall be utilized during roof cutting procedures.
- M. Disposal labels shall be preprinted on self-adhesive labels with the generator name, abatement site and contractor's name and address. Labels shall not be photocopied and applied with spray adhesive.

2.2 TOOLS AND EQUIPMENT

- A. Provide suitable tools for asbestos removal, operations on roofs.
- B. The Contractor shall have air monitoring equipment of type and quantity to monitor operations and conduct personnel exposure surveillance per OSHA requirements.
- C. The Contractor shall have available sufficient inventory on site for materials necessary for the job including protective clothing, respirators, filter cartridges, polyethylene sheeting of proper size and thickness, tape and air filters.
- D. The Contractor shall provide temporary electrical power sources such as generators (when required).
- E. The Contractor shall have available shower stalls and sufficient hose length and a drain system equipped with five (5) micron filters.
- F. Vacuum and dust collection systems, of suitable size and capacities for the project, shall have HEPA filter(s) capable of trapping and retaining at least 99.97 percent of all monodispersed particles of 0.3 micrometers in diameter or larger.

PART 3.0 - EXECUTION

3.1 EXTERIOR WORK AREA PREPARATION

- A. The phases and hours of for this asbestos abatement project shall be coordinated

with the Owner's representative.

- B. Establish temporary electrical service, including receptacles and lighting sufficient to provide power at the regulated area. Provide GFCI devices, temporary power, and temporary lighting installed in compliance with the applicable electrical codes. All installations are to be made by a licensed electrician.
- C. Post asbestos abatement warning signs and erect temporary barricades to create regulated areas. Regulated areas should be kept clear of any persons not fully trained and protected against exposure. Install single six (6) mil drop cloths extending a minimum of ten (10) feet from the base of the building and one (1) foot up on the walls. Install single six (6) mil "critical barriers" over all equipment on the roof areas including but not limited to air intakes, any vents, ventilators and any other openings into the building/ductwork/piping as well as any operable windows, doors, vents, louvers within or directly adjacent to the regulated area.
- D. The regulated areas must be established on the roof as well as on the ground where debris has a potential to fall.
- E. Establish a remote worker decontamination chamber per SECTION 3.2 DECONTAMINATION SYSTEM. Post asbestos abatement warning signs in accordance with OSHA 29 CFR 1926.1101.
- F. The AAC shall have a designated "Competent Person" on the job at all times to ensure proper work practices throughout the project.

3.2 DECONTAMINATION SYSTEM – FRIABLE ROOFING MATERIALS

- A. The shall indicate the use of a remote decontamination facility on the State Department of Public Health 10 day notification form.
- B. The remote decontamination facility shall be utilized during abatement of friable roofing materials.
- C. The remote decontamination facility shall be set up in close proximity to the work area.

3.3 ASBESTOS REMOVAL PROCEDURE - FRIABLE ROOFING MATERIALS

- A. Prior to the removal of any roofing materials the Contractor shall ensure that work area preparation has been conducted in accordance with this section 3.1 EXTERIOR WORK AREA PREPARATION.
- B. The Contractor shall sufficiently wet roofing materials with removal encapsulant, amended water, or a detergent solution to ensure no visible emission during removal of Category I non-friable roofing material.
- C. Wet methods shall be used to remove roofing materials that are not intact, or that will be rendered not intact during removal, unless such wet methods are not feasible or will create safety hazards. Continual water-tightness of the roof is the responsibility of the AAC.

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- D. Cutting machines shall be continuously misted during use, unless a competent person determines that misting substantially decreases worker safety.
- E. When removing asbestos-containing roofing materials using a power roof cutter, all dust resulting from the cutting operation shall be collected by a HEPA dust collector, or shall be HEPA vacuumed by vacuuming along the cut line. When removing built-up roofs with asbestos-containing roofing felts and a smooth surface using a power roof cutter, the dust resulting from the cutting operation shall be collected either by a HEPA dust collector or HEPA vacuuming along the cut line, or by gently sweeping and then carefully and completely wiping up the still-wet dust and debris left along the cut line. The Contractor shall ensure that no visible emissions are generated during any portion of the abatement operation.
- F. Asbestos-containing roofing materials must be removed in manageable sections. Materials that have been removed from a roof shall not be thrown to the ground. Material drop shall not exceed eight (8) feet. Unless the material is carried or passed to the ground by hand, it shall be lowered to the ground via inclined chute or scaffolding (for heights up to 15 feet) or through covered dust-tight chute (for heights exceeding 15 feet).
- G. The amount of ACM removed in a given day shall not exceed the amount of temporary and/or permanent roofing that can be replaced by the end of the day. After completion of stripping work, all surfaces from which asbestos has been removed shall be wet-wiped or cleaned to remove all visible asbestos before covering the surface with new non-asbestos containing material.
- H. Any ACM that is not intact shall be lowered to the ground as soon as is practicable, but in any event no later than the end of the work shift. While the material remains on the roof, it shall either be kept wet, placed in an impermeable waste bag, or wrapped in plastic sheeting.
- I. Intact ACM shall be lowered to the ground as soon as is practicable, but in any event no later than the end of the work shift.
- J. Upon being lowered, unwrapped material shall be transferred to a closed receptacle in such manner so as to preclude the dispersion of dust.
- K. All ACM shall be placed directly into disposal bags and shall be transferred to the asbestos disposal dumpster. Do not allow waste to accumulate on the roof.
- L. At any time during the removal, should the Consultant suspect contamination of areas outside of the work area(s), he/she shall cause all removal work to stop until steps are taken to decontaminate these areas and eliminate the causes of contamination. Unprotected individuals shall be prohibited from entering suspected contaminated areas until air sampling and visual inspection indicate satisfactory decontamination.

3.4 ASBESTOS REMOVAL PROCEDURE – NON-FRIABLE ROOFING MATERIALS

- A. Prior to the removal of any roofing materials the Contractor shall ensure that work area preparation has been conducted in accordance with this section 3.1 EXTERIOR WORK AREA PREPARATION.
- B. The Contractor shall sufficiently wet roofing materials with removal encapsulant,

amended water, or a detergent solution.

- B. The roofing materials shall not be saw cut directly; flashing and seam cement shall remain intact and non-friable during removal procedures.
- C. All ACM shall be placed directly into disposal bags or shall be transferred to the asbestos disposal dumpster. Do not allow waste to accumulate on the roof. The Contractor shall ensure that no visible emissions are generated during any portion of the abatement operation.

3.5 FINAL CLEANING

- A. Prior to the end of the shift, the contractor shall clean all debris generated during the course of the workday. Friable felts, paper and asphalt coated felt products shall be wet swept and deposited into asbestos disposal bags. Non-friable ACM shall also be cleaned up and deposited into the asbestos disposal dumpster.
- C. The polyethylene drop cloths at the base of the building shall be cleaned of debris and shall be rolled up for disposal as asbestos waste.
- D. ACM debris and contaminated soil shall be removed from the perimeter of the building and bagged and labeled for disposal as asbestos waste.
- E. All waste on the roof shall be transported to the asbestos disposal dumpster. Roofing debris shall not be stored on the roof.

3.6 DISPOSAL OF ASBESTOS

- A. All disposal of asbestos-containing and/or asbestos contaminated material must be in compliance with requirements of the State of Connecticut, Office of Solid Waste Management, Department of Energy and Environmental Protection (DEEP), and the USEPA NESHAP regulation.
- B. Disposal approvals shall be obtained before commencing asbestos removal.
- C. A copy of approved disposal authorization shall be provided to the Owner and Consultant and any required federal, state or local agencies.
- D. Copies of all landfill receipts will be retained by the Owner's project monitor as part of the project file. The receipts will be signed by the landfill operator on receipt, and the quantity of asbestos debris leaving the job site and arriving at the landfill acknowledged. The Contractor shall furnish the signed Waste Shipment Record as soon as possible.
- E. All asbestos debris shall be transported in covered, sealed vans, boxes or dumpsters that are physically isolated from the driver by an airtight barrier. All vehicles must be properly licensed to meet DOT requirements.
- F. For live load operations, the ACM dumpster shall be fitted with a minimum of a two (2) layers of 6 mil bladder bags or leak tight polyethylene sheeting and shall be securely covered with a tarp to prevent any emissions. All ACM sent this way shall be thoroughly wetted and labeled. Contractor will ensure bags are voided of air prior to closing.

3.7 CONSULTANT'S RESPONSIBILITIES

- A. The Town of West Hartford shall retain an independent asbestos Project Monitor. Periodic air sampling might be conducted by the Project Monitor at targeted locations inside and outside the building to ascertain the integrity of controls that protect the building from asbestos contamination. Independently, the Contractor shall monitor air quality within the workers breathing zone to ascertain the protection of employees and to comply with OSHA regulations if friable ACM is removed.

The Project Monitor shall periodically collect and analyze air samples during two (2) time periods:

1. Pre-abatement Sampling Period: The Project Monitor may collect a sufficient number of air samples, inside and outside the buildings to establish background air quality conditions.
 2. Abatement Period: The Project Monitor shall collect samples during the work period on a periodic basis. A sufficient number of area samples shall be collected to document the degree of cleanliness during removal. These samples shall be collected inside the buildings, by the remote decontamination enclosure system and waste dumpster at the discretion of the air sampling professional.
 - a. Air samples shall be collected for a minimum period of ninety minutes at a minimum flow rate of 12 liters per minute, or as required to obtain a volume of 1,000 liters. Samples shall be analyzed by phase contrast microscopy (PCM) using the NIOSH 7400 protocol.
 - b. The Project Monitor shall provide a continual evaluation of the air quality of the building during removal, using his/her best professional judgment in respect to the State Department of Public Health guideline of 0.010 fibers/cc. If the air sampling professional determines that the building air quality has become contaminated from the project, he/she shall immediately inform the Contractor to cease all removal operations and implement a work stoppage clean up procedure. The Contractor shall conduct a thorough cleanup of areas of the building designated by the Consultant. No further removal work can take place until the Project Monitor has assessed that the building air has been decontaminated.
- B. Inspections shall be conducted by the Project Monitor during the abatement process. Inspections shall be conducted in order to document the progress of the abatement work as well as the procedures and practices employed by the abatement Contractor.

The Project Monitor shall perform the following inspections during the course of abatement activities:

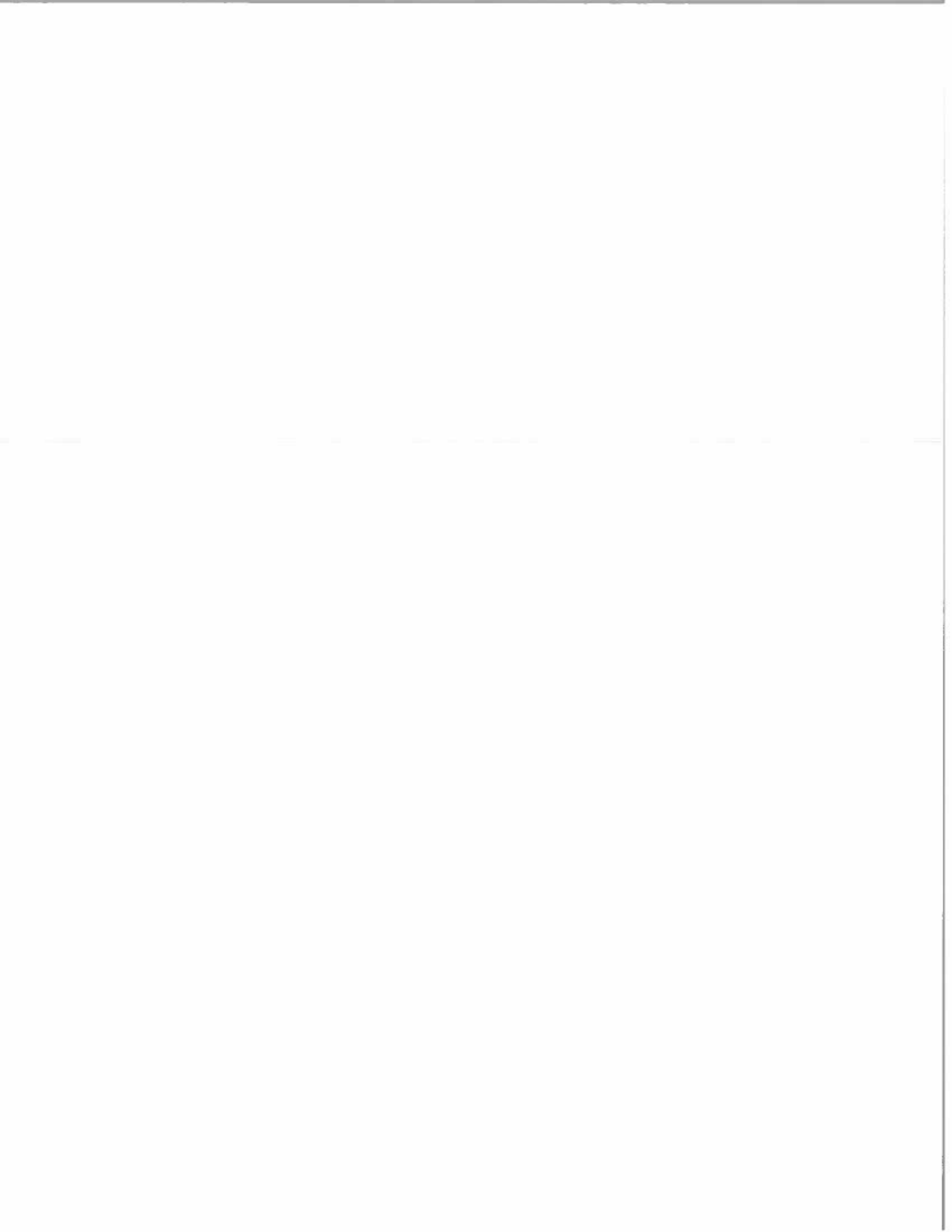
1. Pre-commencement Inspection: Pre-commencement inspections shall be performed at the time requested by the abatement Contractor. The Project Monitor shall be informed 48 hours prior to the time the inspection is needed. During the course of the pre-commencement inspection, the

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Project Monitor shall inspect the roof work area. This shall include, but not be limited to, inspection of barrier integrity, the worker decontamination facility, utilization of power source, and location and capacity of waste transport chutes. If during the course of the pre-commencement inspection, deficiencies are found, the Contractor shall perform the necessary adjustments in order to obtain compliance.

2. Work Area Inspections: Work area inspections shall be conducted on a periodic basis at the discretion of the Project Monitor. During the course of the work area inspections, the Project Monitor shall observe Contractor removal procedures, verify barrier integrity, assess project progress, and inform the abatement Contractor of specific remedial activities if deficiencies are noted.
3. Final Visual Inspection: The Project Monitor shall conduct a final visual inspection of the regulated area. Following the removal of the roofing materials, the Project Monitor shall conduct a final visual inspection inside the regulated area. If residual debris is identified during the course of the final inspection, the AAC shall comply with the request of the Project Monitor in order to render the area debris free.

END OF SECTION 02080



SECTION 02085 - PCB REMEDIATION AND DISPOSAL PLAN

PART 2 - GENERAL

2.1 SECTION INCLUDES

- A. Polychlorinated biphenyls (PCB) have been identified in bituminous roof overhang and roof flashing cement at the roofs (identified as Phase III roof in this specification) of the King Philip Middle School located at 100 King Philip Drive in West Hartford, Connecticut (herein referred to as the "Site"). The Site is owned by the Town of West Hartford, Connecticut (Owner).
- B. The goal of the work detailed herein is to achieve compliance with applicable state statutes/regulations as stated in the Regulations of Connecticut State Agencies (RCSA) Sections 22a-133k-1 through 22a-133k-3 (CTDEEP Remediation Standards Regulations), inclusive, and Sections 22a-463 through 22a-469 (CTDEEP PCB Statutes), inclusive. This specification only addresses environmental issues related to PCBs and includes an outline of the approach and procedures the Contractor will follow to ensure achievement of the remedial objectives.
- C. The remedial goals for this Site is to achieve compliance with the state regulations/statutes as follows:
 - 1. To remove and disposed of all PCB-containing bituminous roof overhang and roof flashing within the project scope with concentrations >1 ppm but <50 ppm from the specified roofing, components; and
 - 2. To perform sufficient verification sampling following the removal efforts to demonstrate compliance with the applicable state regulations/statutes.

2.2 RELATED DOCUMENTS

- A. Contract Specification 02080 – Asbestos Abatement
- B. Pre-renovation Roofing Materials Inspection Report
- C. Additional Roofing Materials Inspection Report

2.3 SITE CHARACTERIZATION

- A. Bituminous roof overhang and roof flashing cement were found to contain greater than one (1.0) but less than fifty (50) parts per million (ppm) Polychlorinated Biphenyl (PCB).

2.4 SCOPE OF WORK

The following table summarizes the PCB remediation Scope of Work. All of the materials and waste generated as a result of the activities summarized below shall be handles, transported, and disposed of as Connecticut Regulated PCB Waste. Quantities estimated below are provided to represent the magnitude of scope and shall not be used

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for bidding purposes. The Contract shall Site verify all estimated quantities for bidding purposes.

TABLE 1 – PCB Remediation Scope of Work

Material	Locations	Estimated Quantity
Bituminous Roofing (Two Layers)	Roofs 17, 18 & 21 –East Side	375 Linear Feet
Roof Flashing Cement	Roof 18-East Side	125 Linear Feet

2.5 GENERAL REQUIREMENTS

- A. The Remediation/Abatement Contractor (the Contractor) shall furnish all labor, materials, facilities, equipment, installation services, employee training, notifications, permits, licenses, certifications, agreements and incidentals necessary to perform the specified work. Work shall be performed in accordance with the Contract Documents, the latest regulations from the Occupational Safety and Health Administration (OSHA), the United States Environmental Protection Agency (USEPA), the State of Connecticut, and all other applicable federal, state and local agencies. Whenever the requirements of the above references conflict or overlap, the more stringent provision shall apply.
- B. The Site Supervisor shall be trained with OSHA 40-Hour Hazardous Waste Operations and Emergency Response (HAZWOPER) training in accordance with OSHA Regulations 29 CFR 1910. 120 and hold current certification. All other project personnel engaged in the remediation work covered under this section shall have PCB remediation-specific training and work under direct supervision of the Site Supervisor.
- C. The Contractor shall provide a Project Health and Safety Officer having a minimum of eight (8) hours of supervisor training in hazardous waste site operations in accordance with the requirements of 29 CFR 1910.120 The Site Supervisor may also function as the Project Health and Safety Officer with appropriate training. The Site Supervisor shall be on site at all times during remediation work.
- D. The Contractor shall be responsible for transportation and disposal of the scheduled source materials, porous substrates, system components, soils, and other materials as indicated on the PCB Remediation Plan RP-1, attached.
- E. The Contractor shall be responsible for decontaminating all working surfaces of tools and equipment that contact contaminated materials shall be decontaminated using the methods prescribed by 40 CFR 761 Subpart S. The Contractor shall capture all decontamination fluids and handle them in accordance with §761.60.
- F. The Contractor shall be responsible for disposal of all disposable decontamination materials and tools and equipment that cannot be cleaned in accordance with 40 CFR Subpart S (i.e. PPE, used containment barriers, etc.) as Connecticut Regulated (PCB) Waste.

2.6 SUBMITTALS

The following documents shall be submitted to the Owner or the Owner's Consultant:

- A. **Training Documentation:** Documentation of 40-Hour HAZWOPER Training for the Site Supervisor and PCB remediation training consisting of a minimum of four (4) hours classroom and field instruction for all workers.
- B. **Training Documentation:** Documentation of 40-Hour HAZWOPER plus 8-Hour HAZWOPER Supervisor Training for the designated on-site Project Health and Safety Officer.
- C. **Work Plan:** A written work plan that details the means and methods to be used for the removal and disposal of scheduled materials, waste staging, ground protection, and the contractor's plan to protect workers and to prevent PCB contamination migrating from the work areas. The work plan shall include the following at a minimum: floor plans and/or site plans indicating the proposed work areas, containment barriers, fencing, weather and erosion control, and signage for all PCB removal work as outlined in this Specification;
 - 1. The work plan shall include specific procedures to be used to remove and dispose of scheduled items and decontamination of substrates, equipment, and tools;
 - 2. The work plan shall include detailed plans and procedures for removal of scheduled materials from in situ positions, transport of the materials to waste containers, reduction of waste materials for disposal requirements;
 - 3. The work plan shall include detailed plans and procedures to ensure that further contamination of the site does not occur as the result of remediation procedures;
 - 4. A detailed plan to remove residual scheduled roofing materials from concrete or masonry substrates and detailed plan on how dispersion of dust or debris generated by the procedures will be controlled.
 - 5. A detailed proposed schedule for all remediation, disposal, and verification activities.
 - 6. Material Data Sheets and manufacturer's information shall be provided for all chemicals and materials to be used during the project including decontamination fluids.
- D. **PCB Disposal Plan:** A written plan that details the Contractor's plan for transportation and disposal of PCB-containing wastes generated during the project. The Disposal Plan shall identify:
 - 1. Waste packaging, labeling, placarding and manifesting procedures,
 - 2. Waste characterization requirements.
 - 3. The name, address, qualifications and contact number for the proposed treatment or disposal facility or facilities to which waste generated during the project will be transported.

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4. The name, address, contact person(s) and state-specific permit numbers for proposed waste transporters, and EPA identification number for firms that will transport hazardous waste.
5. A site plan indicating where waste disposal containers will be staged and how they will be labeled and secured.

E. Health and Safety Plan

1. The contractor is responsible and liable for the health and safety of all on-site personnel and the off-site community affected by the project. All on-site workers or other persons entering the abatement work areas, decontamination areas or waste handling and staging areas shall be knowledgeable of and comply with the requirements of the site-specific Health and Safety Plan (HASP) at all times. The contractor's HASP shall comply with all applicable federal, state and local regulations protecting human health and the environment from the hazards posed by the work to be performed under this project.
2. The HASP shall carry the endorsement and signature of a health and safety professional.
3. The contractor shall not initiate on-site work in the contaminated areas until the HASP has been finalized and reviewed by the Owner's Consultant to confirm applicability.
4. Consistent disregard for the provisions of the HASP shall be deemed as sufficient cause for immediate stoppage of work and termination of the Contract or any Subcontracts without compromise or prejudice to the rights of the Owner or the Architect.
5. Any discrepancies between the contractor's HASP and these specifications or federal and state regulations shall be resolved in favor of the more stringent requirements that provide the highest degree of protection to the project personnel and the surrounding community and environment, as determined by the Owner's Consultant.
6. In addition to exposure concerns relating to the presence of PCB, other health and safety considerations will apply to the work. The contractor shall be responsible for recognizing such hazards and shall be responsible for the health and safety of contractor employees at all times. It is the contractor's responsibility to comply with all applicable health and safety regulations.
7. The contractor shall prepare and submit a site-specific HASP to the Owner's Consultant a minimum of ten (10) business days prior to commencement of abatement work. The HASP shall govern all work conducted at the site during the remediation of glazing, caulk, and related debris; waste handling, sampling, and management; and waste transportation.
8. At a minimum, the HASP shall address the requirements set forth in 29 CFR 1910.120, as further outlined below:
 - a. Health and Safety Organization
 - b. Site Description and Hazard Assessment
 - c. Training (HAZWOPER/Asbestos)

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- d. Medical Surveillance
 - e. Work Areas
 - f. Personal Protective Equipment
 - g. Personal Hygiene and Decontamination
 - h. Standard Operating Procedures and Engineering Controls
 - i. Emergency Equipment and First Aid Provisions
 - j. Equipment Decontamination
 - k. Air Monitoring
 - l. Telephone List
 - m. Emergency Response and Evacuation Procedures and Routes
 - n. Site Control
 - o. Permit-Required Confined Space Procedures(If Applicable)
 - p. Spill Containment Plan
 - q. Heat and Cold Stress
 - r. Record Keeping
 - s. Community Protection Plan
9. The HASP shall be reviewed by all persons prior to entry into the abatement, decontamination, or waste staging areas, whether a representative of the contractor, owner, architect/engineer, environmental consultant, subcontractors, waste transporter or federal, state or local regulatory agency. Such review shall be acknowledged and documented by the contractor's Health and Safety Officer by obtaining the name, signature and affiliation of all persons reviewing the HASP.
10. The HASP shall be maintained so as to be readily accessible and reviewable by all site personnel throughout the duration of the-abatement project and until all waste materials are removed from the site and disposed of at the appropriate disposal facility.
11. The Contractor's on-site Health and Safety Officer shall be responsible for ensuring that project personnel and site visitors are informed of and comply with the provisions of the HASP at all times during the project.
- F. The following documents shall be submitted to the Owner's Consultant within seven (7) calendar days following removal of waste from the site:
- 1. Waste Profile Sheets
 - 2. Pre-Disposal Analysis Test Results (if testing is conducted)
 - 3. Manifests signed by the disposal facility
 - 4. Tipping Receipts provided by the disposal facility
 - 5. Certification of Final Disposal signed by the responsible disposal facility official.

2.7 APPLICABLE STANDARDS AND REGULATIONS

- A. The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only. Where a conflict or overlap among regulations and/or these specifications exist, the most stringent requirements shall apply. The Owner's Consultant will determine which requirements are most stringent.

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1. AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)
 - a. ANSI.Z89.1 Personnel Protective Equipment-Protective Headwear for Industrial Workers-Requirements (Latest Revision)ANSI.Z87 CODE OF FEDERAL REGULATIONS (CFR)U.S. DEPARTMENT OF LABOR, OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION (OSHA)
 - a. 29 CFR Subpart D Walking-Working Surface
 - b. 29 CFR 1910.120 Hazardous Waste Operations and Emergency Response
 - c. 29 CFR 1910.134 Respiratory Protection Standard
 - d. 29 CFR 1910.1200 Hazard Communication
 - e. 29 CFR 1926.20 General Health and Safety Provisions
 - f. 29 CFR 1926.57 Ventilation
 - g. 29 CFR 1926.59 Hazard Communication Program
 - h. 29 CFR 1926.62 Lead Exposure in Construction
 - i. 29 CFR 1926.65 Hazardous Waste Operations and Emergency Response
 - j. 29 CFR 1926.95 Criteria for Personal Protective Equipment
 - k. 29 CFR 1926, Subpart H Materials Handling, Storage, Use and Disposal
 - l. 29 CFR 1926, Subpart L Scaffolding
 - m. 29 CFR 1926, Subpart M Fall Protection
 - n. 29 CFR 1926, Subpart X Ladders
 - o. 29 CFR 1926, Subpart Z Toxic and Hazardous Substances
3. U.S. ENVIRONMENTAL PROTECTION AGENCY (US EPA)
 - a. 40 CFR 50.6 National Primary and Secondary Ambient Air Quality Standards for Particulate Matter
 - b. 40 CFR 260 Hazardous Waste Management System: General
 - c. 40 CFR 261 Identification and Listing of Hazardous Waste
 - d. 40 CFR 262 Standards Applicable to Generators of Hazardous Waste
 - e. 40 CFR 263 Standards Applicable to Transporters of Hazardous Waste
 - f. 40 CFR 264 Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities
 - g. 40 CFR 265 Interim Status Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities
 - h. 40 CFR 268 Land Disposal Restrictions
 - i. 40 CFR 700 Toxic Substances Control Act (TSCA)
 - j. 40 CFR 761 PCBs Manufacturing, Processing, Distribution in Commerce, and Use Prohibitions
4. U.S. DEPARTMENT OF TRANSPORTATION (DOT)
 - a. 49 CFR 105 Hazardous Materials Program. Definitions and General Procedures
 - b. 49 CFR 171 General Information, Regulations and Definitions
 - c. 49 CFR 172 Hazardous Material Tables. Special Provisions, Hazardous Materials Communications

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- Emergency Response Information and Training Requirements
 - d. 49 CFR 173 Shippers-General Requirements for Shipments and Packaging
 - e. 49 CFR 177 Carriage by Public Highway
 - f. 49 CFR 178 Specifications for Packaging
 - 5. NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH (NIOSH) Publication Number 87-10B Respiratory Decision Logic
 - b. NIOSH/OSHA Booklet 3142 Lead in Construction
 - c. Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities (NIOSH Publication 85-115)
 - 6. U.S. DEPARTMENT OF LABOR, OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION (OSHA)
 - a. PUB 3126 Working with Lead in the Construction Industry
 - b. 29 CFR 1910, Subpart I, Appendix B-Non-Mandatory Compliance Guidelines for Hazard Assessment and Personal Protective Equipment Selection
 - 2. REGULATIONS OF CONNECTICUT STATE AGENCIES (RCSA)
 - a. Hazardous Waste 22a-449(c)-100 through 119
 - b. Hazardous Waste Transporter Permits 22a-449(c)-11
 - c. Permit Fees for Hazardous Waste Materials Management 22a-454-1
 - 2. UNITED STATES ENVIRONMENTAL PROTECTION AGENCY GUIDANCE
 - a. Polychlorinated Biphenyl (PCB) Site Revitalization Guidance Under the Toxic Substances Control Act
- 2.8 POSTING AND RECORD MAINTENANCE REQUIREMENTS
- A. The following items shall be conspicuously displayed proximate to but outside of abatement work areas. The contractor shall assure that the posted regulations are not altered, defaced or covered by other materials.
 - B. Exit Routes
 - 1. Emergency exit procedures and routes
 - C. Emergency Phone Numbers
 - 1. A list indicating the telephone numbers and locations of the local hospital(s); the local emergency squad; the local fire department; the local police department; the Poison Control Center; Chemical Transportation Emergency Center (CHEMTREC); the Connecticut State Department of Public Health's office; the contractor (on-site and after hours numbers); and the environmental consultant (on-site and after hours numbers).
 - D. Warning Signs

1. Warning signs shall be In English and the language of any workers on-site who do not speak English, and be of sufficient size to be clearly legible and display the following:

**WARNING:
HAZARDOUS WASTE WORK AREA
PCBs-POISON
NO SMOKING, EATING OR DRINKING
AUTHORIZED PERSONNEL ONLY
PROTECTIVE CLOTHING IS REQUIRED IN THIS AREA**

E. Items Available On-Site

1. The contractor shall maintain the following items on-site and available for review by all employees and authorized visitors:
 - a. The Contractor's Work Plan
 - b. The Contractor's Disposal Plan
 - c. Project Health and Safety Plan (HASP)
 - d. Certificates of Training for all workers and the project Supervisor
 - e. Codes, Standards and Publications
 - 1) Copies of applicable codes, standards, and publications
 - f. Material Safety Data Sheets (MSDS) or Safety data Sheets (SDS) for all chemicals used during the project.
 - g. Copies of the contractor's written hazard communication, respiratory protection, and confined space entry programs.

2.9 WORK AREAS

- A. The contractor shall establish and clearly identify work areas in the field. Access by equipment, site personnel, and the public to the work areas shall be limited as follows:
 1. Abatement Zone - The Abatement Zone(s) shall consist of all areas where remediation, waste handling and staging activities are ongoing and the immediately surrounding locale or other areas where contamination could occur. Each Abatement Zone shall be visibly delineated with orange construction fencing at a minimum, and restricted from access by all persons except those directly necessary to the completion of the respective remediation tasks. The Abatement Zones shall be relocated and delineated as necessary as work progresses from one portion of the project site to another, to limit access to each remediation area and to minimize risk of exposure to site workers and the general public. Access shall be controlled at the periphery of the Abatement Zones to regulate the flow of personnel and equipment into and out of each zone and to help verify that proper procedures for entering and exiting are followed. All persons within the Abatement Zones shall have all required training and wear the appropriate level of protection established in the HASP.
 2. Decontamination Zone - The Decontamination Zone is the transition zone between the remediation area and the clean support zone of the project site, and is intended to reduce the potential for contaminants from being dispersed from the Abatement Zone to clean areas of the site. The Decontamination Zone shall consist of a buffer area surrounding each Abatement Zone through which the transfer of equipment, materials, personnel and containerized waste products will occur and in which decontamination of equipment, personnel, and clothing will

occur, The Decontamination Zones shall be clearly delineated with orange construction fencing at a minimum and labeled with signage as provided in Part 1.6 of this Section. All emergency response and first aid equipment shall be readily maintained in these Zones. All protective equipment and clothing shall be removed or decontaminated in the Decontamination Zone prior to exiting to the Support Zone.

3. Support Zone - The Support Zone will consist of the area outside the Decontamination Zones and the remainder of the project site. Administrative and other support functions and any activities that by nature need not be conducted in the Abatement or Decontamination Zone related to the project shall occur in the Support Zone. Access to the Abatement and Decontamination Zones shall be controlled by the Health and Safety Officer and limited to those persons necessary to complete the remediation work and who have reviewed and signed the HASP.

2.10 PERSONAL PROTECTIVE EQUIPMENT

- A. The contractor shall be responsible to determine and provide the appropriate level of personal protective equipment in accordance with applicable regulations and standards necessary to protect the contractor's employees and the general public from all hazards present.
- B. The contractor shall provide all employees with the appropriate safety equipment and protective clothing to ensure an appropriate level of protection for each task, taking into consideration the chemical, physical, ergonomic and biological hazards posed by the site and work activities.
- C. The contractor shall establish in the HASP criteria for the selection and use of personal protective equipment (PPE).
- D. The PPE to be utilized for the project shall be selected based upon the potential hazards associated with the project site and the work to be performed. Appropriate protective clothing shall be worn at all times within the Abatement Zone.
- E. The contractor shall provide the appropriate level of respiratory protection to all field personnel engaged in activities where respiratory hazards exist or there is a potential for such hazard to exit.
- F. The contractor shall provide, as necessary, protective coveralls, disposable gloves and other protective clothing for all personnel that will be actively involved in abatement activities or waste handling activities or otherwise present in the Abatement Zones. Coveralls shall be of Tyvek or equivalent material. Should the potential for exposure to liquids exist, splash-resistant disposable suits shall be provided and utilized.
- G. Protective coveralls, and other protective clothing shall be donned and removed within the Decontamination Zone and shall be disposed of at the end of each day. Ripped coveralls shall be immediately replaced after appropriate decontamination has been completed to the satisfaction of the Health and Safety Officer. Protective clothing shall not be worn outside of the Decontamination Zone.
- H. Hard Hats, protective eyewear, rubber boots and/or other non-skid footwear shall be provided by the contractor as required for workers and authorized visitors, Safety shoes and hard hats shall be in conformance with ANSI Z89.1 (1969) and ANSI 241.1 (1967), respectively.

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- I. All contaminated protective clothing, respirator cartridges and disposable protective items shall be placed into proper containers to be provided by the contractor for transport and proper disposal in accordance with 40 CFR 262.

2.11 EMERGENCY EQUIPMENT AND FIRST AID REQUIREMENTS

- A. The contractor shall provide and maintain at the site, at a minimum, the following Emergency and First Aid Equipment:
 1. Fire Extinguishers.-a minimum of one (1) fire extinguisher shall be supplied and maintained at the site by the contractor throughout the duration of the project. Each extinguisher shall be a minimum of a 20-pound Class ABC dry fire extinguisher with Underwriters Laboratory approval per 29 CFR 1910.157.
 2. First Aid Kit-a minimum of one (1) first aid kit meeting the requirements of 29 CFR 1910.151 shall be supplied and maintained at the site by the contractor throughout the duration of the project.
 3. Communications-telephone communications (either cellular or land line) shall be provided by the contractor for use by site personnel at all times during the project.
- B. The Health and Safety Officer shall be notified immediately in the event of personal injury, potential exposure to contaminants, or other emergency. The Health and Safety Officer shall then immediately notify the Owner's Consultant of same.
- C. If a member of the work crew demonstrates symptoms of heat or cold stress, injury, chemical exposure or other similar issue, another team member present within the delineated abatement zone (i.e., suitably equipped with appropriate PPE provisions) should remove the affected person from the delineated work site and signal/communicate to the Health and Safety Officer of the incident. Precautions should be taken to avoid exposure of other individuals to contaminated media.
- D. An evaluation of the person's condition shall be made by the Health and Safety Officer, to determine the appropriate course of action to administer first aid or other emergency response provision. The Health and Safety Officer shall assess the seriousness of the injury, give first aid treatment if appropriate, and arrange for appropriate emergency response from outside emergency services, if warranted.
- E. If soiled clothing cannot be removed, the injured person will be wrapped in a blanket while transported from the site.
- F. The Health and Safety Officer shall monitor the affected person to determine whether there are symptoms resulting from the exposure or injury. If there is a visible manifestation of exposure such as skin irritation, the affected party shall be referred to a medical facility for treatment and evaluation as to whether the manifestation may be indicative of a delayed or acute exposure, a secondary response to exposure such as skin infection or occupational dermatitis. All incidents of injuries and/or obvious chemical exposure shall be evaluated by the Health and Safety Officer and the Owner's Consultant to determine whether modifications to work practices and/or protective provisions are warranted.

2.12 STANDARD SAFETY AND HEALTH PROCEDURES AND ENGINEERING CONTROLS

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- A. The following provisions shall be employed to promote overall safety, personnel hygiene and personnel decontamination:
1. Each contractor or subcontractor shall ensure that all safety equipment and protective clothing to be utilized by its personnel is maintained in a clean and readily accessible manner at the site.
 2. All prescription eyeglasses in use on this project shall be safety glasses conforming to ANSI Standard Z87.1. No contact lenses shall be allowed on the site.
 3. Prior to exiting the delineated Decontamination Zone(s), all personnel shall remove protective clothing, and place disposable items in appropriate disposal containers to be dedicated to that purpose. Following removal of PPE, personnel shall thoroughly wash and rinse their face, hands, arms and other exposed areas with soap and tap water wash and subsequent tap water rinse. A fresh supply of tap water shall be provided at the site on each work day by the Contractor for this purpose.
 4. All PPE used on site shall be decontaminated or disposed of at the end of each work day. Discarded PPE shall be placed in the appropriate waste stream.
 5. Respirators, if necessary due to an upgrade to Level C PPE, shall be dedicated to each employee, and not interchanged between workers without cleaning and sanitizing.
 6. Eating, drinking, chewing gum or tobacco, smoking, and any other practice that increases the likelihood of hand to mouth contact shall be prohibited within the delineated abatement and decontamination work zones. Prior to performing these activities, each employee shall thoroughly cleanse their face, hands, arms and other exposed areas,
 7. All personnel shall thoroughly cleanse their face, hands, arms and other exposed areas prior to using toilet facilities.
 8. No alcohol, tobacco, illegal drugs or firearms will be allowed on the site at any time.
 9. All personnel that are on non-prescription (i.e., over-the-counter) or prescription medication of any kind shall notify the Health and Safety Officer prior to conducting work at the site. The Health and Safety Officer will make a determination as to whether such individuals will be allowed to work on the site, and, if so, in what capacity. The Health and Safety Officer may require signed documentation from the Individual's personal physician stating what limitations may be posed by the medication or condition that may apply to that individual's work activities.
 10. Contact with potentially contaminated surfaces should be avoided, if possible. Field personnel should minimize walking through standing water/puddles, mud or other wet or discolored surfaces; kneeling on ground; and placing equipment, materials or food on ground or other potentially contaminated surface.
 11. The use of the "Buddy System" shall be employed at all times while conducting work at the site. Each employee shall frequently monitor other workers for signs of heat stress or chemical exposure or fatigue; periodically examine others PPE

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for signs of wear or damage; routinely communicate with others; and notify the Site Safety Officer in the case of an emergency.

PART 3 - PRODUCTS

3.1 MATERIALS AND EQUIPMENT

- A. All materials shall be delivered in the original packages, containers, or bundles bearing the name of the manufacturer and the brand name.
- B. Damaged or deteriorating materials shall not be used and shall be removed from the premises. Material that becomes contaminated with asbestos shall be decontaminated or disposed of as asbestos waste.
- C. Polyethylene sheet in a roll size to minimize the frequency of joints shall be delivered to job site with factory label indicating six (6) mil.
- D. Tape or adhesive spray will be capable of sealing joints in adjacent polyethylene sheets and for attachment of polyethylene sheets to finished or unfinished surfaces of dissimilar materials and capable of adhering under both dry and wet conditions, including use of amended water.
- E. All proper labeling and placards for waste receptacles shall be maintained on site in a sufficient quantity to support the project.
- F. Orange construction fence and sufficient fence posts/stakes shall be maintained on site in a sufficient quantity to support the project.
- G. Tenax wind screens shall be maintained on site in a sufficient quantity to support the project.
- H. Primary ground cover shall be construction tarps 14 x 14 weave and a 12 mil thickness at a minimum and maintained on site in a sufficient quantity to support the project.
- I. Drain sleeves, hay bales, and other storm water control supplies shall be maintained on site in a sufficient quantity to support the project.

3.2 TOOLS AND EQUIPMENT

- A. Provide suitable tools for PCB removal.
- B. The Contractor shall have air monitoring equipment of type and quantity to monitor operations and conduct personnel exposure surveillance per OSHA requirements.
- C. The Contractor shall have available sufficient inventory on site for materials necessary for the job including protective clothing, respirators, filter cartridges, polyethylene sheeting of proper size and thickness, tape, and air filters.
- D. The Contractor shall provide temporary electrical power sources such as generators (when required).

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- E. Vacuum units, of suitable size and capacities for project, shall have HEPA filter(s) capable of trapping and retaining at least 99.97 percent of all mono-dispersed particles of 0.3 micrometers in diameter or larger.

PART 4 - EXECUTION

4.1 PREPARATION OF ABATEMENT ZONE WORK AREAS FOR NON-FRIABLE ASPHALT BOUND ROOFING MATERIALS

- A. The remediation of roofing materials will be addressed in the Contractor's Work Plan.
 - 1. Cutting or grinding of Connecticut Regulated PCB materials will require additional preparation.
- B. Outdoor Remediation: Negative Pressure Enclosures (NPEs) or containment barriers will not be required in the Abatement Zones for the remediation of scheduled roofing materials as long as the work is performed outside of the building:
 - 1. All approaches to work areas shall be restricted with barriers (i.e. orange construction fencing or banner tape) properly posted with signage.
 - 2. The Contractor shall establish the Abatement Zone, Decontamination Zone and Support Zone in accordance with this Specification. The boundaries of the three (3) zones shall be designated and segregated by orange construction fencing or banner tape and posted with proper signage at a minimum.
 - 3. To ensure that exterior work will not contaminate interior areas of the building, exterior remediation areas shall be isolated from the interior areas of the building by critical barriers consisting of polyethylene sheeting consisting of two (2) layers of six (6) mil polyethylene sheeting or equivalent to prevent accidental entry and air exchange into the building. Within each exterior Abatement Zone, openings into the building interior such as door, ventilation, and window openings shall be securely sealed. The sheeting shall be sturdy enough to withstand inclement weather conditions. Utilize wood framing as necessary to support the sheeting.
 - 4. Weather screens shall be constructed to prevent the dispersion of remediation dust or debris due to wind or rain. The construction and placement of the weather screens shall be addressed in the Contractor's Work Plan.
 - 5. Ground cover and erosion controls shall be established to prevent the migration of remediation dust or debris due to water from rain or remediation activities. The construction and placement of the ground cover and erosion controls shall be addressed in the Contractor's Work Plan.
 - 6. Drains and scuppers shall be sealed to prevent solids or liquids from entering.

4.2 REMEDIATION PROCEDURES - GENERAL

- A. Wind screens shall be of construction quality, commercial Tenax at a minimum and secured withstand adverse weather conditions.
- B. Primary ground cover shall be construction tarps 14 x 14 weave and a 12 mil thickness at a minimum and staked securely into place and drop clothes consisting of a minimum

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six-mil polyethylene sheeting shall be used on top of the primary ground cover. Drop clothes shall be removed daily and the primary ground cover inspected and cleaned as required.

- C. If grinding or cutting of Connecticut Regulated (PCB) Waste is unavoidable, work shall be performed using appropriate engineering controls including HEPA filter equipped tools and misting to prevent exposure from the work and migration of contaminants.
- D. All debris generated during operations including but not limited to visible roofing materials, dust and debris shall be HEPA vacuumed continuously throughout the work shift and at the end of the work shift to avoid accumulation. Any tears or rips that occur in barriers or ground covers shall be repaired or removed and replaced with new protections.
- E. All equipment utilized to perform cutting, or demolition of adjacent materials shall be equipped with appropriate dust collection systems.
- F. Ladders, scaffolding, or lifts utilized in the remediation shall be properly decontaminated as addressed in the Contractor's work plan prior to removal from the work area.
- G. Enclosed chutes, containers, or other lowering systems shall be used during remediation to assure that building components, substrates, waste, debris, etc. are not allowed to be dropped or allowed to "free fall" from more than eight (8) feet during remediation.
- H. Appropriate PCB waste containers shall be placed adjacent to abatement zones. Containers shall be lined, labeled, covered and secured.
- I. Post all approaches to each work area with PCB Warning signs. Warning signs shall be of size and type that are easily readable and are visible from all approaches to the work areas.

4.3 DECONTAMINATION ZONE AND SUPPORT ZONE

- A. Establish orange construction fence or banner tape to delineate the Support Zone from unrestricted areas and post with applicable warning signs. Establish one (1) point of access into the Abatement Zone where the work area access log will be maintained.
- B. The Contractor shall establish a decontamination enclosure system, which is contiguous to each work area (Abatement Zone). The decontamination enclosure system shall consist of a series of three chambers consisting of an equipment area, shower area and clean area. The floor space of each chamber shall be a minimum of three (3) by three (3) feet. The decontamination enclosure system shall be equipped with warm running water, soap and drying towels. All access to and from each work area shall be through the decontamination system. All personnel shall be decontaminated within the decontamination enclosure. The decontamination system shall be constructed of two (2) layers of six (6)-mil polyethylene sheeting on two (2) by four (4) inch dimensional lumber framing.
- C. Each work area shall contain an access log in order to maintain a list of personnel accessing the work area. Each person entering and exiting the work area shall sign the access log.

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- D. All non-disposable equipment and tools employed in the course of the project will be at the conclusion of each work day through the following sequence and left inside of the decontamination zone:
 - 1. Initial tap water rinse, to remove gross debris
 - 2. Tap water and Alconox wash
 - 3. Second tap water rinse
 - 4. Second tap water and Alconox wash
 - 5. Final tap water rinse
 - E. The wash water and decontamination liquids shall be captured and containerized in 55-gallon barrels for testing and/or off-site disposal.
 - F. Decontamination of all non-disposable equipment and tools employed in the course of the project shall be performed in accordance with 40 CFR §761 Subpart S prior to removal from the enclosure system.
 - G. Liquid wastes generated as a result of the decontamination procedures shall be collected in fifty-five (55) gallon steel or poly drums for characterization and treatment or incineration in accordance with §761.60 (if required).
- 4.4 REMEDIATION OF ROOFING MATERIALS AS CONNECTICUT REGULATED (PCB) WASTE
- A. The Contractor shall establish the Abatement Zone, Decontamination Zone, and Support Zone and NPEs in accordance with this Specification prior to the remediation of CMU/mortar or concrete.
 - B. The Contractor shall mist roofing material with water to control dust prior to and during removal. Utilize hand tools to manually remove the roof flashing materials.
 - C. All roofing materials shall be removed and immediately containerized for disposal.
 - D. All working surfaces of tools and equipment that contacts contaminated roofing shall be decontaminated using the methods prescribed by §40 CFR 761 Subpart S prior to removal from the regulated area.
 - E. The Remediation Contractor shall:
 - 1. Remove, package, handle, transport, and dispose of all specified roofing materials and dispose of as CT Regulated PCB Waste.
- 4.5 REMEDIATION OF MASONRY AND CONCRETE (SUBSTRATE REMEDIATION)
- A. The Contractor shall establish the Abatement Zone, Decontamination Zone, and Support Zone and NPEs in accordance with this Specification prior to the remediation of CMU/mortar or concrete.
 - B. The Contractor shall mist masonry and concrete with water to control dust prior to and during removal of residual roofing felts and associated asphalts.

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- C. If feasible, residual roofing felts, flashing felts, and associated asphalts shall be removed from the concrete or masonry by brush scrubbing, with a solvent if necessary.
- D. The removal of residual roofing materials from the specified substrates shall be addressed in the Contractor's Work Plan. If procedures that raise dust, such as grinding or blasting are proposed, then methods to control the dispersion of the generated dust must also be proposed.

4.6 SOIL REMEDIATION

Soil remediation for PCB is not within the scope of work; however, if soil becomes contaminated with PCB as a result of the work specified in this contract, then the Contractor shall decontaminate the soil as outlined below without additional costs to the Owner.

- A. The Contractor shall establish the Abatement Zone and Decontamination Zone in accordance with this Specification prior to the remediation of PCB contaminated soil.
- B. The Contractor shall under no circumstance allow heavy equipment on PCB contaminated soils.
- C. The Contractor shall remove PCB contaminated soil. Soil shall be lightly misted with water to control emissions during removal.
- D. The Contractor shall avoid tracking back over remediated soil areas.
- E. The Contractor shall immediately containerize soil. Stockpiling of soils shall not be allowed.
- F. All working surfaces of tools and equipment that contacts contaminated soil shall be decontaminated using the methods prescribed by §40 CFR 761 Subpart S prior to removal from the regulated area.

4.7 ON-SITE WASTE MANAGEMENT

A. SOLID WASTES

- 1. All solid waste material containment system components, used personnel protective equipment, and other solid wastes generated during the work, shall be placed directly in appropriate waste receptacles immediately upon removal from its in-situ position. Suitable waste receptacles may consist of roll-off containers or CTDOT-approved 55-gallon barrels.
- 2. If roll-off containers are to be utilized for containerization of the remediation wastes, the following shall apply:
 - a. All roll off containers or other similar vessels utilized shall be leak tight and lined with six (6)-mil polyethylene sheeting or equivalent impermeable lining, and equipped with a secured and impermeable cover.
 - b. The impermeable cover shall remain securely in place at all times when material is not being actively placed in the vessels. The contractor shall be responsible for ensuring that the cover remains securely intact until the container is removed from the site.

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3. If 55-Gallon barrel are to be utilized for waste containerization, the barrels shall consists of suitable DOT-approved 55-gallon barrels that are watertight and free of corrosion, perforations, punctures, or other damage. All barrels shall have ring lock lids and shall be sealed at the conclusion of each workday. The waste containers shall remain staged at the site with a secure impermeable cover in place until the materials are transported from the site to be delivered to the designated disposal facility.
4. A waste roll-off and barrel staging area shall be designated prior to initiation of the remediation work, and approved by the Owner's Consultant.
5. PCB Waste at any concentration (including decontamination materials) shall be stored in compliance with the time constraints, container, inspection, and labeling requirements, and all other requirements set forth in §761.65. On-site temporary storage of PCBs shall be limited to thirty (30) per §761.65(C)(1).

B. DECONTAMINATION FLUIDS AND LIQUID WASTE MATERIALS

1. All working surfaces of tools and equipment that contacts contaminated materials shall be decontaminated using the methods prescribed by §40 CFR 761 Subpart S.
2. Liquid Wastes generated as a result of the PCB remediation and equipment decontamination shall be burned in a high temperature incinerator in accordance with §761.60 or managed (treated) in accordance with §761.60 if characterization dictates.
3. Under no circumstances shall decontamination fluids or liquid wastes be discharged to the ground surface or subsurface at the site.
4. Liquid materials, including equipment or personal decontamination fluids or similar liquids generated during work at the site shall be placed directly into appropriately sized and sealed vessels immediately upon generation.
5. Acceptable vessels for the storage of liquid wastes may include DOT approved 55-gallon barrels, steel or polyethylene tanks, fractioning tanks or tank trucks. All proposed vessels shall be compatible with the intended liquid contents.
6. Container staging areas shall be designated prior to initiation of the removal work and approved by the Owner's Consultant.
7. All storage vessels to be used in the containerization and transportation of liquid waste materials shall be free of corrosion, perforations, punctures or other condition that may impair its ability to securely contain liquid.
8. Temporary staging of liquid waste vessels at the site shall be in a manner that will prevent freezing of contained liquids. Should the potential exist for liquid containers to freeze during exterior storage at the site, arrangements shall be made with the Owner's Consultant to identify and utilize an appropriate alternate storage location acceptable to the Owner's Consultant.
9. All liquid storage vessels utilized and staged at the site shall be stored in an area on the property that will not interfere with facility operations or normal flow of vehicle or pedestrian traffic, and in a manner that will minimize the potential for tipping, vandalism or damage by vehicular traffic.

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10. All characterization of waste, testing, analytical fees for disposal purposes shall be borne by the Contractor.

C. LABELING OF WASTE CONTAINERS

1. All waste containers and temporary waste storage areas shall be labeled in accordance with §761.40 and §761.45 (if applicable) and Regulations of Connecticut State Agencies (RCSA) Sections 22a-133k-1 through 22a-133k-3 (CTDEEP Remediation Standards Regulations), inclusive, and Sections 22a-463 through 22a-469 (CTDEEP PCB Statutes).
2. All waste containers shall be posted with signage indicating the disposition of the waste (i.e. "Connecticut Regulated PCB Waste).
3. All waste containers must be labeled with the name of the waste contained; the date in which the first material was placed in the vessel; and the last date at which addition of waste occurred.
4. All waste containers containing caulk or caulk debris, containment system components, used personnel protective equipment, personal and equipment wash water and decontamination fluids, or other wastes generated during the remediation work shall be labeled as follows:

CONNECTICUT REGULATED WASTE-improper disposal prohibited.
If found, contact the nearest police or public safety authority or the Connecticut
Department of Energy and Environmental Protection.

Generator's Name: _____

Manifest Document No.: _____

5. Such marking must be durable, in English and printed on or affixed to the surface of the package or on a label, tag or sign; displayed on a background of sharply contrasting color; un-obscured by labels or attachments and located away from any other marking (such as advertising) that could substantially reduce its effectiveness.

4.8 WASTE TRANSPORTATION AND DISPOSAL

- A. All waste packaging, labeling and transportation activities shall be performed in accordance with applicable State of Connecticut and US Department of Transportation Regulations at 49 CFR Parts 171, 172, 173, 177, and 178, and any and all other applicable federal, state and local laws and regulations.
- B. All hazardous wastes shall be shipped using state-specific standard manifest documents. The Contractor shall supply and complete the manifest documents in accordance with all applicable state and federal regulations. All manifest documents shall be signed by a representative of the Owner and appropriate copies shall be provided to the Owner's representative prior to removing the waste from the site.
- C. The Contractor or their designated waste disposal subcontractor providing waste transportation services shall possess a valid Waste Hauler's Permit issued by the State of

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Connecticut Department of Energy and Environmental Protection (CTDEEP). In addition, if the waste is to be transported and disposed of out of Connecticut State, applicable permits for those states or territories through which the waste will be transported and for where it will be disposed will be required. It is the responsibility of the Contractor to identify the appropriate disposal facility and associated travel route(s) and to identify the pertinent permits that will be required and to provide copies of the applicable permits to the Owner's Consultant prior to removing the waste from the site.

- D. The Contractor shall be responsible for applying for, obtaining and payment of all permits and temporary hazardous waste generator identification numbers to support the project.

4.9 CERTIFICATION OF REMEDIATION WORK

- A. The Contractor shall certify in writing to the Owner's Consultant that all remediation work and waste disposal has been completed in accordance with this specification and all applicable federal and state regulations.
- B. The Contractor shall certify in writing to the Owner's Consultant that each piece of equipment used in the Abatement zones or which has come in or potential come into contact with contaminated material has been decontaminated prior to removal from the site.

4.10 POST REMEDIATION VERIFICATION

Upon completion of work in each area, a visual inspection of all remediated surfaces for visible evidence of dust and debris shall be performed. Surfaces shall also be inspected for visible PCB source materials that may not have been removed. The visual inspection shall provide verification that remediation work has been completed in accordance with this Plan. The visual inspection shall ensure that no visible dust or debris is present on adjacent surfaces where caulks and substrates were removed. In addition to the remediated surfaces, the surfaces of protective coverings and isolation barriers shall be inspected to ensure they are cleaned of dust and debris.

A. Verification Bulk Samples

1. Verification bulk samples may be collected from concrete and masonry in areas where PCB remediation has been completed unless the Contractor decides to remove the entire substrate as PCB-contaminated waste.
2. The criteria for successful verification samples shall be one (1) ppm PCB or less.
3. If any location exceeds this clearance objective, the Owner's Consultant will discuss additional remedial actions with the Owner that may include additional cleaning or sealing of the areas.
4. Samples will be analyzed at Phoenix Environmental Laboratories, Inc. located in Manchester Connecticut. PCB will be extracted from samples using USEPA Extraction Method 3540C and analyzed using EPA method SW846 8082.

END OF SECTION 02085



EAGLE
Environmental, Inc.



Hazardous Building Materials > Industrial Hygiene/IAQ > Environmental Assessments > Laboratory Services & Training

April 24, 2014

Mr. Steve Tedford
Service Response Manager
Town of West Hartford
17 Brixton Street
West Hartford, Connecticut 06110

**RE: Polychlorinated Biphenyls & Asbestos Containing Materials Roofing Inspection
King Phillip Middle School – Roof Replacement Project
100 King Phillip Drive
West Hartford, Connecticut
Eagle Project No. 14-011.2011**

Dear Mr. Tedford:

Attached is the Polychlorinated Biphenyls (PCB) and Asbestos Containing Materials (ACM) Roofing Inspection Report conducted for the roofs at King Phillip Middle School located at 100 King Phillip Drive in West Hartford, Connecticut. The inspection was performed to support the replacement of the existing original roofs constructed in 1955. The newer roof constructed in 2001 was excluded from the scope of work.


Please do not hesitate to contact us if you have any questions regarding the contents of this report.

Sincerely,

Eagle Environmental, Inc.


Report Prepared By:

Aaron E. Hatcher
Project Manager


Report Reviewed By:
Ashis Roychowdhury
Executive Vice President

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1.0 INTRODUCTION

On March 27, 2014, Eagle Environmental, Inc. conducted a Polychlorinated Biphenyl (PCB) and Asbestos Containing Materials (ACM) roofing inspection for the roofs located at the King Phillips Middle School in West Hartford, Connecticut. The roof inspection was performed to support the replacement of the existing roofs. The Town of West Hartford retrieved Shoreline Restoration Roofing Company, a professional roofer, to perform the test cuts and to patch the cuts following sample collection.

1.1 Roof Description

The subject building is a single story brick and concrete school building built in 1955. There were twenty-eight (28) roofs inspected totaling approximately 186,000 square feet in area. Based on the information provided by Mr. Steve Tedford of the Town of West Hartford all twenty-eight (28) roofs were constructed at the same time.

All twenty-eight (28) roofs are flat and consist of either a 4 ply or 6 ply built up roofing system with stone ballast, polyisocyanurate insulation and mineral wool insulation on a concrete roof deck. The roofs are primarily at the same elevation with limited raised roofs. There are several penetrations on each of the twenty-eight (28) roofs, which consist of mechanical equipment, exhaust vents and roof drains. For the purpose of this report, the roofs were divided into three (3) phases:

- Phase I – Consist of Roofs 1-13 and Roofs 26-28
- Phase II – Consist of Roofs 14-16
- Phase III – Consist of Roofs 17-25

The newer roof constructed in 2001 was not included in the scope of services.

2.0 SCOPE OF INSPECTION

2.1 Asbestos Containing Roofing Materials

The asbestos inspection was conducted in order to satisfy the USEPA National Emission Standard for Hazardous Air Pollutants Act (NESHAP) as amended November 20, 1990. The USEPA NESHAP final rule requires the identification and removal of regulated asbestos containing roofing materials as a part of the replacement of the existing roofing materials.

The inspection and sample collection was performed on March 27, 2014 by Aaron E. Hatcher; a State of Connecticut licensed Asbestos Inspector (license # 000645). The inspection was coordinated with the Town of West Hartford who retained Shoreline Restoration Roofing Company, a professional roofer, to perform the test cuts and to patch the cuts following sample collection.

2.2 PCB Containing Roofing Materials

The U.S. EPA has identified roofing materials as potential sources of Polychlorinated Biphenyl (PCB). PCBs are currently prohibited from being used in building materials but was used in caulk and other materials prior to 1977 to improve adhesion and flexibility samples of roofing materials were collected and analyzed for PCB's under this scope of inspection services.

Eagle Environmental, Inc. performed sampling of roofing materials for PCB's. The sampling was performed to satisfy the State of Connecticut Department of Administrative Services Office

of School Facilities (OSF) requirement to test suspect building materials for PCB's for any school project that will be funded by the State. Samples of roofing materials were collected and analyzed for PCB's under this scope of inspection services.

The U.S. EPA regulates the disposal of materials contaminated with PCBs, if the concentration of PCB is found to be equal to or greater than 50 parts-per-million (ppm). Many landfills will not accept materials that contain any amount of PCB's. The State of Connecticut Department of Energy and Environmental Protection (DEEP) regulates removal and disposal of materials with PCB concentration in excess of 1 ppm. Materials with PCB concentrations equal to or greater than 50 ppm are considered "PCB Bulk Product Waste" and materials with PCB concentrations >1 ppm but <50 ppm are considered "PCB Remediation Waste". Materials contaminated with PCB's in concentration less than 1 ppm are not regulated and can be disposed of as general construction waste.

The PCB inspection and sample collection was performed on March 27, 2014, by Aaron E. Hatcher a Project Manager with Eagle Environmental.

3.0 INSPECTION PROTOCOLS

3.1 Asbestos Bulk Sampling

Bulk Sampling

During the sampling process, suspect miscellaneous roofing materials were sampled only. This includes but is not limited to suspect roofing felts, roofing tar, and roof flashing cement, insulation board, vapor barriers, caulks and adhesives. Roof sampling was performed in conjunction with a licensed professional contracted roofer who assisted with the coring and cutting to access suspect layers of roofing materials. Shoreline Restorations Company applied the roof patches once samples were collected. There were a total of thirty-one (31) roof cores and cuts for all twenty-eight (28) inspected roofs. The layers of suspect roofing materials were separated for analysis. The inspection was performed in one (1) day.

Eagle Environmental collected samples of miscellaneous roofing materials in accordance with USEPA and OSHA requirements and current industry standards. A minimum of two (2) samples for each suspect miscellaneous material was collected. Additional samples are collected at the inspector's discretion. Where large quantities of miscellaneous materials are present, additional samples are collected. Current regulations require that sampling of miscellaneous materials shall be conducted in a manner sufficient to provide accurate results. Miscellaneous roofing materials include roofing felts, mastics, transite and caulks.

During the inspection, suspect materials are located, sampled, quantified and the friability of the material is determined. Friable materials are those materials that hand pressure can crumble, pulverize or reduce to powder when dry. An estimated quantity of identified ACM is provided for positive materials only. The materials are quantified in linear or square feet, depending on the nature of the material.

Eagle Environmental, Inc. did not penetrate or inspect the roof associated with the schools addition. Ethylene Propylene Diene Monomer (EPDM) roofing systems were not included in this scope of service. Cutting through an EPDM rubber roof membrane can void the warranty of the roof system if the roof is not repaired by personnel trained in the installation or repair of the specific roof system.

3.2 Asbestos Bulk Sample Analysis

Bulk Sample Analysis

The samples of the suspect asbestos containing materials were sent to a State of Connecticut Department of Public Health approved laboratory for analysis by Polarized Light Microscopy (PLM). PLM is the USEPA accepted method of analysis for identification of asbestos in bulk matrixes. Each set of samples was systematically analyzed until one sample was determined to contain asbestos. Upon determination, that one sample in the set contained asbestos, analysis of the remaining samples in the set was discontinued. If no asbestos was observed during analysis of the set of samples, the suspect material was determined to be negative for asbestos content.

Friable ACM

Certain samples of friable materials shown to contain less than 10% asbestos are analyzed further by the "Point Count Method". This procedure is recommended by the United States Environmental Protection Agency to confirm friable bulk samples shown to have less than 10% asbestos by PLM to be definitively negative or positive for asbestos. This method is accepted as providing statistically reliable results when analyzing bulk samples with very low asbestos concentrations. Friable materials containing "Trace" or "less than one percent (1%)" asbestos must be analyzed by the PLM Point Count Method. No samples were analyzed by the PLM Point Count Method for this project.

Non-Friable ACM

Certain samples of non-friable materials shown to contain "less than 1% asbestos", "TRACE" or "NAD" are recommended for analyses by the "NOB TEM ELAP 198.4 Method". This procedure is recommended by the United States Environmental Protection Agency to further evaluate non-friable bulk samples for asbestos. Suspect materials confirmed by NOB TEM to be "less than 1% asbestos", "TRACE" or "NAD" are considered non-asbestos containing. No samples were analyzed by the NOB TEM Method for this project.

Sample results are reported in percentage of asbestos and non-asbestos components. The USEPA defines any material that contains greater than one percent (>1%) asbestos, utilizing PLM, as being asbestos-containing material (ACM). Suspect materials containing greater than one percent (1%) asbestos utilizing the PLM Point Count Method and the NOB TEM method are also considered to be asbestos-containing. Any material determined to contain greater than one percent (1%) asbestos is regulated by the USEPA, the State of Connecticut Department of Public Health (DPIH) and Department of Energy and Environmental Protection (DEEP) and the United States Department of Labor, Occupational Safety and Health Administration (OSHA). Sample results indicating "no asbestos detected" (NAD) are specified as non-asbestos containing materials. Sample results indicating "Did Not Analyze" (DNA) are not analyzed due to the "stop on first positive" request to the laboratory.

Bulk Sample Results

The results of the bulk sample analysis are provided in two independent tables provided as Table I and Table II. Table I is the Asbestos Containing Materials Summary Table. This table provides an overall inventory of the asbestos containing materials identified during the inspection. The table provides the location, material type, sample number, category, bulk sample result for each analytical procedure performed, a total estimated quantity of each type of ACM and the friability of the material. For the purpose of this report, the roofs are identified by numbers which are located on the attached Roof Plans in Appendix 1.

Table II provides an inventory of all negative materials (non-asbestos containing materials). Table II provides the location, material type, sample number, category and the bulk sample result for each analytical procedure performed. The materials in Table II are negative for asbestos and require no further action.

Sample locations are identified on the Roof Plans attached in Appendix 1. Sample results are attached in Appendix 2.

3.3 PCB Bulk Sampling

A total of twenty (20) samples of roofing materials were collected for PCB analysis.

Physical sampling was performed utilizing hand tools. The hand tools were decontaminated with a soap and water solution following a Hexane solvent (oil extraction agent) rinse between each successive sampling. A minimum of 15 grams of material were collected for each sample. The samples were collected and placed in 4 oz. glass jars and were maintained in a cooler with ice packs until transmitted to the laboratory under proper chain of custody. The PCB samples collected for this project included the following:

- 6-Ply built up roofing – Roof 2
- Black flashing cement – Roof 16
- Built up roofing – Roofs 1,5, 15, 23
- Flashing cement – Roof 14
- Metal flashing caulk – Roofs 14, 20
- Reglet flashing caulk – Roof 15
- Tar and ballast – Roofs 8, 16, 10
- Tar and felt with rubber – Roofs 8, 15
- Tar and felts 2-Ply – Overhang
- Tar between insulation board – Roof 2
- Tar on concrete deck – Roofs 10, 16, 23

PCB sample locations are identified on the Roof Plans provided in Appendix 1. Sample results are in Appendix 3.

3.4 PCB Bulk Sample Analysis

The samples were extracted for analysis by EPA Soxhlet Extraction Method 8082 and analyzed using EPA Methods 3500B/3540C of SW-846 for these solid matrices. The samples were analyzed by Phoenix Environmental Laboratories, Inc. of Manchester, Connecticut.

4.0 INSPECTION RESULTS

4.1 ACM Results

During the course of the building inspection forty-one (41) bulk samples of suspect ACM were collected and thirty-nine (39) samples were analyzed by PLM based on the “stop on first positive” request to the laboratory.

Miscellaneous ACM:

- White caulk on reglets flashing - Roofs 8, 14, 20
- New black flashing on vent base - Roofs 18, 21

The remaining suspect materials were confirmed to be non-ACM.

The summaries of asbestos and non-asbestos materials are presented in Tables I and II respectively. The asbestos analysis laboratory reports are provided in Appendix 2.

Any suspect material not specifically identified in this report as non-ACM should be assumed to contain asbestos unless sample results prove otherwise.

The flashing cements and roof reglet caulking is non-regulated asbestos-containing materials. These materials may be removed by non-licensed workers as long as the material is maintained in a non-friable condition during the removal process. Workers removing the non-friable asbestos-containing roofing materials must have a minimum of eight (8) hours awareness training to comply with the Department of Labor Occupational Safety and Health Administration (OSHA) Asbestos in Construction Standard 29 CFR 1926.1101. The asbestos-containing roofing materials removed during this project must be disposed of as asbestos-containing waste.

The identified asbestos-containing materials are non-friable in their current condition. However, abrasively cutting these materials would render the material friable. Rendering the material friable during removal would trigger certain regulatory requirements of the State of Connecticut Department of Public Health including but not limited to contractor and worker licensing, notification and work practices. The State of Connecticut Department of Energy and Environmental Protection (DEEP), the USEPA and OSHA also have regulatory requirements pertaining to the removal and disposal of roofing materials. Please note that the removal of these materials cannot be performed while there are students or children under 18 years of age are present in the building.

4.2 PCB Results

From the twenty (20) samples collected for PCB's, two (2) samples were confirmed to contain PCB's greater than 1 ppm:

PCB Containing:

- Tar and Felts - Roof overhang 1,12,14,15,18,21
- Flashing cement - Roof 18

These materials are regulated by the State of Connecticut Department of Energy and Environmental Protection (DEEP). Because the tar and felt roofing material is applied directly on the roof concrete overhang it is likely that the PCB's may have leached into the substrate resulting to PCB contamination. Guidance from the DEEP should be sought during the design phase of work to appropriately address the material. The flashing cement is adhered to metal therefore once removed and properly cleaned no further action would be required. If additional materials will be impacted by the roof replacement project, and has not been sampled under this report cover then the materials should be sampled for PCB's or assumed to contain PCB's.

The State of Connecticut Department of Energy and Environmental Protection (DEEP) regulates the removal and disposal of "source" materials, soil, or substrate materials with PCB concentrations in excess of one (1) ppm. Per DEEP Regulations 22a-463, 22a-464, and 22a-467, any materials containing PCB in excess of one (1) ppm are regulated for clean-up and disposal. Although the flashing cement and tar and felts may qualify as "excluded products" under 40 CFR 761, the caulks and glazing compounds contain greater than one (1) ppm PCB and DEEP requires the removal of the materials.

The results of the "source" materials sampling are presented in Table III. The PCB laboratory reports are provided in Appendix 3.

TABLE I
ASBESTOS CONTAINING MATERIALS SUMMARY TABLE

TABLE I
ASBESTOS CONTAINING MATERIALS
SUMMARY TABLE
KING PHILLIP MIDDLE SCHOOL
ROOF REPLACEMENT PROJECT
100 KING PHILLIP DRIVE
WEST HARTFORD, CONNECTICUT

LOCATION(S)	MATERIAL TYPE	SAMPLE NUMBER	CATEGORY	BULK SAMPLE ANALYSIS RESULTS			ESTIMATED QUANTITY	T/NF
				PLM	PLM/PC	TEM/NOB		
Roofs 8, 14, 20	White caulk on reglets flashing	3-27-AH-32 3-27-AH-33	MISC	14% Chrys DNA		YES	80 LF	NF
Roof 21, 18	New black flashing on vent base	3-27-AH-34 3-27-AH-35	MISC	15% Chrys DNA		YES	6 SF	NF
KEY DNA = DID NOT ANALYZE NAD = NO ASBESTOS DETECTED F = FRIABLE NF = NON-FRIABLE TSI = THERMAL SYSTEMS INSULATION SURF = SURFACING MATERIAL MISC = MISCELLANEOUS MATERIAL								
				ANALYTICAL METHODS PLM PC = EPA 600/R-93/116 QUANTITATION 400 POINT COUNT TEM NOB = NEW YORK ELAP 198.4 METHOD PLM = EPA 600/R-93/116 PS = Previously Sampled EA = Each				
BOLD TEXT IN "LOCATION" COLUMN INDICATES SAMPLE LOCATION								

TABLE II
NON-ASBESTOS-CONTAINING MATERIALS SUMMARY TABLE

TABLE II
NON - ASBESTOS CONTAINING MATERIALS
SUMMARY TABLE
KING PHILIP MIDDLE SCHOOL
ROOF REPLACEMENT PROJECT
100 KING PHILIP DRIVE
WEST HARTFORD, CONNECTICUT

SAMPLE LOCATION(S)	MATERIAL TYPE	SAMPLE NUMBER	CATEGORY	BULK SAMPLE ANALYSIS RESULTS		
				PLM	PLM/PC	TEM/NOB
Roofs 1, 3, 15	Built up roofing on fiberboard insulation (Cut 1, 4, 11)	3-27-AH-01	MISC	NAD		
		3-27-AH-02		NAD		
		3-27-AH-03		NAD		
Roofs 2, 9, 17	Top layer 4-ply built up roofing (Cut 3, 15, 20)	3-27-AH-04	MISC	NAD		
		3-27-AH-05		NAD		
		3-27-AH-06		NAD		
Roofs 2, 6, 17	Tar between fiber board and polyisocyanurate insulation (Cut 3, 7, 20)	3-27-AH-07	MISC	NAD		
		3-27-AH-08		NAD		
		3-27-AH-09		NAD		
Roofs 2, 6, 17	Mineral wool insulation (Cut 3, 7, 21)	3-27-AH-10	MISC	NAD		
		3-27-AH-11		NAD		
		3-27-AH-12		NAD		
Roofs 8, 15	Torch down rubber roof at roof wall junction (Cut 9, 14)	3-27-AH-13	MISC	NAD		
		3-27-AH-14		NAD		
Roofs 8, 15	Tar and felt on roof wall junction (Cut 9, 14)	3-27-AH-15	MISC	NAD		
		3-27-AH-16		NAD		
Roofs 15, 16	Tar on concrete deck (Cut 12, 13)	3-27-AH-17	MISC	NAD		
		3-27-AH-18		NAD		
Roofs 12, 16	Black flashing cement on copper flashing	3-27-AH-19	MISC	NAD		
		3-27-AH-20		NAD		
Roofs 1, 17	Tar and felt on concrete roof overhang	3-27-AH-21	MISC	NAD		
		3-27-AH-22		NAD		
Roofs 1, 19	Silver paint on roof overhang	3-27-AH-23	SURF	NAD		
		3-27-AH-24		NAD		
		3-27-AH-25		NAD		
KEY:				ANALYTICAL METHODS		
DNA = DID NOT ANALYZE				PLM PC = EPA 600/R-93/116 QUANTITATION 400 POINT COUNT		
NAD=NO ASBESTOS DETECTED				TEM NOB = NEW YORK ELAP 198.4 METHOD		
F = FRIABLE				PLM = EPA 600/R-93/116		
NF = NON-FRIABLE				PS = Previously Sampled		
TSI = THERMAL SYSTEMS INSULATION				EA = Each		
SURF = SURFACING MATERIAL						
MISC = MISCELLANEOUS MATERIAL						
BOLD TEXT IN "LOCATION" COLUMN INDICATES SAMPLE LOCATION						

TABLE II
NON - ASBESTOS CONTAINING MATERIALS
SUMMARY TABLE
KING PHILLIP MIDDLE SCHOOL
ROOF REPLACEMENT PROJECT
100 KING PHILLIP DRIVE
WEST HARTFORD, CONNECTICUT

SAMPLE LOCATION(S)	MATERIAL TYPE	SAMPLE NUMBER	CATEGORY	BUCK SAMPLE ANALYSIS RESULTS		
				PLM	TEM NOB	
Roofs 12, 21	6-Ply Built up roofing (Cut 19, 26)	3-27-AH-26	MISC	NAD		NO
		3-27-AH-27		NAD		
Roofs 17, 21	Asphalt rolled roofing at roof wall junction (Cut 22, 26)	3-27-AH-28	MISC	NAD		NO
		3-27-AH-29		NAD		
Roof 12	Bottom layer built up roofing on roof deck (Cut 19)	3-27-AH-30	MISC	NAD		NO
		3-27-AH-31		NAD		
Roofs 23, 24	4-Ply built up roofing on fiberglass insulation (Cut 28, 29)	3-27-AH-36	MISC	NAD		NO
		3-27-AH-37		NAD		
Roofs 23, 24	Tar between fiberglass insulation	3-27-AH-38	MISC	NAD		NO
		3-27-AH-39		NAD		
Roof 15	Rubber caulk at roof wall metal flashing	3-27-AH-40	MISC	NAD		NO
		3-27-AH-41		NAD		
KEY				ANALYTICAL METHODS		
DNA = DID NOT ANALYZE				PLM PC = EPA 600/R-93/116 QUANTITATION 400 POINT COUNT		
NAD=NO ASBESTOS DETECTED				TEM NOB = NEW YORK ELAP 198.4 METHOD		
F = FRIABLE				PLM = EPA 600/R-93/116		
NF = NON-FRIABLE				PS = Previously Sampled		
TSI = THERMAL SYSTEMS INSULATION				EA = Each		
SURF = SURFACING MATERIAL						
MISC = MISCELLANEOUS MATERIAL						
				BOLD TEXT IN "LOCATION" COLUMN INDICATES SAMPLE LOCATION		

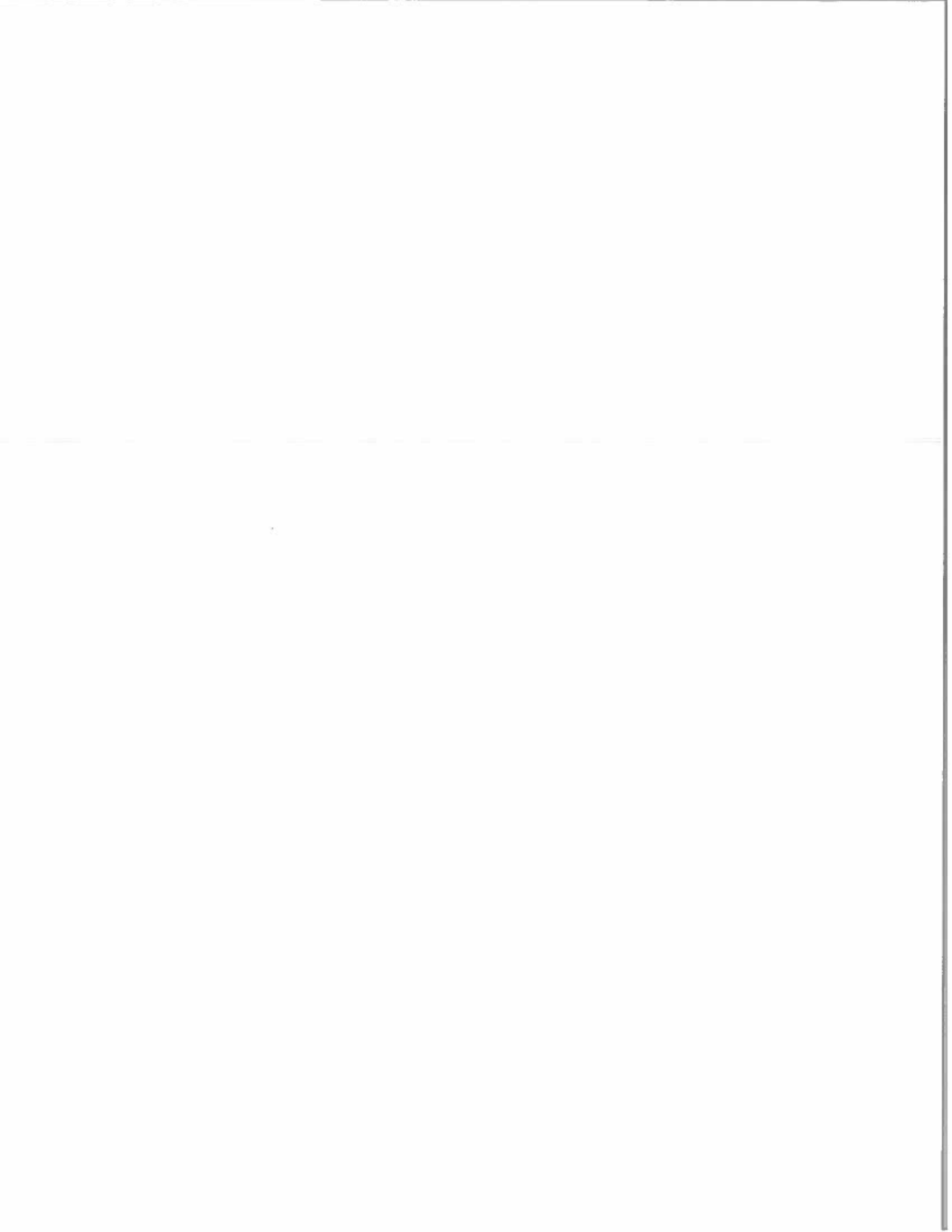
TABLE III
PCB SUMMARY TABLE

**TABLE III
PCB CONTAINING SOURCE MATERIALS
SUMMARY TABLE
KING PHILLIP MIDDLE SCHOOL
ROOF REPLACEMENT PROJECT
100 KING PHILLIP DRIVE
WEST HARTFORD, CONNECTICUT**

SAMPLE DATE	SAMPLE NUMBER	SAMPLE LOCATION	SOURCE SAMPLES	SAMPLE DESCRIPTION	RESULT (PPM)	
					ND / <1 PPM	>1 PPM - <50 PPM
3-27-2014	3-27-PCB-BUR-01	Phase I - Roof 1 - Cut 01	Built up roofing		ND	
3-27-2014	3-27-PCB-TAR-02	Phase I - Roof 2 - Cut 03	Tar between insulation board		ND	
3-27-2014	3-27-PCB-BUR-03	Phase I - Roof 5 - Cut 06	Built up roofing		ND	
3-27-2014	3-27-PCB-TB-04	Phase I - Roof 8 - Cut 08	Tar and ballast		ND	
3-27-2014	3-27-PCB-TRT-05	Phase I - Roof 8 - Cut 09	Tar and felt with rubber		ND	
3-27-2014	3-27-PCB-BUR-06	Phase II - Roof 15 - Cut 11	Built up roofing		ND	
3-27-2014	3-27-PCB-TB-07	Phase II - Roof 16 - Cut 12	Tar and ballast		ND	
3-27-2014	3-27-PCB-TD-08	Phase II - Roof 16 - Cut 12	Tar on concrete deck		ND	
3-27-2014	3-27-PCB-FLASHING-09	Phase II - Roof 16	Black flashing cement		ND	
3-27-2014	3-27-PCB-TRT-10	Phase II - Roof 15 - Cut 14	Tar and felt with rubber		ND	
3-27-2014	3-27-PCB-IF-11	Phase I - Roof 1 - Overhang	Tar and felts 2-ply		2.70	
3-27-2014	3-27-PCB-TD-12	Phase I - Roof 10 - Cut 16	Tar on concrete deck		ND	
3-27-2014	3-27-PCB-TB-13	Phase I - Roof 10 - Cut 17	Tar and ballast		ND	
3-27-2014	3-27-PCB-BUR2-14	Phase I - Roof 12 - Cut 19	6-ply built up roofing		ND	
3-27-2014	3-27-PCB-FC-15	Phase III - Roof 20 - Flashing	Metal flashing caulk		ND	
3-27-2014	3-27-PCB-FLASHING2-16	Phase III - Roof 18	Flashing cement		1.50	
3-27-2014	3-27-PCB-BUR2-17	Phase III - Roof 23 - Cut 28	Built up roofing		ND	
3-27-2014	3-27-PCB-FC-18	Phase II - Roof 14	Metal flashing caulk		ND	
3-27-2014	3-27-PCB-RFC-19	Phase II - Roof 15	Reglet flashing caulk		ND	
3-27-2014	3-27-PCB-TD-20	Phase III - Roof 23 - Cut 28	Tar on concrete deck		ND	
KEY						
ND = NONE DETECTED						
SOXHLET EXTRACTION 3540C & ANALYTICAL METHOD SW846 8082 (Reporting Limit = <1PPM)						
ANALYTICAL METHOD						

APPENDIX 1

ROOF PLANS WITH SAMPLE LOCATION DIAGRAMS



TOWN OF WEST HARTFORD

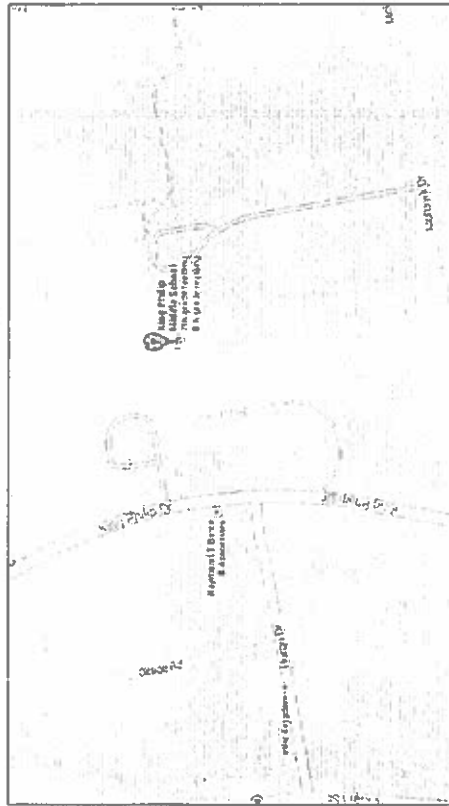
KING PHILLIP MIDDLE SCHOOL
ROOF REPLACEMENT PROJECT
100 KING PHILLIP DRIVE
WEST HARTFORD, CONNECTICUT

EAGLE PROJECT NUMBER: 14-011.20T1

INDEX OF DRAWINGS

- RP-1: PHASE ONE ROOF PLAN
- RP-2: PHASE TWO ROOF AND PHASE THREE ROOF PLANS

LOCATION MAP



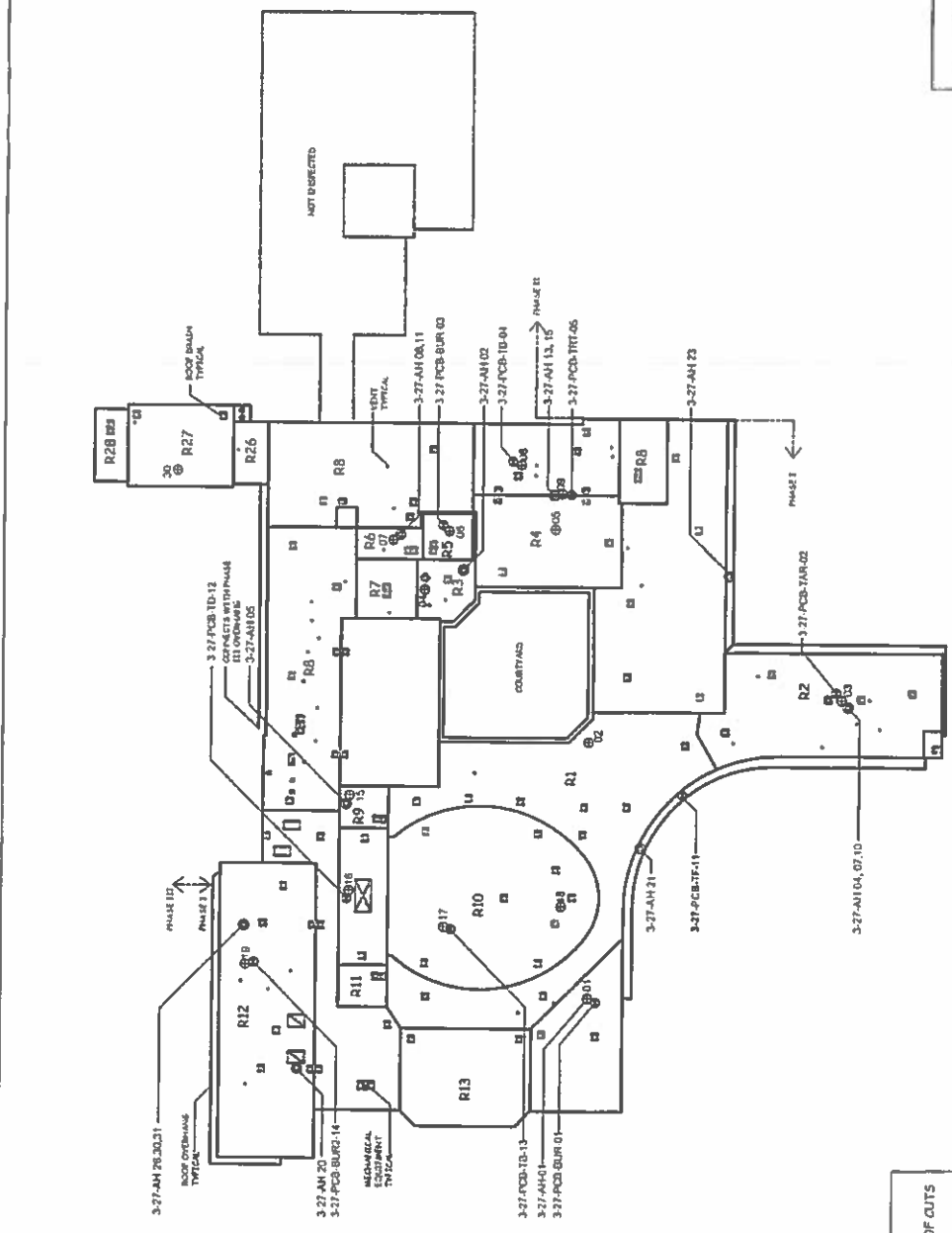
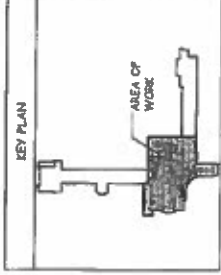
APRIL 14, 2014

HAZARDOUS MATERIAL
INSPECTION DIAGRAMS



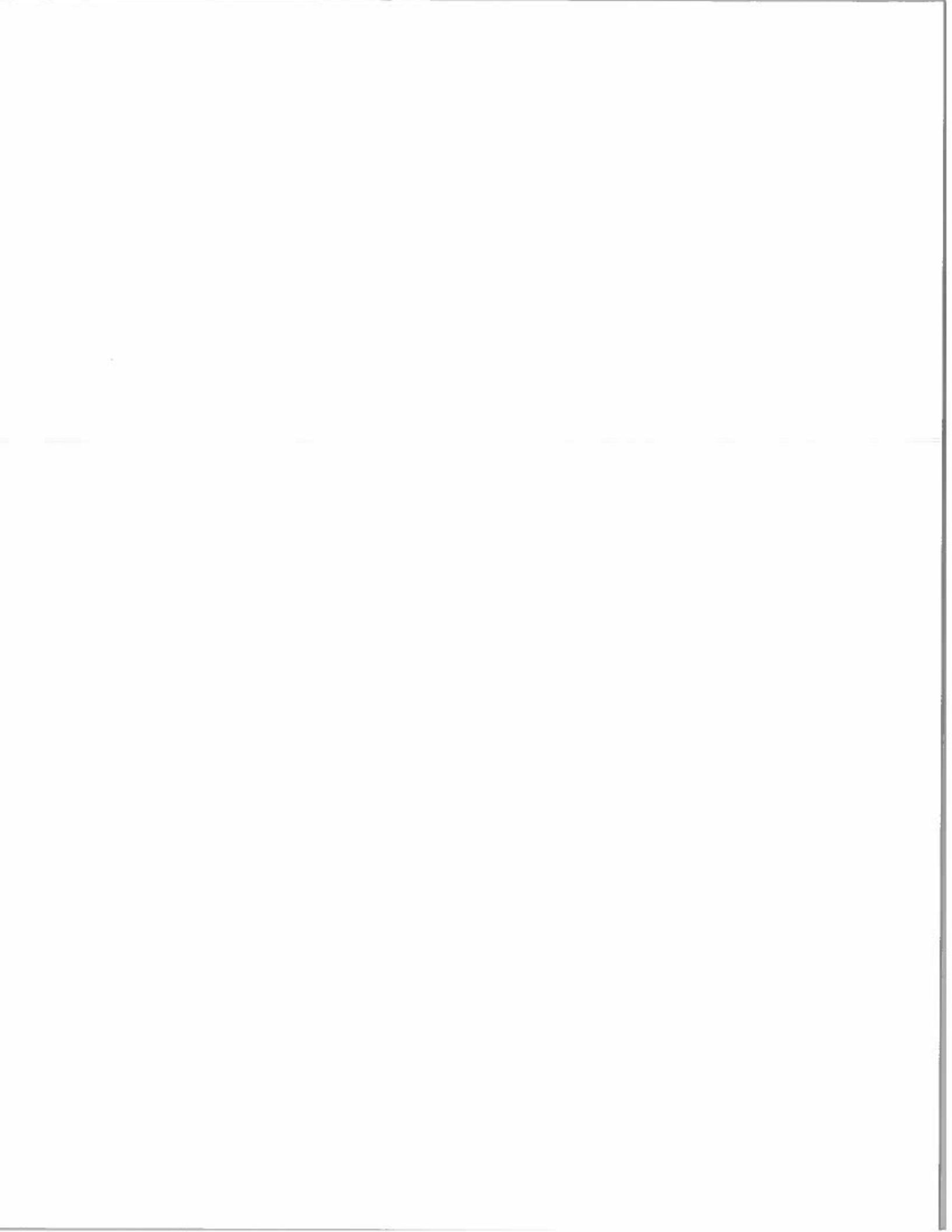
8 SOUTH MAIN STREET, SUITE 3
TERRYVILLE, CONNECTICUT 06786
860-589-8257

TOWN OF WEST HARTFORD
KING PHILLIP
MIDDLE SCHOOL
100 KING PHILLIP DRIVE
WEST HARTFORD, CONNECTICUT



- SYMBOL KEY:**
- ⊕ DENOTES AREA AND NUMBER OF ROOF CUTS
 - R# DENOTES ROOF (I.E. R2 : ROOF 2)
 - ⊙ 3-27-AH - ASBESTOS SAMPLE LOCATIONS
 - ⊙ 3-27-PCB - PCB SAMPLE LOCATIONS
 - ⊙** BOLD INDICATES SAMPLE TESTED POSITIVE FOR ASBESTOS OR PCB'S

PHASE I
 NOT TO SCALE



APPENDIX 2

ASBESTOS BULK SAMPLE LABORATORY REPORTS



EMSL - MA
 7 Constitution Way, Ste 107
 Woburn, MA 01801
 (781) 933-8411
 (781) 933-8412 Fax

EMSL - CT
 29 N. Plains Hwy, Unit 4
 Wallingford, CT 06492
 (203) 284-5948
 (203) 284-5978 Fax

EMSL - NY
 307 West 38th Street
 New York, NY 10018
 (866) 448-3675
 (212) 290-0058 Fax

EMSL - NJ
 107 Haddon Avenue
 Westmont, NJ 08108
 (800) 220-3675
 (856) 858-4960 Fax

Your Name: Brandy LeBlanc **Project Manager:** AR
Company: Eagle Environmental, Inc.
Street: 8 South Main Street, Suite 3
City/State/Zip: Terryville, CT 06786
Phone: 860-589-8257 ext. 203 **Fax:** 860-585-7034 **Email:** bleblanc@eagleenviro.com; rporter@eagleenviro.com; dwynn@eagleenviro.com; jsloch@eagleenviro.com
Project Name: TOWN OF WEST HARTFORD/KING PHILIP MIDDLE SCH. **Project #:** 14-011.20T1
Project Location: 100 KING PHILIP DR., WEST HARTFORD **Project State (US):** CT

TURNAROUND TIME

3 Hours 6 Hours 24 Hours 48 Hours 72 Hours 4 Days 5 Days 6-10 Days

SAMPLE MATRIX

Air Bulk Soil Wipe Micro-Vac Drinking Water Wastewater Chips Other

ASBESTOS ANALYSIS

PCM - Air
 NIOSH 7400 (A) Issue 2: August 1094
 OSHA w/TWA
TEM AIR
 AHERA 40 CFR, Part 763 Subpart E
 NIOSH 7402 Issue 2
 EPA Level II
PLM - Bulk
 EPA 600/R-93/116
 NY Stratified Point Count
 California Air Resource Board (CARB) 435
 NIOSH 9002
 PLM NOB (Gravimetric) NYS 198.1
 EPA Point Count (400 Points)
 EPA Point Count (1,000 Points)
 Standard Addition Point Count
SOILS
 EPA Protocol Qualitative
 EPA Protocol Quantitative
 EMSL MSD 9000 Method fibers/gram
 Superfund EPA 540-R097-029 (dust generation)
TEM BULK
 Drop Mount (Qualitative)
 Chaffield SOP-1988-02
 TEM NOB (Gravimetric) NY 198.4
TEM MICROVAC
 ASTM D 5755-95 (Quantitative)
TEM WIPE
 ASTM D-6490-99
 Qualitative
TEM WATER
 EPA 100.1
 EPA 100.2
 NYS 198.2
 Other:

LEAD ANALYSIS

Flame Atomic Absorption
 Wipe, SW846-7420 ASTM non ASTM
 Soil, SW846-7420
 Air, NIOSH 7082
 Chips, SW846-7420 or AOAC 5.009 (974.02)
 Wastewater, SW 846-7420
 TCLP LEAD SW846 1311/7420
Graphite Furnace Atomic Absorption
 Air, NIOSH 7105
 Wastewater, SW846-7421
 Soil, SW846-7421
 Drinking Water, EPA 239.2
ICP - Inductively Coupled Plasma
 Wipe, SW846-5010 ASTM non ASTM
 Soil, SW846-5010
 Air, NIOSH 7300

MICROBIAL ANALYSIS

Air Samples
 Mold & Fungi by Air O Cell
 Mold & Fungi by Agar Plate count & id
 Bacterial Count and Gram Stain
 Bacterial Count and Identification
Water Samples
 Total Coliforms, Fecal Coliforms
 Escherichia Coll, Fecal Streptococcus
 Legionella
 Salmonella
 Giardia and Cryptosporidium
Wipe and Bulk Samples
 Mold & Fungi - Direct Examination
 Mold & Fungi - (Culture follow up to direct examination if necessary)
 Mold & Fungi - Culture (Count & ID)
 Mold & Fungi - Culture (Count only)
 Bacterial Count & Gram Stain
 Bacterial Count & Identification (3 most prominent types)
 Other:

MATERIALS ANALYSIS

Full Particle Identification
 Optical Particle Identification
 Dust Mites and Insect Fragments
 Particle Size & Distribution
 Product Comparison
 Paint Characterization
 Failure Analysis
 Corrosion Analysis
 Glove Box Containment Study
 Petrographic Examination of Concrete
 Portland Cement in Workplace Atmospheres (OSHA ID-143)
 Man Made Vitreous Fibers - MMVF's
 Synthetic Fiber Identification
 Other:

IAQ ANALYSIS

Nuisance Dust (NIOSH 0500 & 0600)
 Airborne Dust (PM10, TSP)
 Silica Analysis by XRD NIOSH 7500
 HVAC Efficiency
 Carbon Black
 Airborne Oil Mist
 Other:

Additional Information/Comments/Instructions: ****PLEASE STOP ON 1ST POSITIVE WITHIN SETS**

Client Sample # (S)	3-27-AH-01	3-27-AH-41	TOTAL SAMPLE #
Relinquished:	AARON HATCHER <i>Aaron Hatcher</i>	Date: 3-27-2014	Time: PM
Received:	NANCY PORTER <i>Nancy Porter</i>	Date: 3-31-2014	Time: AM
Relinquished:	NANCY PORTER <i>Nancy Porter</i>	Date: 3-31-2014	Time: PM
Received:	R. DOLOINSKI <i>R. Dolinski</i>	Date: 4/1/14	Time: 10:44 AM

4/1/14 12:09

WS 4/1/14 10:57 AM



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SAMPLE NUMBER	SAMPLE DESCRIPTION	ROOM or LOCATION	VOLUME Air (L)	Area (Inches sq.)
3-27-AH-01	Built up roofing	Roof 1		NAD
3-27-AH-02	Built up roofing	Roof 3		
3-27-AH-03	Built up roofing	Roof 15		
3-27-AH-04	Top lay 4 ply built up roofing	Roof 2		
3-27-AH-05	Top lay 4 ply built up roofing	Roof 9		
3-27-AH-06	Top lay 4 ply built up roofing	Roof 17		
3-27-AH-07	Tar between fiber board and ISO Insulation	Roof 2		
3-27-AH-08	Tar between fiber board and ISO Insulation	Roof 6		
3-27-AH-09	Tar between fiber board and ISO insulation	Roof 17		
3-27-AH-10	Bottom lay mineral wool on concrete deck	Roof 2		
3-27-AH-11	Bottom lay mineral wool on concrete deck	Roof 6		
3-27-AH-12	Bottom lay mineral wool on concrete deck	Roof 17		
3-27-AH-13	Torch down rubber roof at roof wall junction	Roof 8		
3-27-AH-14	Torch down rubber roof at roof wall junction	Roof 15		
3-27-AH-15	Tar and felt on roof wall junction	Roof 8		
3-27-AH-16	Tar and felt on roof wall junction	Roof 15		
3-27-AH-17	Tar on concrete deck	Roof 16		
3-27-AH-18	Tar on concrete deck	Roof 15		
3-27-AH-19	Black flashing cement on copper flashing	Roof 16		
3-27-AH-20	Black flashing cement on copper flashing	Roof 12		
3-27-AH-21	Tar and felt on concrete roof overhang	Roof 1		
3-27-AH-22	Tar and felt on concrete roof overhang	Roof 20		
3-27-AH-23	Silver paint on roof overhang	Roof 1		
3-27-AH-24	Silver paint on roof overhang	Roof 1		
3-27-AH-25	Silver paint on roof overhang	Roof 19		

MS 4/4/14 12-4

MS 4/4 6:58 PM Page 2



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SAMPLE NUMBER	SAMPLE DESCRIPTION	ROOM or LOCATION	VOLUME Air (L)	Area (Inches sq.)
3-27-AH-26	6 Ply Built up roofing	Roof 12		N/A
3-27-AH-27	6 Ply B.U.R Built up roofing	Roof 21		
3-27-AH-28	Asphalt rolled roofing at roof wall junction	Roof 17		
3-27-AH-29	Asphalt rolled roofing at roof wall junction	Roof 21		
3-27-AH-30	Bot. lay B.U.R on roof deck	Roof 12		
3-27-AH-31	Bot. lay B.U.R on roof deck	Roof 12		
3-27-AH-32	White caulk on reglet flashing	Roof 20		14% Chrys DNA
3-27-AH-33	White caulk on reglet flashing	Roof 14		
3-27-AH-34	New black flashing on vent base	Roof 21		15% Chrys DNA
3-27-AH-35	New black flashing on vent base	Roof 21		DNA
3-27-AH-36	4 Ply B.U.R on fiberglass insulation	Roof 23		N/A
3-27-AH-37	4 Ply B.U.R on fiberglass insulation	Roof 24		
3-27-AH-38	Tar between fiberglass insulation	Roof 23		
3-27-AH-39	Tar between fiberglass insulation	Roof 24		
3-27-AH-40	Rubber caulk at roof wall metal flashing	Roof 15		
3-27-AH-41	Rubber caulk at roof wall metal flashing	Roof 15		

[Handwritten signature]

WS 4/21 6:58 PM

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 Collected: 3/27/2014

Project: 14-011.20T1/ TOWN OF WEST HARTFORD/ KING PHILIP MIDDLE SCH./ 100 KING PHILIP DR., WEST HARTFORD/ CT

Test Report: Asbestos Analysis of Bulk Materials via EPA 600/R-93/116 Method using Polarized Light Microscopy

Sample	Description	Appearance	Non-Asbestos		Asbestos
			% Fibrous	% Non-Fibrous	% Type
3-27-AH-01 031412263-0001	BUILT UP ROOFING - ROOF 1	Black Fibrous Homogeneous		100% Non-fibrous (other)	None Detected
3-27-AH-02 031412263-0002	BUILT UP ROOFING - ROOF 3	Black Fibrous Homogeneous	23% Cellulose 17% Glass	43% Matrix 17% Non-fibrous (other)	None Detected
3-27-AH-03 031412263-0003	BUILT UP ROOFING - ROOF 15	Black Fibrous Homogeneous	10% Glass	90% Non-fibrous (other)	None Detected
3-27-AH-04 031412263-0004	TOP LAY 4 PLY BUILT UP ROOFING - ROOF 2	Brown Fibrous Homogeneous	20% Cellulose	80% Non-fibrous (other)	None Detected
3-27-AH-05 031412263-0005	TOP LAY 4 PLY BUILT UP ROOFING - ROOF 9	Black Fibrous Homogeneous	5% Cellulose 12% Glass	83% Non-fibrous (other)	None Detected
3-27-AH-06 031412263-0006	TOP LAY 4 PLY BUILT UP ROOFING - ROOF 17	Gray/Black Fibrous Homogeneous	23% Cellulose 13% Glass	43% Matrix 3% Perlite 18% Non-fibrous (other)	None Detected
3-27-AH-07 031412263-0007	TAR BETWEEN FIBER BOARD AND ISO INSULATION - ROOF 2	Brown/Black Fibrous Homogeneous	5% Cellulose	95% Non-fibrous (other)	None Detected

Analyst(s)

Albert Grohmann (16)
 Kerl-Dean Scarlett (23)

James Hall, Laboratory Manager
 or other approved signatory

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 Samples analyzed by EMSL Analytical, Inc. New York, NY AIIA-LAP, LLC-IHLAP Accredited #102581, NVLAP Lab Code 101048-9, NYS ELAP 11606, NJ NY022, CT PH-0170, MA AAD00170

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Test Report: Asbestos Analysis of Bulk Materials via EPA 600/R-93/116 Method using Polarized Light Microscopy

Sample	Description	Appearance	Non-Asbestos		Asbestos
			% Cellulose	% Non-Fibrous	% Type
3-27-AH-08 031412263-0008	TAR BETWEEN FIBER BOARD AND ISO INSULATION - ROOF 8	Brown Fibrous Homogeneous	20%	80% Non-fibrous (other)	None Detected
3-27-AH-09 031412263-0009	TAR BETWEEN FIBER BOARD AND ISO INSULATION - ROOF 17	Tan/Black Fibrous Homogeneous	47%	27% Matrix 4% Perlite 22% Non-fibrous (other)	None Detected
3-27-AH-10 031412263-0010	BOTTOM LAY MINERAL WOOL ON CONCRETE DECK - ROOF 2	Brown Fibrous Homogeneous	85%	15% Non-fibrous (other)	None Detected
3-27-AH-11 031412263-0011	BOTTOM LAY MINERAL WOOL ON CONCRETE DECK - ROOF 8	Brown Fibrous Homogeneous	80%	20% Non-fibrous (other)	None Detected
3-27-AH-12 031412263-0012	BOTTOM LAY MINERAL WOOL ON CONCRETE DECK - ROOF 17	Tan Fibrous Homogeneous	68%	13% Perlite 19% Non-fibrous (other)	None Detected
3-27-AH-13 031412263-0013	TORCH DOWN RUBBER ROOF AT ROOF WALL JUNCTION - ROOF 8	Black Fibrous Homogeneous	5%	30% Ca Carbonate 65% Non-fibrous (other)	None Detected

Analyst(s)

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 Keri-Dean Scarlett (23)

James Hall, Laboratory Manager
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Project: 14-011.20T1/ TOWN OF WEST HARTFORD/ KING PHILIP MIDDLE SCH./ 100 KING PHILIP DR., WEST HARTFORD/ CT

Test Report: Asbestos Analysis of Bulk Materials via EPA 600/R-93/116 Method using Polarized Light Microscopy

Sample	Description	Appearance	Non-Asbestos		Asbestos
			% Fibrous	% Non-Fibrous	% Type
3-27-AH-14 031412263-0014	TORCH DOWN RUBBER ROOF AT ROOF WALL JUNCTION - ROOF 15	Black Fibrous Homogeneous	13% Synthetic 15% Glass	48% Matrix 24% Non-fibrous (other)	None Detected
3-27-AH-15 031412263-0015	TAR FELT ON ROOF WALL JUNCTION - ROOF 8	Black Fibrous Homogeneous	15% Cellulose	85% Non-fibrous (other)	None Detected
3-27-AH-16 031412263-0016	TAR FELT ON ROOF WALL JUNCTION - ROOF 15	Black Fibrous Homogeneous	47% Glass	37% Matrix 16% Non-fibrous (other)	None Detected
3-27-AH-17 031412263-0017	TAR ON CONCRETE DECK - ROOF 16	Black Non-Fibrous Homogeneous		100% Non-fibrous (other)	None Detected
3-27-AH-18 031412263-0018	TAR ON CONCRETE DECK - ROOF 15	Black Non-Fibrous Homogeneous	23% Glass	53% Matrix 24% Non-fibrous (other)	None Detected
3-27-AH-19 031412263-0019	BLACK FLASHING CEMENT ON COPPER FLASHING - ROOF 16	Black Non-Fibrous Homogeneous	20% Cellulose	80% Non-fibrous (other)	None Detected

Analyst(s)

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Project: 14-011.20T1/ TOWN OF WEST HARTFORD/ KING PHILIP MIDDLE SCH/ 100 KING PHILIP DR., WEST HARTFORD/ CT

Test Report: Asbestos Analysis of Bulk Materials via EPA 600/R-93/116 Method using Polarized Light Microscopy

Sample	Description	Appearance	Non-Asbestos		Asbestos
			% Fibrous	% Non-Fibrous	% Type
3-27-AH-20 031412263-0020	BLACK FLASHING CEMENT ON COPPER FLASHING - ROOF 12	Black Non-Fibrous Homogeneous	13% Cellulose	65% Matrix 22% Non-fibrous (other)	None Detected
3-27-AH-21 031412263-0021	TAR ON FELT ON CONCRETE ROOFING OVERHANG - ROOF 1	Black Fibrous Homogeneous	9% Cellulose	91% Non-fibrous (other)	None Detected
3-27-AH-22 031412263-0022	TAR ON FELT ON CONCRETE ROOFING OVERHANG - ROOF 20	Black Non-Fibrous Homogeneous	7% Cellulose	75% Matrix 18% Non-fibrous (other)	None Detected
3-27-AH-23 031412263-0023	SILVER PAINT ON ROOF OVERHANG - ROOF 1	Black Non-Fibrous Homogeneous		8% Quartz 92% Non-fibrous (other)	None Detected
3-27-AH-24 031412263-0024	SILVER PAINT ON ROOF OVERHANG - ROOF 1	Silver Non-Fibrous Homogeneous		100% Non-fibrous (other)	None Detected
3-27-AH-25 031412263-0025	SILVER PAINT ON ROOF OVERHANG - ROOF 19	Silver Non-Fibrous Homogeneous		63% Matrix 37% Non-fibrous (other)	None Detected

Analyst(s)

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Project: 14-011.20T1/ TOWN OF WEST HARTFORD/ KING PHILIP MIDDLE SCH./ 100 KING PHILIP DR., WEST HARTFORD/ CT

Test Report: Asbestos Analysis of Bulk Materials via EPA 600/R-93/116 Method using Polarized Light Microscopy

Sample	Description	Appearance	Non-Asbestos		Asbestos
			% Fibrous	% Non-Fibrous	% Type
3-27-AH-26 031412263-0026	6 PLY BUILT UP ROOFING - ROOF 12	Black Non-Fibrous Homogeneous	6% Glass	94% Non-fibrous (other)	None Detected
3-27-AH-27 031412263-0027	6 PLY B.U.R. BUILT UP ROOFING - ROOF 21	Black Non-Fibrous Homogeneous	23% Glass	55% Matrix 22% Non-fibrous (other)	None Detected
3-27-AH-28 031412263-0028	ASPHALT ROLLED ROOFING AT ROOF WALL JUNCTION - ROOF 17	Black Non-Fibrous Homogeneous		100% Non-fibrous (other)	None Detected
3-27-AH-29 031412263-0029	ASPHALT ROLLED ROOFING AT ROOF WALL JUNCTION - ROOF 21	White/Black Fibrous Homogeneous	23% Glass	35% Matrix 42% Non-fibrous (other)	None Detected
3-27-AH-30 031412263-0030	BOTT. LAY B.U.R. ON ROOF DECK - ROOF 12	Black Non-Fibrous Homogeneous	8% Cellulose	92% Non-fibrous (other)	None Detected
3-27-AH-31 031412263-0031	BOTT. LAY B.U.R. ON ROOF DECK - ROOF 12	Black Non-Fibrous Homogeneous	23% Glass	53% Matrix 24% Non-fibrous (other)	None Detected
3-27-AH-32 031412263-0032	WHITE CAULK ON REGLET FLASHING - ROOF 20	Gray Non-Fibrous Homogeneous		86% Non-fibrous (other)	14% Chrysotile

Analyst(s)

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Test Report: Asbestos Analysis of Bulk Materials via EPA 600/R-93/116 Method using Polarized Light Microscopy

Sample	Description	Appearance	Non-Asbestos		Asbestos
			% Fibrous	% Non-Fibrous	% Type
3-27-AH-33 031412263-0033	WHITE CAULK ON REGLET FLASHING - ROOF 14				Stop Positive (Not Analyzed)
3-27-AH-34 031412263-0034	NEW BLACK FLASHING ON VENT BASE - ROOF 21	Black Fibrous Homogeneous	20% Glass	65% Non-fibrous (other)	15% Chrysotile
3-27-AH-35 031412263-0035	NEW BLACK FLASHING ON VENT BASE - ROOF 21				Stop Positive (Not Analyzed)
3-27-AH-36 031412263-0036	4 PLY B.U.R. ON FIBERGLASS INSULATION - ROOF 23	Black Fibrous Homogeneous	7% Glass	93% Non-fibrous (other)	None Detected
3-27-AH-37 031412263-0037	4 PLY B.U.R. ON FIBERGLASS INSULATION - ROOF 24	Black Non-Fibrous Homogeneous	15% Glass	63% Matrix 22% Non-fibrous (other)	None Detected
3-27-AH-38 031412263-0038	TAR BETWEEN FIBERGLASS INSULATION - ROOF 23	Black Non-Fibrous Homogeneous	15% Glass	85% Non-fibrous (other)	None Detected
3-27-AH-39 031412263-0039	TAR BETWEEN FIBERGLASS INSULATION - ROOF 24	Black Non-Fibrous Homogeneous	23% Cellulose 15% Glass	47% Matrix 15% Non-fibrous (other)	None Detected

Analyst(s)

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James Hall
 James Hall, Laboratory Manager
 or other approved signatory

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Test Report: Asbestos Analysis of Bulk Materials via EPA 600/R-93/116 Method using Polarized Light Microscopy

Sample	Description	Appearance	Non-Asbestos		Asbestos
			% Fibrous	% Non-Fibrous	% Type
3-27-AH-40 031412263-0040	RUBBER CAULK AT ROOF WALL METAL FLASHING - ROOF 15	Gray Non-Fibrous Homogeneous		35% Ca Carbonate 65% Non-fibrous (other)	None Detected
3-27-AH-41 031412263-0041	RUBBER CAULK AT ROOF WALL METAL FLASHING - ROOF 15	Gray Non-Fibrous Homogeneous		67% Matrix 33% Non-fibrous (other)	None Detected

Analyst(s)

Albert Grohmann (16)
Keri-Dean Scarlett (23)

James Hall, Laboratory Manager
 or other approved signatory

EMSL maintains liability limited to cost of analysis. This report relates only to the samples reported and may not be reproduced, except in full, without written approval by EMSL. EMSL bears no responsibility for sample collection activities or analytical method limitations. Interpretation and use of test results are the responsibility of the client. This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST or any agency of the federal government. Non-friable organically bound materials present a problem matrix and therefore EMSL recommends gravimetric reduction prior to analysis. Samples received in good condition unless otherwise noted. Estimated accuracy, precision and uncertainty data available upon request. Unless requested by the client, building materials manufactured with multiple layers (i.e. linoleum, wallboard, etc.) are reported as a single sample. Reporting limit is 1%.
 Samples analyzed by EMSL Analytical, Inc. New York, NY AIHA-LAP, LLC-IHLAP Accredited #102581, NVLAP Lab Code 101048-9, NYS ELAP 11505, NJ NY022, CT FH-0170, MA AAC00170

Initial report from 04/04/2014 12:09:33

APPENDIX 3
PCB BULK SAMPLE LABORATORY REPORTS



Monday, April 07, 2014

Attn: Mr. Peter Folino
Eagle Environmental Inc.
8 South Main Street, Suite 3 ©
Terryville CT 06786

Project ID: TOWN OF W HTFD KING PHILLIP ROOF
Sample ID#s: BG24981 - BG25000

This laboratory is in compliance with the NELAC requirements of procedures used except where indicated.

This report contains results for the parameters tested, under the sampling conditions described on the Chain Of Custody, as received by the laboratory.

All soils, solids and sludges are reported on a dry weight basis unless otherwise noted in the sample comments.

A scanned version of the COC form accompanies the analytical report and is an exact duplicate of the original.

If you have any questions concerning this testing, please do not hesitate to contact Phoenix Client Services at ext. 200.

Sincerely yours,

A handwritten signature in cursive script that reads "Phyllis Shiller".

Phyllis Shiller
Laboratory Director

NELAC - #NY11301
CT Lab Registration #PH-0618
MA Lab Registration #MA-CT-007
ME Lab Registration #CT-007
NH Lab Registration #213693-A,B

NJ Lab Registration #CT-003
NY Lab Registration #11301
PA Lab Registration #68-03530
RI Lab Registration #63
VT Lab Registration #VT11301



Environmental Laboratories, Inc.
 587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
 Tel. (860) 645-1102 Fax (860) 845-0823

Analysis Report
 April 07, 2014

FOR: Attn: Mr. Peter Folino
 Eagle Environmental Inc.
 8 South Main Street, Suite 3 ©
 Terryville CT 06786

Sample Information

Matrix: SOLID
 Location Code: EAGLEENV
 Rush Request: 72 Hour
 P.O.#:

Custody Information

Collected by: AT
 Received by: SW
 Analyzed by: see "By" below

Date Time

03/27/14 0 00
 03/31/14 14:26

Laboratory Data

SDG ID: GBG24981
 Phoenix ID: BG24981

Project ID: TOWN OF W HTFD KING PHILLIP ROOF
 Client ID: 3-27-PCB-BUR-01

Parameter	Result	RL/ PQL	Units	Date/Time	By	Reference
Percent Solid	100		%	03/31/14	I	E160.3
Extraction for PCB	Completed			03/31/14	PP/X	SW3540C
<u>PCB (Soxhlet)</u>						
PCB-1016	ND	750	ug/Kg	04/01/14	AW	3540C/8082
PCB-1221	ND	750	ug/Kg	04/01/14	AW	3540C/8082
PCB-1232	ND	750	ug/Kg	04/01/14	AW	3540C/8082
PCB-1242	ND	750	ug/Kg	04/01/14	AW	3540C/8082
PCB-1248	ND	750	ug/Kg	04/01/14	AW	3540C/8082
PCB-1254	ND	750	ug/Kg	04/01/14	AW	3540C/8082
PCB-1260	ND	750	ug/Kg	04/01/14	AW	3540C/8082
PCB-1262	ND	750	ug/Kg	04/01/14	AW	3540C/8082
PCB-1268	ND	750	ug/Kg	04/01/14	AW	3540C/8082
<u>QA/QC Surrogates</u>						
% DCBP	91		%	04/01/14	AW	30 - 150 %
% TCMX	103		%	04/01/14	AW	30 - 150 %

Project ID: TOWN OF W HTFD KING PHILLIP ROOF
Client ID: 3-27-PCB-BUR-01

Phoenix I.D.: BG24981

Parameter	Result	RL/ PQL	Units	Date/Time	By	Reference
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RL/PQL=Reporting/Practical Quantitation Level ND=Not Detected BRL=Below Reporting Level

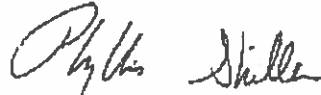
Comments:

100% Solid Assumed

All soils, solids and sludges are reported on a dry weight basis unless otherwise noted in the sample comments.

If there are any questions regarding this data, please call Phoenix Client Services at extension 200.

This report must not be reproduced except in full as defined by the attached chain of custody.



Phyllis Shiller, Laboratory Director

April 07, 2014

Reviewed and Released by: Greg Lawrance, Assistant Lab Director



Environmental Laboratories, Inc.
 567 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
 Tel. (860) 645-1102 Fax (860) 645-0823

Analysis Report
 April 07, 2014

FOR: Attn: Mr. Peter Folino
 Eagle Environmental Inc.
 8 South Main Street, Suite 3 ©
 Terryville CT 06786

Sample Information

Matrix: SOLID
 Location Code: EAGLEENV
 Rush Request: 72 Hour
 P.O.#:

Custody Information

Collected by: AT
 Received by: SW
 Analyzed by: see "By" below

Date

03/27/14
 03/31/14

Time

0:00
 14:26

Laboratory Data

SDG ID: GBG24981
 Phoenix ID: BG24982

Project ID: TOWN OF W HTFD KING PHILLIP ROOF
 Client ID: 3-27-PCB-TAR-02

Parameter	Result	RL/ PQL	Units	Date/Time	By	Reference
Percent Solid	100		%	03/31/14	I	E160.3
Extraction for PCB	Completed			03/31/14	PP/X	SW3540C
<u>PCB (Soxhlet)</u>						
PCB-1016	ND	740	ug/Kg	04/03/14	AW	3540C/8082
PCB-1221	ND	740	ug/Kg	04/03/14	AW	3540C/8082
PCB-1232	ND	740	ug/Kg	04/03/14	AW	3540C/8082
PCB-1242	ND	740	ug/Kg	04/03/14	AW	3540C/8082
PCB-1248	ND	740	ug/Kg	04/03/14	AW	3540C/8082
PCB-1254	ND	740	ug/Kg	04/03/14	AW	3540C/8082
PCB-1260	ND	740	ug/Kg	04/03/14	AW	3540C/8082
PCB-1262	ND	740	ug/Kg	04/03/14	AW	3540C/8082
PCB-1268	ND	740	ug/Kg	04/03/14	AW	3540C/8082
<u>QA/QC Surrogates</u>						
% DCBP	85		%	04/03/14	AW	30 - 150 %
% TCMX	67		%	04/03/14	AW	30 - 150 %

Parameter	Result	RL/ PQL	Units	Date/Time	By	Reference
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RL/PQL=Reporting/Practical Quantitation Level ND=Not Detected BRL=Below Reporting Level

Comments:

100% Solid Assumed

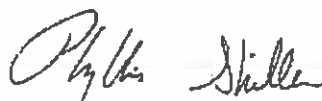
***PCB Analysis Comment:**

For PCBs, in order to reach the desired RL, multiple cleanup steps were performed. The extract was cleaned up with a combination of sulfuric acid, potassium permanganate, copper powder and additional florissil.

All soils, solids and sludges are reported on a dry weight basis unless otherwise noted in the sample comments.

If there are any questions regarding this data, please call Phoenix Client Services at extension 200.

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Phyllis Shiller, Laboratory Director

April 07, 2014

Reviewed and Released by: Greg Lawrence, Assistant Lab Director



Environmental Laboratories, Inc.
 587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
 Tel. (860) 645-1102 Fax (860) 645-0823

Analysis Report
 April 07, 2014

FOR: Attn: Mr. Peter Folino
 Eagle Environmental Inc
 8 South Main Street, Suite 3 ©
 Terryville CT 06786

Sample Information

Matrix: SOLID
 Location Code: EAGLEENV
 Rush Request: 72 Hour
 P.O.#:

Custody Information

Collected by: AT
 Received by: SW
 Analyzed by: see "By" below

Date Time
 03/27/14 0:00
 03/31/14 14:26

Laboratory Data

SDG ID: GBG24981
 Phoenix ID: BG24983

Project ID: TOWN OF W HTFD KING PHILLIP ROOF
 Client ID: 3-27-PCB-BUR-03

Parameter	Result	RL/ PQL	Units	Date/Time	By	Reference
Percent Solid	100		%	03/31/14	I	E160.3
Extraction for PCB	Completed			03/31/14	PP/X	SW3540C
<u>PCB (Soxhlet)</u>						
PCB-1016	ND	330	ug/Kg	04/03/14	AW	3540C/8082
PCB-1221	ND	330	ug/Kg	04/03/14	AW	3540C/8082
PCB-1232	ND	330	ug/Kg	04/03/14	AW	3540C/8082
PCB-1242	ND	330	ug/Kg	04/03/14	AW	3540C/8082
PCB-1248	ND	330	ug/Kg	04/03/14	AW	3540C/8082
PCB-1254	ND	330	ug/Kg	04/03/14	AW	3540C/8082
PCB-1260	ND	330	ug/Kg	04/03/14	AW	3540C/8082
PCB-1262	ND	330	ug/Kg	04/03/14	AW	3540C/8082
PCB-1268	ND	330	ug/Kg	04/03/14	AW	3540C/8082
<u>QA/QC Surrogates</u>						
% DCBP	84		%	04/03/14	AW	30 - 150 %
% TCMX	75		%	04/03/14	AW	30 - 150 %

Parameter	Result	RL/ PQL	Units	Date/Time	By	Reference
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RL/PQL=Reporting/Practical Quantitation Level ND=Not Detected BRL=Below Reporting Level

Comments:

100% Solid Assumed

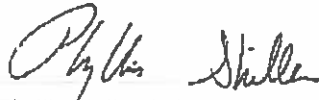
*PCB Analysis Comment:

For PCBs, in order to reach the desired RL, multiple cleanup steps were performed. The extract was cleaned up with a combination of sulfuric acid, potassium permanganate, copper powder and additional florasil.

All soils, solids and sludges are reported on a dry weight basis unless otherwise noted in the sample comments.

If there are any questions regarding this data, please call Phoenix Client Services at extension 200.

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Phyllis Shiller, Laboratory Director

April 07, 2014

Reviewed and Released by: Greg Lawrence, Assistant Lab Director



Environmental Laboratories, Inc.
 587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
 Tel. (860) 645-1102 Fax (860) 645-0823

Analysis Report
 April 07, 2014

FOR: Attn: Mr. Peter Folino
 Eagle Environmental Inc.
 8 South Main Street, Suite 3 ©
 Terryville CT 06786

Sample Information

Matrix: SOLID
 Location Code: EAGLEENV
 Rush Request: 72 Hour
 P.O.#:

Custody Information

Collected by: AT
 Received by: SW
 Analyzed by: see "By" below

Date

03/27/14
 03/31/14

Time

0:00
 14:26

Laboratory Data

SDG ID: GBG24981
 Phoenix ID: BG24984

Project ID: TOWN OF W HTFD KING PHILLIP ROOF
 Client ID: 3-27-PCB-TB-04

Parameter	Result	RL/ PQL	Units	Date/Time	By	Reference
Percent Solid	100		%	03/31/14	I	E160.3
Extraction for PCB	Completed			03/31/14	BP/X	SW3540C
<u>PCB (Soxhlet)</u>						
PCB-1016	ND	790	ug/Kg	04/01/14	AW	3540C/8082
PCB-1221	ND	790	ug/Kg	04/01/14	AW	3540C/8082
PCB-1232	ND	790	ug/Kg	04/01/14	AW	3540C/8082
PCB-1242	ND	790	ug/Kg	04/01/14	AW	3540C/8082
PCB-1248	ND	790	ug/Kg	04/01/14	AW	3540C/8082
PCB-1254	ND	790	ug/Kg	04/01/14	AW	3540C/8082
PCB-1260	ND	790	ug/Kg	04/01/14	AW	3540C/8082
PCB-1262	ND	790	ug/Kg	04/01/14	AW	3540C/8082
PCB-1268	ND	790	ug/Kg	04/01/14	AW	3540C/8082
<u>QA/QC Surrogates</u>						
% DCBP	97		%	04/01/14	AW	30 - 150 %
% TCMX	106		%	04/01/14	AW	30 - 150 %

Project ID: TOWN OF W HTFD KING PHILLIP ROOF
Client ID: 3-27-PCB-TB-04

Phoenix I.D.: BG24984

Parameter	Result	RL/ PQL	Units	Date/Time	By	Reference
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RL/PQL=Reporting/Practical Quantitation Level ND=Not Detected BRL=Below Reporting Level

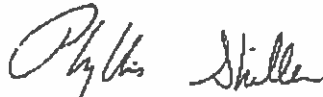
Comments:

100% Solid Assumed

All soils, solids and sludges are reported on a dry weight basis unless otherwise noted in the sample comments.

If there are any questions regarding this data, please call Phoenix Client Services at extension 200.

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Phyllis Shiller, Laboratory Director

April 07, 2014

Reviewed and Released by: Greg Lawrence, Assistant Lab Director



Environmental Laboratories, Inc.
 587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
 Tel. (860) 645-1102 Fax (860) 645-0823

Analysis Report
 April 07, 2014

FOR: Attn: Mr. Peter Folino
 Eagle Environmental Inc.
 8 South Main Street, Suite 3 ©
 Terryville CT 06786

Sample Information

Matrix: SOLID
 Location Code: EAGLEENV
 Rush Request: 72 Hour
 P.O.#:

Custody Information

Collected by: AT
 Received by: SW
 Analyzed by: see "By" below

Date

03/27/14
 03/31/14

Time

0:00
 14:26

Laboratory Data

SDG ID: GBG24981
 Phoenix ID: BG24985

Project ID: TOWN OF W HTFD KING PHILLIP ROOF
 Client ID: 3-27-PCB-TRT-05

Parameter	Result	RL/ PQL	Units	Date/Time	By	Reference
Percent Solid	100		%	03/31/14	I	E160 3
Extraction for PCB	Completed			03/31/14	BPX	SW3540C
<u>PCB (Soxhlet)</u>						
PCB-1016	ND	800	ug/Kg	04/01/14	AW	3540C/8082
PCB-1221	ND	800	ug/Kg	04/01/14	AW	3540C/8082
PCB-1232	ND	800	ug/Kg	04/01/14	AW	3540C/8082
PCB-1242	ND	800	ug/Kg	04/01/14	AW	3540C/8082
PCB-1248	ND	800	ug/Kg	04/01/14	AW	3540C/8082
PCB-1254	ND	800	ug/Kg	04/01/14	AW	3540C/8082
PCB-1260	ND	800	ug/Kg	04/01/14	AW	3540C/8082
PCB-1262	ND	800	ug/Kg	04/01/14	AW	3540C/8082
PCB-1268	ND	800	ug/Kg	04/01/14	AW	3540C/8082
<u>QA/QC Surrogates</u>						
% DCBP	90		%	04/01/14	AW	30 - 150 %
% TCMX	102		%	04/01/14	AW	30 - 150 %

Project ID: TOWN OF W HTFD KING PHILLIP ROOF
Client ID: 3-27-PCB-TRT-05

Phoenix I.D.: BG24985

Parameter	Result	RL/ PQL	Units	Date/Time	By	Reference
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RL/PQL=Reporting/Practical Quantitation Level ND=Not Detected BRL=Below Reporting Level

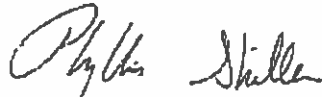
Comments:

100% Solid Assumed

All soils, solids and sludges are reported on a dry weight basis unless otherwise noted in the sample comments.

If there are any questions regarding this data, please call Phoenix Client Services at extension 200.

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Phyllis Shiller, Laboratory Director

April 07, 2014

Reviewed and Released by: Greg Lawrence, Assistant Lab Director



Environmental Laboratories, Inc.
 587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
 Tel. (860) 645-1102 Fax (860) 645-0823

Analysis Report
 April 07, 2014

FOR: Attn: Mr. Peter Folino
 Eagle Environmental Inc.
 8 South Main Street, Suite 3 ©
 Terryville CT 06786

Sample Information

Matrix: SOLID
 Location Code: EAGLEENV
 Rush Request: 72 Hour
 P.O.#:

Custody information

Collected by: AT
 Received by: SW
 Analyzed by: see "By" below

Date

03/27/14
 03/31/14

Time

0:00
 14:26

Laboratory Data

SDG ID: GBG24981
 Phoenix ID: BG24986

Project ID: TOWN OF W HTFD KING PHILLIP ROOF
 Client ID: 3-27-PCB-BUR-06

Parameter	Result	RL/ PQL	Units	Date/Time	By	Reference
Percent Solid	100		%	03/31/14	I	E160.3
Extraction for PCB	Completed			03/31/14	BP/X	SW3540C
<u>PCB (Soxhlet)</u>						
PCB-1016	ND	330	ug/Kg	04/03/14	AW	3540C/8082
PCB-1221	ND	330	ug/Kg	04/03/14	AW	3540C/8082
PCB-1232	ND	330	ug/Kg	04/03/14	AW	3540C/8082
PCB-1242	ND	330	ug/Kg	04/03/14	AW	3540C/8082
PCB-1248	ND	330	ug/Kg	04/03/14	AW	3540C/8082
PCB-1254	ND	330	ug/Kg	04/03/14	AW	3540C/8082
PCB-1260	ND	330	ug/Kg	04/03/14	AW	3540C/8082
PCB-1262	ND	330	ug/Kg	04/03/14	AW	3540C/8082
PCB-1268	ND	330	ug/Kg	04/03/14	AW	3540C/8082
<u>QA/QC Surrogates</u>						
% DCBP	60		%	04/03/14	AW	30 - 150 %
% TCMX	62		%	04/03/14	AW	30 - 150 %

Project ID: TOWN OF W HTFD KING PHILLIP ROOF
Client ID: 3-27-PCB-BUR-06

Phoenix I.D.: BG24986

Parameter	Result	RL/ PQL	Units	Date/Time	By	Reference
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RL/PQL=Reporting/Practical Quantitation Level ND=Not Detected BRL=Below Reporting Level

Comments:

100% Solid Assumed

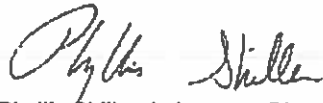
***PCB Analysis Comment:**

For PCBs, in order to reach the desired RL, multiple cleanup steps were performed. The extract was cleaned up with a combination of sulfuric acid, potassium permanganate, copper powder and additional florasil.

All soils, solids and sludges are reported on a dry weight basis unless otherwise noted in the sample comments.

If there are any questions regarding this data, please call Phoenix Client Services at extension 200.

This report must not be reproduced except in full as defined by the attached chain of custody.



Phyllis Shiller, Laboratory Director

April 07, 2014

Reviewed and Released by: Greg Lawrence, Assistant Lab Director



Environmental Laboratories, Inc.
 587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
 Tel. (860) 645-1102 Fax (860) 645-0823

Analysis Report
 April 07, 2014

FOR: Attn: Mr. Peter Folino
 Eagle Environmental Inc.
 8 South Main Street, Suite 3 ©
 Terryville CT 06786

Sample Information

Matrix: SOLID
 Location Code: EAGLEENV
 Rush Request: 72 Hour
 P.O.#:

Custody Information

Collected by: AT
 Received by: SW
 Analyzed by: see "By" below

Date

03/27/14
 03/31/14

Time

0:00
 14:26

Laboratory Data

SDG ID: GBG24981
 Phoenix ID: BG24987

Project ID: TOWN OF W HTFD KING PHILLIP ROOF
 Client ID: 3-27-PCB-TB-07

Parameter	Result	RL/ PQL	Units	Date/Time	By	Reference
Percent Solid	100		%	03/31/14	I	E160.3
Extraction for PCB	Completed			03/31/14	BP/X	SW3540C
<u>PCB (Soxhlet)</u>						
PCB-1016	ND	480	ug/Kg	04/01/14	AW	3540C/8082
PCB-1221	ND	480	ug/Kg	04/01/14	AW	3540C/8082
PCB-1232	ND	480	ug/Kg	04/01/14	AW	3540C/8082
PCB-1242	ND	480	ug/Kg	04/01/14	AW	3540C/8082
PCB-1248	ND	480	ug/Kg	04/01/14	AW	3540C/8082
PCB-1254	ND	480	ug/Kg	04/01/14	AW	3540C/8082
PCB-1260	ND	480	ug/Kg	04/01/14	AW	3540C/8082
PCB-1262	ND	480	ug/Kg	04/01/14	AW	3540C/8082
PCB-1268	ND	480	ug/Kg	04/01/14	AW	3540C/8082
<u>QA/QC Surrogates</u>						
% DCBP	94		%	04/01/14	AW	30 - 150 %
% TCMX	106		%	04/01/14	AW	30 - 150 %

Project ID: TOWN OF W HTFD KING PHILLIP ROOF
Client ID: 3-27-PCB-TB-07

Phoenix I.D.: BG24987

Parameter	Result	RL/ PQL	Units	Date/Time	By	Reference
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RL/PQL=Reporting/Practical Quantitation Level ND=Not Detected BRL=Below Reporting Level


Comments:

100% Solid Assumed

All soils, solids and sludges are reported on a dry weight basis unless otherwise noted in the sample comments.

If there are any questions regarding this data, please call Phoenix Client Services at extension 200.

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Phyllis Shiller, Laboratory Director

April 07, 2014

Reviewed and Released by: Greg Lawrence, Assistant Lab Director



Environmental Laboratories, Inc.
 587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
 Tel. (860) 645-1102 Fax (860) 645-0823

Analysis Report
 April 07, 2014

FOR: Attn: Mr. Peter Folino
 Eagle Environmental Inc.
 8 South Main Street, Suite 3 ©
 Terryville CT 06786

Sample Information

Matrix: SOLID
 Location Code: EAGLEENV
 Rush Request: 72 Hour
 P.O.#:

Custody Information

Collected by: AT
 Received by: SW
 Analyzed by: see "By" below

Date

03/27/14
 03/31/14

Time

0:00
 14:26

Laboratory Data

SDG ID: GBG24981
 Phoenix ID: BG24988

Project ID: TOWN OF W HTFD KING PHILLIP ROOF
 Client ID: 3-27-PCB-TD-08

Parameter	Result	RL/ PQL	Units	Date/Time	By	Reference
Percent Solid	100		%	03/31/14	I	E160.3
Extraction for PCB	Completed			03/31/14	BP/X	SW3540C
<u>PCB (Soxhlet)</u>						
PCB-1016	ND	330	ug/Kg	04/03/14	AW	3540C/8082
PCB-1221	ND	330	ug/Kg	04/03/14	AW	3540C/8082
PCB-1232	ND	330	ug/Kg	04/03/14	AW	3540C/8082
PCB-1242	ND	330	ug/Kg	04/03/14	AW	3540C/8082
PCB-1248	ND	330	ug/Kg	04/03/14	AW	3540C/8082
PCB-1254	ND	330	ug/Kg	04/03/14	AW	3540C/8082
PCB-1260	ND	330	ug/Kg	04/03/14	AW	3540C/8082
PCB-1262	ND	330	ug/Kg	04/03/14	AW	3540C/8082
PCB-1268	ND	330	ug/Kg	04/03/14	AW	3540C/8082
<u>QA/QC Surrogates</u>						
% DCBP	71		%	04/03/14	AW	30 - 150 %
% TCMX	84		%	04/03/14	AW	30 - 150 %

Parameter	Result	RL/ PQL	Units	Date/Time	By	Reference
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RL/PQL=Reporting/Practical Quantitation Level ND=Not Detected BRL=Below Reporting Level

Comments:

100% Solid Assumed

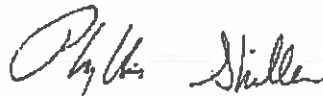
***PCB Analysis Comment:**

For PCBs, in order to reach the desired RL, multiple cleanup steps were performed. The extract was cleaned up with a combination of sulfuric acid, potassium permanganate, copper powder and additional florasil.

All soils, solids and sludges are reported on a dry weight basis unless otherwise noted in the sample comments.

If there are any questions regarding this data, please call Phoenix Client Services at extension 200.

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Phyllis Shiller, Laboratory Director

April 07, 2014

Reviewed and Released by: Greg Lawrence, Assistant Lab Director



Environmental Laboratories, Inc.
 587 East Middle Turnpike, P.O. Box 370, Manchester, CT 06045
 Tel. (860) 645-1102 Fax (860) 645-0823

Analysis Report
 April 07, 2014

FOR: Attn: Mr. Peter Follno
 Eagle Environmental Inc.
 8 South Main Street, Suite 3 ©
 Terryville CT 06786

Sample Information

Matrix: SOLID
 Location Code: EAGLEENV
 Rush Request: 72 Hour
 P.O.#:

Custody Information

Collected by: AT
 Received by: SW
 Analyzed by: see "By" below

Date Time
 03/27/14 0:00
 03/31/14 14:26

Laboratory Data

SDG ID: GBG24981
 Phoenix ID: BG24989

Project ID: TOWN OF W HTFD KING PHILLIP ROOF
 Client ID: 3-27-PCB-FLASHING-09

Parameter	Result	RL/ PQL	Units	Date/Time	By	Reference
Percent Solid	100		%	03/31/14	I	E160.3
Extraction for PCB	Completed			03/31/14	BP/X	SW3540C
<u>PCB (Soxhlet)</u>						
PCB-1016	ND	790	ug/Kg	04/03/14	AW	3540C/8082
PCB-1221	ND	790	ug/Kg	04/03/14	AW	3540C/8082
PCB-1232	ND	790	ug/Kg	04/03/14	AW	3540C/8082
PCB-1242	ND	790	ug/Kg	04/03/14	AW	3540C/8082
PCB-1248	ND	790	ug/Kg	04/03/14	AW	3540C/8082
PCB-1254	ND	790	ug/Kg	04/03/14	AW	3540C/8082
PCB-1260	ND	790	ug/Kg	04/03/14	AW	3540C/8082
PCB-1262	ND	790	ug/Kg	04/03/14	AW	3540C/8082
PCB-1268	ND	790	ug/Kg	04/03/14	AW	3540C/8082
<u>QA/QC Surrogates</u>						
% DCBP	146		%	04/03/14	AW	30 - 150 %
% TCMX	126		%	04/03/14	AW	30 - 150 %

Project ID: TOWN OF W HTFD KING PHILLIP ROOF
Client ID: 3-27-PCB-FLASHING-09

Phoenix I.D.: BG24989

Parameter	Result	RL/ PQL	Units	Date/Time	By	Reference
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RL/PQL=Reporting/Practical Quantitation Level ND=Not Detected BRL=Below Reporting Level

Comments:

100% Solid Assumed

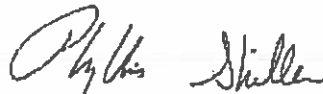
***PCB Analysis Comment:**

For PCBs, in order to reach the desired RL, multiple cleanup steps were performed. The extract was cleaned up with a combination of sulfuric acid, potassium permanganate, copper powder and additional florisil.

All soils, solids and sludges are reported on a dry weight basis unless otherwise noted in the sample comments.

If there are any questions regarding this data, please call Phoenix Client Services at extension 200.

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Phyllis Shiller, Laboratory Director

April 07, 2014

Reviewed and Released by: Greg Lawrence, Assistant Lab Director



Environmental Laboratories, Inc.
 587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
 Tel. (860) 645-1102 Fax (860) 645-0823

Analysis Report
 April 07, 2014

FOR: Attn: Mr. Peter Folino
 Eagle Environmental Inc.
 8 South Main Street, Suite 3 ©
 Terryville CT 06786

Sample Information

Matrix: SOLID
 Location Code: EAGLEENV
 Rush Request: 72 Hour
 P.O.#:

Custody Information

Collected by: AT
 Received by: SW
 Analyzed by: see "By" below

Date

03/27/14
 03/31/14

Time

0:00
 14:26

Laboratory Data

SDG ID: GBG24981
 Phoenix ID: BG24990

Project ID: TOWN OF W HTFD KING PHILLIP ROOF
 Client ID: 3-27-PCB-TRT-10

Parameter	Result	RL/ PQL	Units	Date/Time	By	Reference
Percent Solid	100		%	03/31/14	I	E160.3
Extraction for PCB	Completed			03/31/14	BP/X	SW3540C
<u>PCB (Soxhlet)</u>						
PCB-1016	ND	430	ug/Kg	04/04/14	AW	3540C/8082
PCB-1221	ND	430	ug/Kg	04/04/14	AW	3540C/8082
PCB-1232	ND	430	ug/Kg	04/04/14	AW	3540C/8082
PCB-1242	ND	430	ug/Kg	04/04/14	AW	3540C/8082
PCB-1248	ND	430	ug/Kg	04/04/14	AW	3540C/8082
PCB-1254	ND	430	ug/Kg	04/04/14	AW	3540C/8082
PCB-1260	ND	430	ug/Kg	04/04/14	AW	3540C/8082
PCB-1262	ND	430	ug/Kg	04/04/14	AW	3540C/8082
PCB-1268	ND	430	ug/Kg	04/04/14	AW	3540C/8082
<u>QA/QC Surrogates</u>						
% DCBP	67		%	04/04/14	AW	30 - 150 %
% TCMX	59		%	04/04/14	AW	30 - 150 %

Parameter	Result	RL/ PQL	Units	Date/Time	By	Reference
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RL/PQL=Reporting/Practical Quantitation Level ND=Not Detected BRL=Below Reporting Level

Comments:

100% Solid Assumed

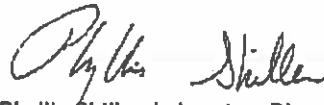
***PCB Analysis Comment:**

For PCBs, in order to reach the desired RL, multiple cleanup steps were performed. The extract was cleaned up with a combination of sulfuric acid, potassium permanganate, copper powder and additional florisil.

All soils, solids and sludges are reported on a dry weight basis unless otherwise noted in the sample comments.

If there are any questions regarding this data, please call Phoenix Client Services at extension 200.

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Phyllis Shiller, Laboratory Director

April 07, 2014

Reviewed and Released by: Greg Lawrence, Assistant Lab Director



Environmental Laboratories, Inc.
 587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
 Tel. (860) 645-1102 Fax (860) 645-0823

Analysis Report
 April 07, 2014

FOR: Attn: Mr. Peter Folino
 Eagle Environmental Inc.
 8 South Main Street, Suite 3 ©
 Terryville CT 06786

Sample Information

Matrix: SOLID
 Location Code: EAGLEENV
 Rush Request: 72 Hour
 P.O.#:

Custody Information

Collected by: AT
 Received by: SW
 Analyzed by: see "By" below

Date

03/27/14
 03/31/14

Time

0:00
 14:26

Laboratory Data

SDG ID: GBG24981
 Phoenix ID: BG24991

Project ID: TOWN OF W HTFD KING PHILLIP ROOF
 Client ID: 3-27-PCB-TF-11

Parameter	Result	RL/ PQL	Units	Date/Time	By	Reference
Percent Solid	100		%	03/31/14	I	E180.3
Extraction for PCB	Completed			03/31/14	BP/X	SW3540C
<u>PCB (Soxhlet)</u>						
PCB-1016	ND	320	ug/Kg	04/04/14	AW	3540C/8082
PCB-1221	ND	320	ug/Kg	04/04/14	AW	3540C/8082
PCB-1232	ND	320	ug/Kg	04/04/14	AW	3540C/8082
PCB-1242	ND	320	ug/Kg	04/04/14	AW	3540C/8082
PCB-1248	2700	320	ug/Kg	04/04/14	AW	3540C/8082
PCB-1254	ND	320	ug/Kg	04/04/14	AW	3540C/8082
PCB-1260	ND	320	ug/Kg	04/04/14	AW	3540C/8082
PCB-1262	ND	320	ug/Kg	04/04/14	AW	3540C/8082
PCB-1268	ND	320	ug/Kg	04/04/14	AW	3540C/8082
<u>QA/QC Surrogates</u>						
% DCBP	106		%	04/04/14	AW	30 - 150 %
% TCMX	83		%	04/04/14	AW	30 - 150 %

Parameter	Result	RL/ PQL	Units	Date/Time	By	Reference
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RL/PQL=Reporting/Practical Quantitation Level ND=Not Detected BRL=Below Reporting Level

Comments:

100% Solid Assumed

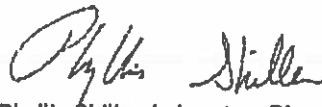
***PCB Analysis Comment:**

For PCBs, in order to reach the desired RL, multiple cleanup steps were performed. The extract was cleaned up with a combination of sulfuric acid, potassium permanganate, copper powder and additional florisl.

All soils, solids and sludges are reported on a dry weight basis unless otherwise noted in the sample comments.

If there are any questions regarding this data, please call Phoenix Client Services at extension 200.

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Phyllis Shiller, Laboratory Director

April 07, 2014

Reviewed and Released by: Greg Lawrence, Assistant Lab Director



Environmental Laboratories, Inc.
 587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
 Tel. (860) 645-1102 Fax (860) 645-0823

Analysis Report
 April 07, 2014

FOR: Attn: Mr. Peter Folino
 Eagle Environmental Inc.
 8 South Main Street, Suite 3 ©
 Terryville CT 06786

Sample Information

Matrix: SOLID
 Location Code: EAGLEENV
 Rush Request: 72 Hour
 P.O.#:

Custody Information

Collected by: AT
 Received by: SW
 Analyzed by: see "By" below

Date

03/27/14
 03/31/14

Time

0:00
 14:26

Laboratory Data

SDG ID: GBG24981
 Phoenix ID: BG24992

Project ID: TOWN OF W HTFD KING PHILLIP ROOF
 Client ID: 3-27-PCB-TD-12

Parameter	Result	RL/ PQL	Units	Date/Time	By	Reference
Percent Solid	100		%	03/31/14	I	E160.3
Extraction for PCB	Completed			03/31/14	BP/X	SW3540C
<u>PCB (Soxhlet)</u>						
PCB-1016	ND	750	ug/Kg	04/01/14	AW	3540C/8082
PCB-1221	ND	750	ug/Kg	04/01/14	AW	3540C/8082
PCB-1232	ND	750	ug/Kg	04/01/14	AW	3540C/8082
PCB-1242	ND	750	ug/Kg	04/01/14	AW	3540C/8082
PCB-1248	ND	750	ug/Kg	04/01/14	AW	3540C/8082
PCB-1254	ND	750	ug/Kg	04/01/14	AW	3540C/8082
PCB-1260	ND	750	ug/Kg	04/01/14	AW	3540C/8082
PCB-1262	ND	750	ug/Kg	04/01/14	AW	3540C/8082
PCB-1268	ND	750	ug/Kg	04/01/14	AW	3540C/8082
<u>QA/QC Surrogates</u>						
% DCBP	100		%	04/01/14	AW	30 - 150 %
% TCMX	127		%	04/01/14	AW	30 - 150 %

Project ID: TOWN OF W HTFD KING PHILLIP ROOF
Client ID: 3-27-PCB-TD-12

Phoenix I.D.: BG24992

Parameter	Result	RL/ PQL	Units	Date/Time	By	Reference
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RL/PQL=Reporting/Practical Quantitation Level ND=Not Detected BRL=Below Reporting Level

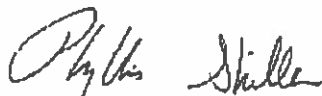
Comments:

100% Solid Assumed

All soils, solids and sludges are reported on a dry weight basis unless otherwise noted in the sample comments.

If there are any questions regarding this data, please call Phoenix Client Services at extension 200.

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Phyllis Shiller, Laboratory Director

April 07, 2014

Reviewed and Released by: Greg Lawrence, Assistant Lab Director



Environmental Laboratories, Inc.
 587 East Middle Turnpike, P.O. Box 370, Manchester, CT 06045
 Tel. (860) 645-1102 Fax (860) 645-0823

Analysis Report
 April 07, 2014

FOR: Attn: Mr. Peter Folino
 Eagle Environmental Inc.
 8 South Main Street, Suite 3 ©
 Terryville CT 06786

Sample Information

Matrix: SOLID
 Location Code: EAGLEENV
 Rush Request: 72 Hour
 P.O.#:

Custody Information

Collected by: AT
 Received by: SW
 Analyzed by: see "By" below

Date

03/27/14
 03/31/14

Time

0:00
 14:26

Laboratory Data

SDG ID: GBG24981
 Phoenix ID: BG24993

Project ID: TOWN OF W HTFD KING PHILLIP ROOF
 Client ID: 3-27-PCB-TB-13

Parameter	Result	RL/ PQL	Units	Date/Time	By	Reference
Percent Solid	100		%	03/31/14	I	E160.3
Extraction for PCB	Completed			03/31/14	BP/X	SW3540C

PCB (Soxhlet)

PCB-1016	ND	760	ug/Kg	04/01/14	AW	3540C/8082
PCB-1221	ND	760	ug/Kg	04/01/14	AW	3540C/8082
PCB-1232	ND	760	ug/Kg	04/01/14	AW	3540C/8082
PCB-1242	ND	760	ug/Kg	04/01/14	AW	3540C/8082
PCB-1248	ND	760	ug/Kg	04/01/14	AW	3540C/8082
PCB-1254	ND	760	ug/Kg	04/01/14	AW	3540C/8082
PCB-1260	ND	760	ug/Kg	04/01/14	AW	3540C/8082
PCB-1262	ND	760	ug/Kg	04/01/14	AW	3540C/8082
PCB-1268	ND	760	ug/Kg	04/01/14	AW	3540C/8082

QA/QC Surrogates

% DCBP	88		%	04/01/14	AW	30 - 150 %
% TCMX	90		%	04/01/14	AW	30 - 150 %

Project ID: TOWN OF W HTFD KING PHILLIP ROOF
Client ID: 3-27-PCB-TB-13

Phoenix I.D.: BG24993

Parameter	Result	RL/ PQL	Units	Date/Time	By	Reference
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RL/PQL=Reporting/Practical Quantitation Level ND=Not Detected BRL=Below Reporting Level

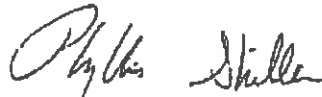
Comments:

100% Solid Assumed

All soils, solids and sludges are reported on a dry weight basis unless otherwise noted in the sample comments.

If there are any questions regarding this data, please call Phoenix Client Services at extension 200.

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Phyllis Shiller, Laboratory Director

April 07, 2014

Reviewed and Released by: Greg Lawrence, Assistant Lab Director



Environmental Laboratories, Inc.
 587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
 Tel. (860) 645-1102 Fax (860) 645-0823

Analysis Report
 April 07, 2014

FOR: Attn: Mr. Peter Folino
 Eagle Environmental Inc.
 8 South Main Street, Suite 3 ©
 Terryville CT 06786

Sample Information

Matrix: SOLID
 Location Code: EAGLEENV
 Rush Request: 72 Hour
 P.O.#:

Custody Information

Collected by: AT
 Received by: SW
 Analyzed by: see "By" below

Date

03/27/14
 03/31/14

Time

0:00
 14:26

Laboratory Data

SDG ID: GBG24981
 Phoenix ID: BG24994

Project ID: TOWN OF W HTFD KING PHILLIP ROOF
 Client ID: 3-27-PCB-BUR2-14

Parameter	Result	RL/ PQL	Units	Date/Time	By	Reference
Percent Solid	100		%	03/31/14	I	E160.3
Extraction for PCB	Completed			03/31/14	BP/X	SW3540C
<u>PCB (Soxhlet)</u>						
PCB-1016	ND	320	ug/Kg	04/04/14	AW	3540C/8082
PCB-1221	ND	320	ug/Kg	04/04/14	AW	3540C/8082
PCB-1232	ND	320	ug/Kg	04/04/14	AW	3540C/8082
PCB-1242	ND	320	ug/Kg	04/04/14	AW	3540C/8082
PCB-1248	ND	320	ug/Kg	04/04/14	AW	3540C/8082
PCB-1254	ND	320	ug/Kg	04/04/14	AW	3540C/8082
PCB-1260	ND	320	ug/Kg	04/04/14	AW	3540C/8082
PCB-1262	ND	320	ug/Kg	04/04/14	AW	3540C/8082
PCB-1268	ND	320	ug/Kg	04/04/14	AW	3540C/8082
<u>QA/QC Surrogates</u>						
% DCBP	81		%	04/04/14	AW	30 - 150 %
% TCMX	73		%	04/04/14	AW	30 - 150 %

Project ID: TOWN OF W HTFD KING PHILLIP ROOF
Client ID: 3-27-PCB-BUR2-14

Phoenix I.D.: BG24994

Parameter	Result	RL/ PQL	Units	Date/Time	By	Reference
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RL/PQL=Reporting/Practical Quantitation Level ND=Not Detected BRL=Below Reporting Level

Comments:

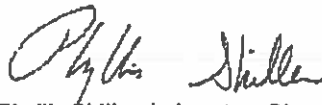
100% Solid Assumed

***PCB Analysis Comment:**

For PCBs, in order to reach the desired RL, multiple cleanup steps were performed. The extract was cleaned up with a combination of sulfuric acid, potassium permanganate, copper powder and additional florist.

All soils, solids and sludges are reported on a dry weight basis unless otherwise noted in the sample comments.

If there are any questions regarding this data, please call Phoenix Client Services at extension 200.
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Phyllis Shiller, Laboratory Director

April 07, 2014

Reviewed and Released by: Greg Lawrence, Assistant Lab Director



Environmental Laboratories, Inc.
 587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
 Tel. (860) 645-1102 Fax (860) 645-0823

Analysis Report
 April 07, 2014

FOR: Attn: Mr. Peter Folino
 Eagle Environmental Inc.
 8 South Main Street, Suite 3 ©
 Terryville CT 06786

Sample Information

Matrix: SOLID
 Location Code: EAGLEENV
 Rush Request: 72 Hour
 P.O.#:

Custody Information

Collected by: AT
 Received by: SW
 Analyzed by: see "By" below

Date

03/27/14
 03/31/14

Time

0:00
 14:26

Laboratory Data

SDG ID: GBG24981
 Phoenix ID: BG24995

Project ID: TOWN OF W HTFD KING PHILLIP ROOF
 Client ID: 3-27-PCB-FC-15

Parameter	Result	RL/ PQL	Units	Date/Time	By	Reference
Percent Solid	100		%	03/31/14	I	E160.3
Extraction for PCB	Completed			03/31/14	BP/X	SW3540C
<u>PCB (Soxhlet)</u>						
PCB-1016	ND	330	ug/Kg	04/04/14	AW	3540C/8082
PCB-1221	ND	330	ug/Kg	04/04/14	AW	3540C/8082
PCB-1232	ND	330	ug/Kg	04/04/14	AW	3540C/8082
PCB-1242	ND	330	ug/Kg	04/04/14	AW	3540C/8082
PCB-1248	ND	330	ug/Kg	04/04/14	AW	3540C/8082
PCB-1254	ND	330	ug/Kg	04/04/14	AW	3540C/8082
PCB-1260	ND	330	ug/Kg	04/04/14	AW	3540C/8082
PCB-1262	ND	330	ug/Kg	04/04/14	AW	3540C/8082
PCB-1268	ND	330	ug/Kg	04/04/14	AW	3540C/8082
<u>QA/QC Surrogates</u>						
% DCBP	66		%	04/04/14	AW	30 - 150 %
% TCMX	59		%	04/04/14	AW	30 - 150 %

Parameter	Result	RL/ PQL	Units	Date/Time	By	Reference
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RL/PQL=Reporting/Practical Quantitation Level ND=Not Detected BRL=Below Reporting Level

Comments:

100% Solid Assumed

***PCB Analysis Comment:**

For PCBs, in order to reach the desired RL, multiple cleanup steps were performed. The extract was cleaned up with a combination of sulfuric acid, potassium permanganate, copper powder and additional florasil.

All soils, solids and sludges are reported on a dry weight basis unless otherwise noted in the sample comments.

If there are any questions regarding this data, please call Phoenix Client Services at extension 200.

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Phyllis Shiller, Laboratory Director

April 07, 2014

Reviewed and Released by: Greg Lawrence, Assistant Lab Director



Environmental Laboratories, Inc.
 587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
 Tel. (860) 645-1102 Fax (860) 645-0823

Analysis Report
 April 07, 2014

FOR: Attn: Mr. Peter Folino
 Eagle Environmental Inc.
 8 South Main Street, Suite 3 ©
 Terryville CT 06786

Sample Information

Matrix: SOLID
 Location Code: EAGLEENV
 Rush Request: 72 Hour
 P.O.#:

Custody Information

Collected by: AT
 Received by: SW
 Analyzed by: see "By" below

Date

03/27/14
 03/31/14

Time

0:00
 14:26

Laboratory Data

SDG ID: GBG24981
 Phoenix ID: BG24996

Project ID: TOWN OF W HTFD KING PHILLIP ROOF
 Client ID: 3-27-PCB-FLASHING2-16

Parameter	Result	RL/ PQL	Units	Date/Time	By	Reference
Percent Solid	100		%	03/31/14	I	E180.3
Extraction for PCB	Completed			03/31/14	BP/X	SW3540C
<u>PCB (Soxhlet)</u>						
PCB-1016	ND	760	ug/Kg	04/01/14	AW	3540C/8082
PCB-1221	ND	760	ug/Kg	04/01/14	AW	3540C/8082
PCB-1232	ND	760	ug/Kg	04/01/14	AW	3540C/8082
PCB-1242	ND	760	ug/Kg	04/01/14	AW	3540C/8082
PCB-1248	ND	760	ug/Kg	04/01/14	AW	3540C/8082
PCB-1254	1500	760	ug/Kg	04/01/14	AW	3540C/8082
PCB-1260	ND	760	ug/Kg	04/01/14	AW	3540C/8082
PCB-1262	ND	760	ug/Kg	04/01/14	AW	3540C/8082
PCB-1268	ND	760	ug/Kg	04/01/14	AW	3540C/8082
<u>QA/QC Surrogates</u>						
% DCBP	101		%	04/01/14	AW	30 - 150 %
% TCMX	98		%	04/01/14	AW	30 - 150 %

Project ID: TOWN OF W HTFD KING PHILLIP ROOF
Client ID: 3-27-PCB-FLASHING2-16

Phoenix I.D.: BG24996

Parameter	Result	RL/ PQL	Units	Date/Time	By	Reference
-----------	--------	------------	-------	-----------	----	-----------

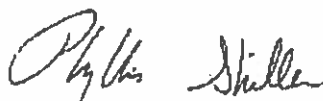
RL/PQL=Reporting/Practical Quantitation Level ND=Not Detected BRL=Below Reporting Level

Comments:

100% Solid Assumed

All soils, solids and sludges are reported on a dry weight basis unless otherwise noted in the sample comments.

If there are any questions regarding this data, please call Phoenix Client Services at extension 200.
This report must not be reproduced except in full as defined by the attached chain of custody.



Phyllis Shiller, Laboratory Director

April 07, 2014

Reviewed and Released by: Greg Lawrence, Assistant Lab Director



Environmental Laboratories, Inc.
 587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
 Tel. (860) 645-1102 Fax (860) 645-0823

Analysis Report

April 07, 2014

FOR: Attn: Mr. Peter Folino
 Eagle Environmental Inc.
 8 South Main Street, Suite 3 ©
 Terryville CT 06786

Sample Information

Matrix: SOLID
 Location Code: EAGLEENV
 Rush Request: 72 Hour
 P.O.#:

Custody Information

Collected by: AT
 Received by: SW
 Analyzed by: see "By" below

Date

03/27/14
 03/31/14

Time

0:00
 14:26

Laboratory Data

SDG ID: GBG24981
 Phoenix ID: BG24997

Project ID: TOWN OF W HTFD KING PHILLIP ROOF
 Client ID: 3-27-PCB-BUR2-17

Parameter	Result	RL/ PQL	Units	Date/Time	By	Reference
Percent Solid	100		%	03/31/14	I	E1603
Extraction for PCB	Completed			03/31/14	BP/X	SW3540C
<u>PCB (Soxhlet)</u>						
PCB-1016	ND	720	ug/Kg	04/01/14	AW	3540C/8082
PCB-1221	ND	720	ug/Kg	04/01/14	AW	3540C/8082
PCB-1232	ND	720	ug/Kg	04/01/14	AW	3540C/8082
PCB-1242	ND	720	ug/Kg	04/01/14	AW	3540C/8082
PCB-1248	ND	720	ug/Kg	04/01/14	AW	3540C/8082
PCB-1254	ND	720	ug/Kg	04/01/14	AW	3540C/8082
PCB-1260	ND	720	ug/Kg	04/01/14	AW	3540C/8082
PCB-1262	ND	720	ug/Kg	04/01/14	AW	3540C/8082
PCB-1268	ND	720	ug/Kg	04/01/14	AW	3540C/8082
<u>QA/QC Surrogates</u>						
% DCBP	90		%	04/01/14	AW	30 - 150 %
% TCMX	101		%	04/01/14	AW	30 - 150 %

Project ID: TOWN OF W HTFD KING PHILLIP ROOF
Client ID: 3-27-PCB-BUR2-17

Phoenix I.D.: BG24997

Parameter	Result	RL/ PQL	Units	Date/Time	By	Reference
-----------	--------	------------	-------	-----------	----	-----------

RL/PQL=Reporting/Practical Quantitation Level ND=Not Detected BRL=Below Reporting Level

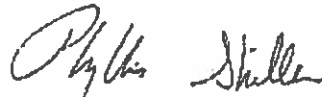
Comments:

100% Solid Assumed

All soils, solids and sludges are reported on a dry weight basis unless otherwise noted in the sample comments.

If there are any questions regarding this data, please call Phoenix Client Services at extension 200.

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Phyllis Shiller, Laboratory Director

April 07, 2014

Reviewed and Released by: Greg Lawrence, Assistant Lab Director



Environmental Laboratories, Inc.
 587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
 Tel. (860) 645-1102 Fax (860) 645-0823

Analysis Report
 April 07, 2014

FOR: Attn: Mr. Peter Folino
 Eagle Environmental Inc.
 8 South Main Street, Suite 3 ©
 Terryville CT 06786

Sample Information

Matrix: SOLID
 Location Code: EAGLEENV
 Rush Request: 72 Hour
 P.O.#:

Custody Information

Collected by: AT
 Received by: SW
 Analyzed by: see "By" below

Date

03/27/14
 03/31/14

Time

0.00
 14:26

Laboratory Data

SDG ID: GBG24981
 Phoenix ID: BG24998

Project ID: TOWN OF W HTFD KING PHILLIP ROOF
 Client ID: 3-27-PCB-FC-18

Parameter	Result	RL/ PQL	Units	Date/Time	By	Reference
Percent Solid	100		%	03/31/14	I	E160.3
Extraction for PCB	Completed			03/31/14	BP/X	SW3540C
<u>PCB (Soxhlet)</u>						
PCB-1016	ND	330	ug/Kg	04/04/14	AW	3540C/8082
PCB-1221	ND	330	ug/Kg	04/04/14	AW	3540C/8082
PCB-1232	ND	330	ug/Kg	04/04/14	AW	3540C/8082
PCB-1242	ND	330	ug/Kg	04/04/14	AW	3540C/8082
PCB-1248	ND	330	ug/Kg	04/04/14	AW	3540C/8082
PCB-1254	ND	330	ug/Kg	04/04/14	AW	3540C/8082
PCB-1260	ND	330	ug/Kg	04/04/14	AW	3540C/8082
PCB-1262	ND	330	ug/Kg	04/04/14	AW	3540C/8082
PCB-1268	ND	330	ug/Kg	04/04/14	AW	3540C/8082
<u>QA/QC Surrogates</u>						
% DCBP	62		%	04/04/14	AW	30 - 150 %
% TCMX	48		%	04/04/14	AW	30 - 150 %

Project ID: TOWN OF W HTFD KING PHILLIP ROOF
Client ID: 3-27-PCB-FC-18

Phoenix I.D.: BG24998

Parameter	Result	RL/ PQL	Units	Date/Time	By	Reference
-----------	--------	------------	-------	-----------	----	-----------

RL/PQL=Reporting/Practical Quantitation Level ND=Not Detected BRL=Below Reporting Level

Comments:

100% Solid Assumed

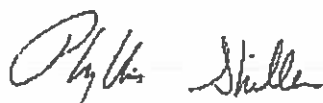
***PCB Analysis Comment:**

For PCBs, in order to reach the desired RL, multiple cleanup steps were performed. The extract was cleaned up with a combination of sulfuric acid, potassium permanganate, copper powder and additional floristil.

All soils, solids and sludges are reported on a dry weight basis unless otherwise noted in the sample comments.

If there are any questions regarding this data, please call Phoenix Client Services at extension 200.

This report must not be reproduced except in full as defined by the attached chain of custody.



Phyllis Shiller, Laboratory Director

April 07, 2014

Reviewed and Released by: Greg Lawrence, Assistant Lab Director



Environmental Laboratories, Inc.
 587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
 Tel. (860) 645-1102 Fax (860) 645-0823

Analysis Report
 April 07, 2014

FOR: Attn: Mr. Peter Folino
 Eagle Environmental Inc.
 8 South Main Street, Suite 3 ©
 Terryville CT 06786

Sample Information

Matrix: SOLID
 Location Code: EAGLEENV
 Rush Request: 72 Hour
 P.O.#:

Custody Information

Collected by: AT
 Received by: SW
 Analyzed by: see "By" below

Date

03/27/14
 03/31/14

Time

0:00
 14:26

Laboratory Data

SDG ID: GBG24981
 Phoenix ID: BG24999

Project ID: TOWN OF W HTFD KING PHILLIP ROOF
 Client ID: 3-27-PCB-RFC-19

Parameter	Result	RL/ PQL	Units	Date/Time	By	Reference
Percent Solid	100		%	03/31/14	I	E160.3
Extraction for PCB	Completed			03/31/14	BP/X	SW3540C
<u>PCB (Soxhlet)</u>						
PCB-1016	ND	320	ug/Kg	04/04/14	AW	3540C/8082
PCB-1221	ND	320	ug/Kg	04/04/14	AW	3540C/8082
PCB-1232	ND	320	ug/Kg	04/04/14	AW	3540C/8082
PCB-1242	ND	320	ug/Kg	04/04/14	AW	3540C/8082
PCB-1248	ND	320	ug/Kg	04/04/14	AW	3540C/8082
PCB-1254	ND	320	ug/Kg	04/04/14	AW	3540C/8082
PCB-1260	ND	320	ug/Kg	04/04/14	AW	3540C/8082
PCB-1262	ND	320	ug/Kg	04/04/14	AW	3540C/8082
PCB-1268	ND	320	ug/Kg	04/04/14	AW	3540C/8082
<u>QA/QC Surrogates</u>						
% DCBP	79		%	04/04/14	AW	30 - 150 %
% TCMX	82		%	04/04/14	AW	30 - 150 %

Parameter	Result	RL/ PQL	Units	Date/Time	By	Reference
-----------	--------	------------	-------	-----------	----	-----------

RL/PQL=Reporting/Practical Quantitation Level ND=Not Detected BRL=Below Reporting Level

Comments:

100% Solid Assumed

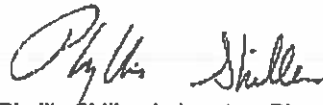
***PCB Analysis Comment:**

For PCBs, in order to reach the desired RL, multiple cleanup steps were performed. The extract was cleaned up with a combination of sulfuric acid, potassium permanganate, copper powder and additional florasil.

All soils, solids and sludges are reported on a dry weight basis unless otherwise noted in the sample comments.

If there are any questions regarding this data, please call Phoenix Client Services at extension 200.

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Phyllis Shiller, Laboratory Director

April 07, 2014

Reviewed and Released by: Greg Lawronce, Assistant Lab Director



Environmental Laboratories, Inc.
 587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
 Tel. (860) 645-1102 Fax (860) 645-0823

Analysis Report
 April 07, 2014

FOR: Attn: Mr. Peter Folino
 Eagle Environmental Inc.
 8 South Main Street, Suite 3 ©
 Terryville CT 06786

Sample Information

Matrix: SOLID
 Location Code: EAGLEENV
 Rush Request: 72 Hour
 P.O.#:

Custody Information

Collected by: AT
 Received by: SW
 Analyzed by: see "By" below

Date

03/27/14
 03/31/14

Time

0:00
 14:26

Laboratory Data

SDG ID: GBG24981
 Phoenix ID: BG25000

Project ID: TOWN OF W HTFD KING PHILLIP ROOF
 Client ID: 3-27-PCB-TD-20

Parameter	Result	RL/ PQL	Units	Date/Time	By	Reference
Percent Solid	100		%	03/31/14	I	E160.3
Extraction for PCB	Completed			03/31/14	BP/X	SW3540C
<u>PCB (Soxhlet)</u>						
PCB-1016	ND	320	ug/Kg	04/04/14	AW	3540C/8082
PCB-1221	ND	320	ug/Kg	04/04/14	AW	3540C/8082
PCB-1232	ND	320	ug/Kg	04/04/14	AW	3540C/8082
PCB-1242	ND	320	ug/Kg	04/04/14	AW	3540C/8082
PCB-1248	ND	320	ug/Kg	04/04/14	AW	3540C/8082
PCB-1254	ND	320	ug/Kg	04/04/14	AW	3540C/8082
PCB-1260	ND	320	ug/Kg	04/04/14	AW	3540C/8082
PCB-1262	ND	320	ug/Kg	04/04/14	AW	3540C/8082
PCB-1268	ND	320	ug/Kg	04/04/14	AW	3540C/8082
<u>QA/QC Surrogates</u>						
% DCBP	70		%	04/04/14	AW	30 - 150 %
% TCMX	70		%	04/04/14	AW	30 - 150 %

Parameter	Result	RL/ PQL	Units	Date/Time	By	Reference
-----------	--------	------------	-------	-----------	----	-----------

RL/PQL=Reporting/Practical Quantitation Level ND=Not Detected BRL=Below Reporting Level

Comments:

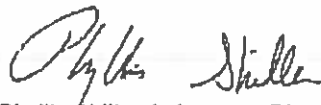
100% Solid Assumed

***PCB Analysis Comment:**

For PCBs, in order to reach the desired RL, multiple cleanup steps were performed. The extract was cleaned up with a combination of sulfuric acid, potassium permanganate, copper powder and additional florisl.

All soils, solids and sludges are reported on a dry weight basis unless otherwise noted in the sample comments.

If there are any questions regarding this data, please call Phoenix Client Services at extension 200.
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Phyllis Shiller, Laboratory Director

April 07, 2014

Reviewed and Released by: Greg Lawrence, Assistant Lab Director



Environmental Laboratories, Inc.
 587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
 Tel. (860) 645-1102 Fax (860) 645-0823

QA/QC Report

April 07, 2014

QA/QC Data

SDG I.D.: GBG24981

Parameter	Blank	LCS %	LCSD %	LCS RPD	MS %	MSD %	MS RPD	% Rec Limits	% RPD Limits
QA/QC Batch 270168, QC Sample No: BG24984 (BG24984, BG24985, BG24986, BG24987, BG24988, BG24989, BG24990, BG24991, BG24992, BG24993, BG24994, BG24995, BG24996, BG24997, BG24998, BG24999, BG25000)									
Polychlorinated Biphenyls - Solid									
PCB-1016	ND	89	84	5.8				40 - 140	30
PCB-1221	ND							40 - 140	30
PCB-1232	ND							40 - 140	30
PCB-1242	ND							40 - 140	30
PCB-1248	ND							40 - 140	30
PCB-1254	ND							40 - 140	30
PCB-1260	ND	96	97	1.0				40 - 140	30
PCB-1262	ND							40 - 140	30
PCB-1268	ND							40 - 140	30
% DCBP (Surrogate Rec)	90	89	89	0.0				30 - 150	30
% TCMX (Surrogate Rec)	91	100	88	12.8				30 - 150	30

Comment:

A LCS and LCS Duplicate were performed instead of a matrix spike and matrix spike duplicate.


QA/QC Batch 270163, QC Sample No: BG25062 (BG24981, BG24982, BG24983)

Polychlorinated Biphenyls - Solid

PCB-1016	ND	88	88	0.0	88	86	2.3	40 - 140	30
PCB-1221	ND							40 - 140	30
PCB-1232	ND							40 - 140	30
PCB-1242	ND							40 - 140	30
PCB-1248	ND							40 - 140	30
PCB-1254	ND							40 - 140	30
PCB-1260	ND	92	90	2.2	93	91	2.2	40 - 140	30
PCB-1262	ND							40 - 140	30
PCB-1268	ND							40 - 140	30
% DCBP (Surrogate Rec)	94	100	96	4.1	97	97	0.0	30 - 150	30
% TCMX (Surrogate Rec)	96	100	100	0.0	99	98	1.0	30 - 150	30

If there are any questions regarding this data, please call Phoenix Client Services at extension 200.

- RPD - Relative Percent Difference
- LCS - Laboratory Control Sample
- LCSD - Laboratory Control Sample Duplicate
- MS - Matrix Spike
- MS Dup - Matrix Spike Duplicate
- NC - No Criteria
- Intf - Interference


 Phyllis Shiller, Laboratory Director
 April 07, 2014

Monday, April 07, 2014

Sample Criteria Exceedences Report

Page 1 of 1

Criteria: None

GBG24981 - EAGLEENV

State: CT

SampNo	Acoda	Phoenix Analyte	Criteria	Result	RL	Criteria	RL	Criteria	Analysis Units
--------	-------	-----------------	----------	--------	----	----------	----	----------	----------------

*** No Data to Display ***

Phoenix Laboratories does not assume responsibility for the data contained in this report. It is provided as an additional tool to identify requested criteria exceedences. All efforts are made to ensure the accuracy of the data (obtained from appropriate agencies). A lack of exceedence information does not necessarily suggest conformance to the criteria. It is ultimately the site professional's responsibility to determine appropriate compliance.

CHAIN OF CUSTODY RECORD

587 East Middletown Turnpike, Manchester, CT 06040
 Email: info@phoenixlabs.com Fax: (860) 645-0823
 Client Services (860) 645-8726



Customer: ESGIE ENVIRONMENTAL, INC.
 Address: 8 S. MAIN ST. SUITE 3
TEASDALE, CT 06786

Project: Town of Wethers - Kings Phillip Road - 10/11/2011
 Report to: ESGIE
 Invoice to: ↓

Project P.O.: _____
 Phone #: _____
 Fax #: _____

Data Delivery: Fax # _____
 Email _____

Cooler: Yes No
 Coolant: IPK ICE N
 Temp 6 °C/F of _____

Sampler's Signature: [Signature] Date: 3-27-14
 Client Sample - Information - Identification

PHOENIX USE ONLY SAMPLE #	Customer Sample Identification	Sample Matrix	Date Sampled	Time Sampled
24981	3-27-PCB-BUR-01	SD	3/27	AM/PM
24982	3-27-PCB-TAR-02			
24983	3-27-PCB-BUR-03			
24984	3-27-PCB-TR-04			
24985	3-27-PCB-TRT-05			
24986	3-27-PCB-BUR-06			
24987	3-27-PCB-TR-07			
24988	3-27-PCB-TR-08			
24989	3-27-PCB-HUM-09			
24990	3-27-PCB-TRT-10			
24991	3-27-PCB-TF-11			
24992	3-27-PCB-TD-12			

Analysis Request

TPM PCBs 0922

Analysis Request	Requested	Completed
Soil VOA Vol. (methanol) (H2O)		
Soil Coarsest () (H2O)		
40 mL VOA Vol. (As Is) (HCl)		
GL Amber 1000ml (As Is) (HCl)		
PL H2SO4 (250ml) (500ml) (1000ml)		
PL H2SO4 (250ml) (500ml) (1000ml)		
PL HNO3 (250ml) (500ml) (1000ml)		
Bacteria Bottle		

Relinquished by: [Signature]
 Accepted by: [Signature]
 Date: 3/31/14 Time: 13
 Date: 3/31/14 Time: 1426
 Turnaround:
 1 Day
 2 Days
 3 Days
 Standard
 Other
 Comments, Special Requirements or Regulations:
SOXLET EXT.
R.L. <1.0ppm
BAG 1

State where samples were collected: CT

MA MCP Certification
 GW-1
 GW-2
 GW-3
 S-1
 S-2
 S-3
 MWRA eSMART
 Other

RI Direct Exposure (Residential)
 GW
 Other

CT RCP Cert
 GW Protection
 SW Protection
 GA Mobility
 GB Mobility
 Residential DEC
 IC DEC
 Other

Date Format:
 Excel
 PDF
 GIS/Key
 EQUIS
 Other
 Data Package:
 Tier II Checklist
 Full Data Package
 Phoenix Std Report
 Other

* SURCHARGE APPLIES

CHAIN OF CUSTODY RECORD



587 East Middle Turnpike, Manchester, CT 06040
 Email: info@phoenixlabs.com Fax (860) 645-0823
 Client Services (860) 645-8726

Customer: Eagle Environmental, Inc. Project P.O.: Town of Eagle - Kirtland Rd - 14-01-2011
 Address: 8 S. Main St. Suite 3 Phone #: _____
Therbyville, CT 06786 Invoice to: Eagle Fax #: _____

Sampler's Signature: [Signature] Date: 3-27-14
 Client Sample - Information - Identification

Matrix Code: _____
 DW=Drinking Water GW=Ground Water SW=Surface Water WW=Waste Water
 SE=Sediment SL=Sludge S=Soil/Solid W=Wipe O=Other

PHOENIX USE ONLY SAMPLE #	Customer Sample Identification	Sample Matrix	Date Sampled	Time Sampled
24993	3-27-PB-TB-13	SD	3/27	Am/PM
24994	3-27-PB-BURZ-14			
24995	3-27-PB-FC-15			
24996	3-27-PB-THINK-16			
24997	3-27-PB-BURZ-17			
24998	3-27-PB-FC-18			
24999	3-27-PB-RFC-19			
25000	3-27-PB-TD-20			

Analysis Request

EPA Method 816

<input type="checkbox"/>	SO4 VOA Val (method) / HCO
<input type="checkbox"/>	GL Sol Contake ()
<input type="checkbox"/>	GL Sol Contake ()
<input type="checkbox"/>	40% VOA Val (AS) / HCO
<input type="checkbox"/>	PL AS () / 250ml / 150ml / 100ml
<input type="checkbox"/>	PL H2SO4 () / 250ml / 150ml
<input type="checkbox"/>	PL NAOH 250ml / 100ml
<input type="checkbox"/>	General Bathy

Relinquished by: [Signature] Accepted by: [Signature]

Date: 3/31/14 Time: 13

Date: 3/31/14 Time: 1426

Turnaround:
 1 Day
 2 Days
 3 Days
 Standard
 Other

Comments, Special Requirements or Regulations:
SOXNET EXT.
R.L. < 1.0 ppm
PAGE 2

State where samples were collected: CT

MA MCP Certification
 GW-1
 GW-2
 GW-3
 S-1
 S-2
 S-3
 MWRA eSMART
 Other

CT RCP Cert
 GW Protection
 SW Protection
 GA Mobility
 GB Mobility
 Residential DEC
 LC DEC
 Other

RI Direct Exposure (Residential)
 GW
 Other

Data Format:
 Excel
 PDF
 GIS/Key
 EOUIS
 Other
 Data Package:
 Tier II Checklist
 Full Data Package*
 Phoenix Std Report
 Other

* SURCHARGE APPLIES

Cooler: Yes No
 Coolant: JPK ICE N

Temp 9 °C Pg 1 of _____

Data Delivery:
 Fax #:
 Email:

APPENDIX 4

EAGLE ENVIRONMENTAL INC. LICENSES AND CERTIFICATES

CERTIFICATE OF ACHIEVEMENT

This certifies that

Aaron E. Hatcher

has successfully completed the
**Asbestos Site Inspector Refresher Training
Asbestos Accreditation Under TSCA Title II
40 CFR Part 763**

conducted by

*Cardno ATC
73 William Franks Drive
West Springfield, MA 01089
(413) 781-0070*

Gregory J. Mousch
Principal Instructor
December 12, 2013
Date of Course
December 12, 2014
Expiration Date

Gregory J. Mousch
Regional Manager
SIAR-4751
Certificate Number
December 12, 2013
Examination Date



State of Connecticut

Lookup Detail View

Name

Name

AARON HATCHER

License Information

Lookup

License Type	License Number	Expiration Date	Granted Date	License Name	License Status	Licensure Actions or Pending Charges
Asbestos Consultant-Inspector	645	05/31/2014	05/01/2008	Aaron Hatcher	ACTIVE	None

APPENDIX 5
LABORATORY ACCREDITATION CERTIFICATES

State of Connecticut, Department of Public Health
Approved Environmental Laboratory

THIS IS TO CERTIFY THAT THE LABORATORY DESCRIBED BELOW HAS BEEN APPROVED BY THE STATE DEPARTMENT OF PUBLIC HEALTH PURSUANT TO APPLICABLE PROVISIONS OF THE PUBLIC HEALTH CODE AND GENERAL STATUTES OF CONNECTICUT, FOR MAKING THE EXAMINATIONS, DETERMINATIONS OR TESTS SPECIFIED BELOW WHICH HAVE BEEN AUTHORIZED IN WRITING BY THAT DEPARTMENT.

EMSL ANALYTICAL, INC. - MANHATTAN, NY

LOCATED AT 307 West 38th Street IN New York, NY 10018
AND REGISTERED IN THE NAME OF Peter Frasca, Ph.D.

THIS CERTIFICATE IS ISSUED IN THE NAME OF James Hall WHO HAS BEEN DESIGNATED
BY THE REGISTERED OWNER/AUTHORIZED AGENT TO BE IN CHARGE OF THE LABORATORY WORK COVERED BY THIS CERTIFICATE OF
APPROVAL AS FOLLOWS:

ASBESTOS

Environmental Health & Housing

Examination For:

Bulk - Identification (PLM, TEM)
Air - Fiber Counting (PCM, TEM)
Water - TEM

Examination For:

Lead in Paint
Lead Paint in Soil
Lead in Dust Wipes

SEE COMPUTER PRINT-OUT FOR SPECIFIC TESTS APPROVED

THIS CERTIFICATE EXPIRES September 30, 2014 AND IS REVOCABLE FOR CAUSE BY THE STATE DEPARTMENT OF PUBLIC HEALTH
DATED AT HARTFORD, CONNECTICUT, THIS 4th DAY OF October, 2012



Registration No.

PH-0170

SUZANNE BLANCAFLOR, MS
CHIEF, ENVIRONMENTAL HEALTH SECTION

State of Connecticut, Department of Public Health
Approved Environmental Laboratory

THIS IS TO CERTIFY THAT THE LABORATORY DESCRIBED BELOW HAS BEEN APPROVED BY THE STATE DEPARTMENT OF PUBLIC HEALTH PURSUANT TO APPLICABLE PROVISIONS OF THE PUBLIC HEALTH CODE AND GENERAL STATUTES OF CONNECTICUT, FOR MAKING THE EXAMINATIONS, DETERMINATIONS OR TESTS SPECIFIED BELOW WHICH HAVE BEEN AUTHORIZED IN WRITING BY THAT DEPARTMENT.

PHOENIX ENVIRONMENTAL LABORATORIES, INC.

LOCATED AT 587 East Middle Turnpike IN Manchester, Connecticut 06040
AND REGISTERED IN THE NAME OF Allan E. Caffyn
THIS CERTIFICATE IS ISSUED IN THE NAME OF Phyllis Shiller (Chemistry) WHO HAS BEEN DESIGNATED
Kathleen Cressia (Microbiology)

BY THE REGISTERED OWNER\AUTHORIZED AGENT TO BE IN CHARGE OF THE LABORATORY WORK COVERED BY THIS CERTIFICATE OF APPROVAL AS FOLLOWS:

DRINKING WATER, NON-POTABLE/WASTEWATER, SOLID WASTE/SOIL

Examination For:

MICROBIOLOGICALS
INORGANIC CHEMICALS
ORGANIC CHEMICALS

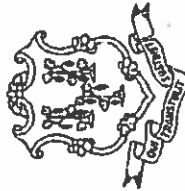
ENVIRONMENTAL HEALTH & HOUSING

Examination For:

LEAD in PAINT, LEAD in DUST WIPES, LEAD PAINT in SOIL

SEE COMPUTER PRINT-OUT FOR SPECIFIC TESTS APPROVED

THIS CERTIFICATE EXPIRES June 30, 2014 AND IS REVOCABLE FOR CAUSE BY THE STATE DEPARTMENT OF PUBLIC HEALTH
DATED AT HARTFORD, CONNECTICUT, THIS 29th DAY OF June, 2012



Registration
No.
PH - 0618

SUZANNE BLANCAFLOR, MS
CHIEF, ENVIRONMENTAL HEALTH SECTION



EAGLE
Environmental, Inc.

- Industrial Hygiene / IAQ
- Hazardous Building Materials
- Environmental Assessments
- Laboratory Services & Training

April 9, 2015

Mr. Steve Tedford
Town of West Hartford
17 Brixton Street
West Hartford, Connecticut, 06110

**RE: Asbestos Bulk Sample Collection and Analysis Report
King Phillip Middle School-Targeted Areas
100 King Phillip Drive
West Hartford, Connecticut
Eagle Project No. 15-021.18T1**

Dear Mr. Tedford:

On March 10, 2015, Eagle Environmental, Inc. conducted bulk sampling of suspect asbestos-containing materials (ACM) in Rooms 7, 33, the Choir room, the closet near the Choir room and the large cafeteria of King Phillip Middle School located at 100 King Phillip Drive in West Hartford, Connecticut. The bulk sampling was performed by Erik Foley; a State of Connecticut licensed Asbestos Inspector (license #000883). The bulk sampling was limited to suspect ceiling tiles (two types) and associated glue daubs (four types) that were impacted by water intrusion from a roof leak. The sampled ceiling tiles and glue daubs, although only sampled in the aforementioned rooms, were homogeneous throughout the building.

The bulk samples were submitted to EMSL Analytical of Wallingford, Connecticut for initial analyses by Polarized Light Microscopy (PLM). PLM is the USEPA accepted method of analysis for identification of asbestos in bulk matrices. EMSL is a State of Connecticut approved laboratory for bulk sample analysis. Materials containing greater than one percent (>1%) asbestos by PLM are defined as asbestos-containing materials and are regulated under state and federal regulations.

A total of eighteen (18) bulk samples were collected and analyzed. Based upon the results of the analysis, all of the materials analyzed were confirmed to be non-ACM.

This report contains important information that must be maintained with the School's Asbestos Hazard Emergency Response Act (AHERA) asbestos records.

Please do not hesitate to contact us if you have any questions regarding the contents of this report.

Sincerely,
Eagle Environmental, Inc.


Aaron E. Hatcher
Project Manager

\\Eagleenv\public\2015 Files\2015 Reports\W. Hartford, Town of\King Phillip Middle\100 King Phillip Drive - ACM Bulk Report (Shatt School).docx

8 SOUTH MAIN STREET, SUITE 3 • TERRYVILLE, CT 06786
PHONE (860) 589-8257 • FAX (860) 585-7034

TABLE I
 ASBESTOS CONTAINING MATERIALS
 SUMMARY TABLE
 KING PHILLIP MIDDLE SCHOOL
 100 KING PHILLIP DRIVE
 WEST HARTFORD, CONNECTICUT

LOCATION(S)	MATERIAL TYPE	SAMPLE NUMBER	CATEGORY	BULK SAMPLE ANALYSIS RESULTS			ESTIMATED QUANTITY	F/NF
				PLM	PLM PC	TEM NOB		
NO ASBESTOS WAS DETECTED IN THIS SCOPE OF WORK								
KEY								
DNA = DID NOT ANALYZE		SF = SQUARE FEET		ANALYTICAL METHODS				
NAD = NO ASBESTOS DETECTED		LF = LINEAR FEET		PLM PC = EPA 600/R-93/116 QUANTITATION 400 POINT COUNT				
F = FRIABLE		Chrys = Chrysotile		TEM NOB = NEW YORK ELAP 198.4 METHOD				
NF = NON-FRIABLE		Amos = Amosite		PLM = EPA 600/R-93/116				
TSI = THERMAL SYSTEMS INSULATION		Anth = Anthophyllite		PS = Previously Sampled				
SURF = SURFACING MATERIAL		Trem = Tremolite		E.A = Each				
MISC = MISCELLANEOUS MATERIAL		Croc = Crocidolite						
BOLD TEXT IN "LOCATION" COLUMN INDICATES SAMPLE LOCATION								

TABLE II
 NON - ASBESTOS CONTAINING MATERIALS
 SUMMARY TABLE
 KING PHILLIP MIDDLE SCHOOL
 100 KING PHILLIP DRIVE
 WEST HARTFORD, CONNECTICUT

SAMPLE LOCATION(S)	MATERIAL TYPE	SAMPLE NUMBER	CATEGORY	BULK SAMPLE ANALYSIS RESULTS		
				PLM	PLM/PC	AGM
Room 033	White glue daubs	03-10-EF-01	MISC	NAD		NO
		03-10-EF-02				
		03-10-EF-03				
Room 033, Closet near Choir Room	Dark brown glue daubs	03-10-EF-04	MISC	NAD		NO
		03-10-EF-05				
		03-10-EF-06				
Rooms 007, 033	Large pinhole acoustic ceiling tile	03-10-EF-07	MISC	NAD		NO
		03-10-EF-08				
		03-10-EF-09				
Rooms 007, 033, Large Café	Small pinhole ceiling tile	03-10-EF-10	MISC	NAD		NO
		03-10-EF-11				
		03-10-EF-12				
Room 007	Tan glue daubs	03-10-EF-13	MISC	NAD		NO
		03-10-EF-14				
		03-10-EF-15				
Large Café	Brittle tan glue daubs	03-10-EF-16	MISC	NAD		NO
		03-10-EF-17				
		03-10-EF-18				

KEY:
 DNA = DID NOT ANALYZE
 NAD=NO ASBESTOS DETECTED
 F = FRIABLE
 NF = NON-FRIABLE
 TSI = THERMAL SYSTEMS INSULATION
 SURF = SURFACING MATERIAL
 MISC = MISCELLANEOUS MATERIAL

SF = SQUARE FEET
 LF = LINEAR FEET
 Chrys = Chrysotile
 Amos = Amosite
 Anth = Anthophyllite
 Trem = Tremolite
 Croc = Crocidolite

ANALYTICAL METHODS
 PLM PC = EPA 600/R-93/116 QUANTITATION 400 POINT COUNT
 TEM NOB = NEW YORK ELAP 198.4 METHOD
 PLM = EPA 600/R-93/116
 PS = Previously Sampled
 EA = Each

BOLD TEXT IN "LOCATION" COLUMN INDICATES SAMPLE LOCATION



EMSL ANALYTICAL, INC.
LABORATORY PRODUCTS DIVISION

Asbestos Chain of Custody

EMSL Order Number (Lab Use Only):

241500897

EMSL ANALYTICAL INC
29 NORTH PLAINS HWY UNIT 4
WALLINGFORD, CT 06492
PHONE (203) 284-5948
FAX (203) 284-5978

Company: <u>Eagle Environmental</u>		EMSL-Bill to: <input checked="" type="checkbox"/> Same <input type="checkbox"/> Different <small>If Bill to is Different note instructions in Comments**</small>	
Street: <u>8 South Main St Suite 3</u>		<i>Third Party Billing requires written authorization from third party</i>	
City: <u>Terryville</u>	State/Province: <u>CT</u>	Zip/Postal Code:	Country:
Report To (Name): <u>Aaron Hatcher</u>		Telephone #:	
Email Address: <u>ahatcher@eagleenvto.com</u>		Fax #:	Purchase Order:
Project Name/Number: <u>15-021-187L</u>		Please Provide Results: <input type="checkbox"/> Fax <input checked="" type="checkbox"/> Email	
U.S. State Samples Taken: <u>CT</u>		CT Samples: <input type="checkbox"/> Commercial/Taxable <input type="checkbox"/> Residential/Tax Exempt	

Turnaround Time (TAT) Options* - Please Check

3 Hour
 6 Hour
 24 Hour
 48 Hour
 72 Hour
 96 Hour
 1 Week
 2 Week

*For TEM Air 3 hr through 6 hr, please call ahead to schedule. *There is a premium charge for 3 Hour TEM AHERA or EPA Level II TAT. You will be asked to sign an authorization form for this service. Analysis completed in accordance with EMSL's Terms and Conditions located in the Analytical Price Guide.

PCM - Air <input type="checkbox"/> Check if samples are from NY <input type="checkbox"/> NIOSH 7400 <input type="checkbox"/> w/ OSHA 8hr. TWA	TEM - Air <input type="checkbox"/> 4-4.5hr TAT (AHERA only) <input type="checkbox"/> AHERA 40 CFR, Part 763 <input type="checkbox"/> NIOSH 7402 <input type="checkbox"/> EPA Level II <input type="checkbox"/> ISO 10312	TEM - Dust <input type="checkbox"/> Microvac - ASTM D 6755 <input type="checkbox"/> Wipe - ASTM D6480 <input type="checkbox"/> Carpet Sonication (EPA 600/J-93/167)
PLM - Bulk (reporting limit) <input checked="" type="checkbox"/> PLM EPA 600/R-93/116 (<1%) <input type="checkbox"/> PLM EPA NOB (<1%) Point Count <input type="checkbox"/> 400 (<0.25%) <input type="checkbox"/> 1000 (<0.1%) Point Count w/Gravimetric <input type="checkbox"/> 400 (<0.25%) <input type="checkbox"/> 1000 (<0.1%) <input type="checkbox"/> NYS 198.1 (friable in NY) <input type="checkbox"/> NYS 198.6 NOB (non-friable-NY) <input type="checkbox"/> NIOSH 9002 (<1%)	TEM - Bulk <input type="checkbox"/> TEM EPA NOB <input type="checkbox"/> NYS NOB 198.4 (non-friable-NY) <input type="checkbox"/> Chatfield SOP <input type="checkbox"/> TEM Mass Analysis-EPA 600 sec. 2.6	Soil/Rock/Vermiculite <input type="checkbox"/> PLM CARB 435 - A (0.25% sensitivity) <input type="checkbox"/> PLM CARB 435 - B (0.1% sensitivity) <input type="checkbox"/> TEM CARB 435 - B (0.1% sensitivity) <input type="checkbox"/> TEM CARB 435 - C (0.01% sensitivity) <input type="checkbox"/> TEM Qual. via Filtration Technique <input type="checkbox"/> TEM Qual. via Drop-Mount Technique
TEM - Water: EPA 100.2 Fibers >10µm <input type="checkbox"/> Waste <input type="checkbox"/> Drinking All Fiber Sizes <input type="checkbox"/> Waste <input type="checkbox"/> Drinking		Other: <input type="checkbox"/>

Check For Positive Stop - Clearly Identify Homogenous Group Filter Pore Size (Air Samples): 0.8µm 0.45µm

Samplers Name: Erik Foley Samplers Signatures: [Signature]

Sample #	Sample Description	Volume/Area (Air) HA # (Bulk)	Date/Time Sampled
3-10-EF-01	White Glue Dabs		pm 3-10-15
02	↓		↓
03			
04	Dark Brown Glue Dabs		
05	↓		↓
06			
07	Large Pinhole Ceiling Tile		
08	↓		↓

Client Sample # (s): 3-10-EF-01 - 3-10-EF-18 Total # of Samples: 18

Relinquished (Client): Date: Time:

Received (Lab): Date:

Comments/Special Instructions:

RECEIVED

MAR 10 2015

By: [Signature] 16:55



EMSL ANALYTICAL, INC.
LABORATORY PROCELOGYS TRAINING

Asbestos Chain of Custody

EMSL Order Number (Lab Use Only):

241500897

EMSL ANALYTICAL, INC
29 NORTH PLAINS HWY, UNIT 4
WALLINGFORD, CT 06492
PHONE (203) 284-5948
FAX (203) 284-5978

Additional Pages of the Chain of Custody are only necessary if needed for additional sample information

Sample #	Sample Description	Volume/Area (Air) HA # (Bulk)	Date/Time Sampled
3-10-EF-09	Large Pinhole Ceiling Tile		pm 3-10-15
10	Small Pinhole Ceiling Tile		
11	↓		
12	↓		
13	Tan Glue Dabs		
14	↓		
15	↓		
16	Brittle Tan Glue Dabs		
17	↓		
18	↓		
*Comments/Special Instructions:			

RECEIVED
MAR 10 2015
BY: [Signature] 10:55

**EMSL Analytical, Inc.**

29 North Plains Highway, Unit # 4, Wallingford, CT 06492
 Phone/Fax: 203-284-5948 / (203) 284-5978
<http://www.EMSL.com> wallingfordlab@emsl.com

EMSL Order: 241500897
 CustomerID: EEVM50
 CustomerPO:
 ProjectID:

Attn: **Brandy LeBlanc**
Eagle Environmental, Inc. - CT
8 South Main Street
Suite 3
Terryville, CT 06786

Phone: (860) 589-8257
 Fax: (860) 585-7034
 Received: 03/10/15 4:55 PM
 Analysis Date: 3/11/2015
 Collected: 3/10/2015

Project: 15-021.18T1

Test Report: Asbestos Analysis of Bulk Materials via EPA 600/R-93/116 Method using Polarized Light Microscopy

Sample	Description	Appearance	Non-Asbestos		Asbestos
			% Fibrous	% Non-Fibrous	% Type
3-10-EF-01 241500897-0001	White glue daubs	White Non-Fibrous Homogeneous	<1% Cellulose	100% Non-fibrous (other)	None Detected
3-10-EF-02 241500897-0002	White glue daubs	White Non-Fibrous Homogeneous	<1% Cellulose	100% Non-fibrous (other)	None Detected
3-10-EF-03 241500897-0003	White glue daubs	White Non-Fibrous Homogeneous		100% Non-fibrous (other)	None Detected
3-10-EF-04 241500897-0004	Dark brown glue daubs	Brown Non-Fibrous Homogeneous	<1% Cellulose	100% Non-fibrous (other)	None Detected
3-10-EF-05 241500897-0005	Dark brown glue daubs	Brown Non-Fibrous Homogeneous	<1% Cellulose	100% Non-fibrous (other)	None Detected
3-10-EF-06 241500897-0006	Dark brown glue daubs	Brown Non-Fibrous Homogeneous	<1% Cellulose	100% Non-fibrous (other)	None Detected
3-10-EF-07 241500897-0007	Large pinhole ceiling tile	Gray Fibrous Homogeneous	65% Cellulose 10% Min. Wool	25% Non-fibrous (other)	None Detected
3-10-EF-08 241500897-0008	Large pinhole ceiling tile	Gray Fibrous Homogeneous	60% Cellulose 10% Min. Wool	30% Non-fibrous (other)	None Detected

Analyst(s)

Kristin Lopez (12)
 Lauren Brennan (6)

Gloria V. Oriol, Laboratory Manager
 or other approved signatory

EMSL maintains liability limited to cost of analysis. This report relates only to the samples reported and may not be reproduced, except in full, without written approval by EMSL. EMSL bears no responsibility for sample collection activities or analytical method limitations. Interpretation and use of test results are the responsibility of the client. This report must not be used by the client to claim product certification, approval, or endorsement by NVI AP, NIST or any agency of the federal government. Non friable organically bound materials present a problem matrix and therefore EMSL recommends gravimetric reduction prior to analysis. Samples received in good condition unless otherwise noted. Estimated accuracy, precision and uncertainty data available upon request. Unless requested by the client, building materials manufactured with multiple layers (i.e. linoleum, wallboard, etc.) are reported as a single sample. Reporting limit is 1%
 Samples analyzed by EMSL Analytical, Inc. Wallingford, CT NVLAP Lab Code 200709-0.

Initial report from 03/11/2015 15:06:54

**EMSL Analytical, Inc.**

29 North Plains Highway, Unit # 4, Wallingford, CT 06492
 Phone/Fax: 203-284-5948 / (203) 284-5978
<http://www.EMSL.com> wallingfordlab@emsl.com

EMSL Order: 241500897
 CustomerID: EEVM50
 CustomerPO:
 ProjectID:

Attn: **Brandy LeBlanc**
Eagle Environmental, Inc. - CT
8 South Main Street
Suite 3
Terryville, CT 06786

Phone: (860) 589-8257
 Fax: (860) 585-7034
 Received: 03/10/15 4:55 PM
 Analysis Date: 3/11/2015
 Collected: 3/10/2015

Project: 15-021.18T1

Test Report: Asbestos Analysis of Bulk Materials via EPA 600/R-93/116 Method using Polarized Light Microscopy

Sample	Description	Appearance	Non-Asbestos		Asbestos
			% Fibrous	% Non-Fibrous	% Type
3-10-EF-09 241500897-0009	Large pinhole ceiling tile	White Fibrous Homogeneous	60% Cellulose	40% Non-fibrous (other)	None Detected
3-10-EF-10 241500897-0010	Small pinhole ceiling tile	Brown Fibrous Homogeneous	98% Cellulose	2% Non-fibrous (other)	None Detected
3-10-EF-11 241500897-0011	Small pinhole ceiling tile	Brown Fibrous Homogeneous	99% Cellulose	1% Non-fibrous (other)	None Detected
3-10-EF-12 241500897-0012	Small pinhole ceiling tile	Brown Fibrous Homogeneous	99% Cellulose	1% Non-fibrous (other)	None Detected
3-10-EF-13 241500897-0013	Tan glue daubs	Tan Non-Fibrous Homogeneous	2% Fibrous (other)	98% Non-fibrous (other)	None Detected
3-10-EF-14 241500897-0014	Tan glue daubs	Tan Non-Fibrous Homogeneous	2% Fibrous (other)	98% Non-fibrous (other)	None Detected
3-10-EF-15 241500897-0015	Tan glue daubs	Tan Non-Fibrous Homogeneous	2% Fibrous (other)	98% Non-fibrous (other)	None Detected
3-10-EF-16 241500897-0016	Brittle tan glue daubs	Tan Non-Fibrous Homogeneous	<1% Cellulose	100% Non-fibrous (other)	None Detected

Analyst(s)

Kristin Lopez (12)
 Lauren Brennan (6)

Gloria V. Oriol, Laboratory Manager
 or other approved signatory

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 Samples analyzed by EMSL Analytical, Inc. Wallingford, CT NVLAP Lab Code 200700-0.

Initial report from 03/11/2015 15:06:54



EMSL Analytical, Inc.

29 North Plains Highway, Unit # 4, Wallingford, CT 06492
Phone/Fax: 203-284-5948 / (203) 284-5978
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Received: 03/10/15 4:55 PM
Analysis Date: 3/11/2015
Collected: 3/10/2015

Project: 15-021.18T1

Test Report: Asbestos Analysis of Bulk Materials via EPA 600/R-93/116 Method using Polarized Light Microscopy

Sample	Description	Appearance	Non-Asbestos		Asbestos
			% Fibrous	% Non-Fibrous	% Type
3-10-EF-17 241500897-0017	Brittle tan glue daubs	Tan Non-Fibrous Homogeneous	<1% Cellulose	100% Non-fibrous (other)	None Detected
3-10-EF-18 241500897-0018	Brittle tan glue daubs	Brown Non-Fibrous Homogeneous	<1% Cellulose	100% Non-fibrous (other)	None Detected

Analyst(s)
Kristin Lopez (12)
Lauren Brennan (6)


Gloria V. Oriol, Laboratory Manager
or other approved signatory

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Samples analyzed by EMSL Analytical, Inc. Wallingford, CT NVLAP Lab Code 2C0700-0.

Initial report from 03/11/2015 15:06:54

CERTIFICATE OF ACHIEVEMENT

This certifies that

Erik Foley

has successfully completed the
Asbestos Site Inspector Initial Training
Asbestos Accreditation Under TSCA Title II
40 CFR Part 763

conducted by

Cardno LLC
73 William Frank Drive
West Springfield, MA 01089
(413) 781-0070

Gregory J. Morach

Principal Inspector

June 2nd, 2014

Date of Course

June 4, 2015

Expiration Date

Gregory J. Morach

Regional Manager:

SI-1738

Certificate Number

June 4, 2014

Expiration Date

STATE OF CONNECTICUT

DEPARTMENT OF PUBLIC HEALTH

PURSUANT TO THE PROVISIONS OF THE GENERAL STATUTES OF CONNECTICUT

THE INDIVIDUAL NAMED BELOW IS CERTIFIED
BY THIS DEPARTMENT AS A

ASBESTOS CONSULTANT-INSPECTOR

ERIK J FOLEY

CERTIFICATE NO.

000883

CURRENT THROUGH

12/31/15

VALIDATION NO.

03-148785

[Signature]
CONSULTANT

[Signature]
CERTIFICATION

State of Connecticut, Department of Public Health

Approved Environmental Laboratory

THIS IS TO CERTIFY THAT THE LABORATORY DESCRIBED BELOW HAS BEEN APPROVED BY THE STATE DEPARTMENT OF PUBLIC HEALTH PURSUANT TO APPLICABLE PROVISIONS OF THE PUBLIC HEALTH CODE AND GENERAL STATUTES OF CONNECTICUT, FOR MAKING THE EXAMINATIONS, DETERMINATIONS OR TESTS SPECIFIED BELOW WHICH HAVE BEEN AUTHORIZED IN WRITING BY THAT DEPARTMENT.

EMSL ANALYTICAL, INC. - MANHATTAN, NY

LOCATED AT 307 West 38th Street IN New York, NY 10018
AND REGISTERED IN THE NAME OF Peter Frasca, Ph.D.

THIS CERTIFICATE IS ISSUED IN THE NAME OF James Hall WHO HAS BEEN DESIGNATED
BY THE REGISTERED OWNER/AUTHORIZED AGENT TO BE IN CHARGE OF THE LABORATORY WORK COVERED BY THIS CERTIFICATE OF
APPROVAL AS FOLLOWS:

ASEESTOS

Environmental Health & Housing

Examination For:

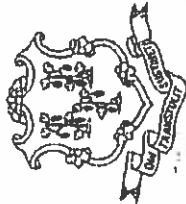
Examination For:

Bulk - Identification (PLM, TEM)
Air - Fiber Counting (PCM, TEM)
Water - TEM

Lead in Paint
Lead Paint in Soil
Lead in Dust Wipes

SEE COMPUTER PRINT-OUT FOR SPECIFIC TESTS APPROVED

THIS CERTIFICATE EXPIRES September 30, 2016 AND IS REVOCABLE FOR CAUSE BY THE STATE DEPARTMENT OF PUBLIC HEALTH
DATED AT HARTFORD, CONNECTICUT, THIS 3rd DAY OF September 2014



Registration No.

PH-0170

SUZANNE BLANCAFLOR, MS
CHIEF, ENVIRONMENTAL HEALTH SECTION

1 PART 1 – GENERAL

1.1 SECTION INCLUDES

- A. Pourable gypsum deck system for existing roof deck repairs
- B. Testing of gypsum concrete grout

1.2 RELATED SECTIONS

- A. Section 01019 – Contract Considerations
- B. Section 06100 – Rough Carpentry
- C. Section 07212 – Roof Insulation Board
- D. Section 07565 – Roofing Removals and Preparation

1.3 REFERENCES

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

- 1. American Society for Testing and Material (ASTM) Publications:

- C 332-17 Lightweight Aggregates for Insulating Concrete
- C 513-11 Obtaining and Testing Specimens of Hardened Lightweight Insulating Concrete for Compressive Strength

- 1.4 QUALIFICATIONS OF APPLICATOR: Perform work by or under the supervision of personnel specializing in deck application and having not less than two (2) years experience.

1.5 SUBMITTALS

- A. Shop Drawings: Include sections, details and plans showing joints and roof penetrations.

- B. Manufacturer's Data:

- 1. Compressive strength.
- 2. Oven dry density.
- 3. Coefficient of heat transmission.

- C. Certificates of Conformance:

- 1. Aggregates.
- 2. Admixtures.
- 3. Cement.

4. Gypsum material.
 5. Mix design and reinforcement.
- D. **Manufacturer's Installation Procedures:** Include manufacturer's written recommendation for installation of panels.
- E. **Certified Test Reports:** Submit certified test reports on laboratory testing of bonding gypsum concrete samples taken at time of placement.
- 1.6 **DELIVERY AND STORAGE:** Deliver all materials to the building site in original unopened, undamaged packages or containers, or approved bulk handling equipment, with manufacturer's brand name and contents clearly identified. Protect materials against dampness during shipment and after delivery. Store materials under cover and off the ground, in well-ventilated areas, not exposed to extreme changes of temperature and humidity, and in a manner to prevent deterioration or intrusion of foreign substances. Keep materials dry until ready for use. Protect metal components from rusting.
- 1.7 **ENVIRONMENTAL CONDITIONS**
- A. **Normal Conditions:** When ambient air temperatures of 40 degrees F or above are predicted for the initial twenty-four (24) to seventy-two (72) hours after placement of insulating concrete, the use of hot water and other cold weather protection measures are not required.
- B. **Cold Weather Conditions:** When ambient air temperature at time of placing insulating concrete is between 40 and 32 degrees F, use hot water. Water shall be in temperature range of 90 to 120 degrees F at the time of placement. When ambient air temperatures of 32 degrees F or below are predicted for the initial twenty-four (24) to seventy-two (72) hours after placement of insulating concrete, additional protection measures, such as temporary heat or other methods, as recommended by the aggregate manufacturer shall be used.
- 1.8 **SAFETY AND HEALTH REQUIREMENTS:** Comply with manufacturer's protective measures in the safe installation and use of the boards.

2 PART 2 – PRODUCTS

2.1 GYPSUM REPAIR MATERIAL

- A. Pourable gypsum deck repair material to match the profile and strength of the existing deck. This material will include reinforcement to match existing, tying the reinforcement into existing reinforcement for a contiguous slab finish. If the form is not in good condition, a form board to match existing shall be used over which the reinforced gypsum roof repair shall be installed.

- 2.2 AGGREGATE: ASTM C 332, Group I.
- 2.3 WATER: Water shall be clean and free from injurious amounts of acids, alkali, organic matter or other deleterious substances.
- 2.4 GROUT: Premixed gypsum concrete such as **Tectum grout, Pyrofill, Structolite or MetroMix** or as recommended by the roof deck manufacturer.

3 PART 3 – EXECUTION

3.1 EXAMINATION

- A. Verify existing site conditions under provisions of the general conditions of this contract.
- B. Verify that existing roof surface is clear and ready for work of this Section.
- C. Do not remove sections of existing roofing membrane that is ponded or on which water is present, as this water may infiltrate into the roof, requiring remedial treatment that will affect the roofing procedures and schedule.

3.2 PREPARATION

- A. Sweep roof surface clean of loose matter. Remove loose refuse and dispose off site.
- B. Control dust, noise and debris to the satisfaction of the Owner.
- C. Remove all ponded and standing water areas adjacent to roof project areas before commencing roof removal operations.

3.3 GYPSUM DECK MATERIAL REMOVAL AND REPLACEMENT

- A. Deck Examination
 - 1. Evaluate existing gypsum roof deck surfaces and remove deteriorated existing gypsum deck surfaces in accordance with the following criteria:
 - a. Upon removal of existing roof membranes and slip sheets (if any), the existing gypsum roof deck should be firm and dry. If this is the case, roofing operations can proceed as specified elsewhere in the construction documents.
 - b. If the gypsum roof deck is saturated, viscous, pliable, wet to the touch or in any way exhibiting distress, the contractor shall cordon off the wet or distressed area, permitting the roof deck to dry, either under

GYPSUM ROOF DECK SYSTEMS

ambient conditions or using dryers prescribed by reputable gypsum roofing system manufacturers.

- 1) The drying process may require tenting over the area or other appropriate protective measures to enhance the drying process. This procedure may require water damming around the drying areas to prohibit storm water from infiltrating the area, which will be installed and monitored as required by the Contractor to expedite the drying process.
- 2) If the existing gypsum material dries to a firm, dry finish without spalling, fracturing or delamination, to a depth of one-half ($\frac{1}{2}$) of the deck thickness measured from above, the deck is suitable for re-roofing, which should proceed with caution as the core material cures.
- 3) If the existing gypsum roof deck materials spalls, delaminates or fractures in large pieces, the structural integrity of the area is compromised, and the wet and delaminated section must be removed and replaced with pourable gypsum material as specified.

B. Deck Removal

1. Should the examination procedures determine that the area is no longer structurally viable, the Contractor shall remove the deteriorated sections in accordance with the following procedure:
 - a. Sawcut and remove the deteriorated sections completely between the parallel supporting bulb tees or subpurlins. Sawcutting will be done with a radial saw with a steel cutting blade to mitigate damage to the adjacent sound and reinforced gypsum roof deck surfaces.
 - b. Protect the ceiling, floor and furniture surfaces below the removed roof section, replacing damaged interior finishes and equipment as required to restore the space to its original condition.
2. Remove all loose and bulky gypsum material from the bulb tees, providing a suitable bearing surface for the pourable gypsum material.
3. Touch up rusted areas of the subpurlins, bulb tees or metal joist in contact with the new gypsum material with red oxide primer after wire brushing loose scale and rust from the rusted accessory scheduled to remain.

C. Deck Replacement

1. Form Board Surface Preparation: Clean surfaces to receive gypsum of dirt, debris and other foreign materials that would affect bonding. The form board shall be free of standing water, snow and ice.

GYPSUM ROOF DECK SYSTEMS

- a. Application of New Form Boards and Gypsum Deck: Apply form boards, gypsum slurry and related materials in accordance with respective specifications and manufacturer's instructions, except as modified herein.
2. Confirm that tees and subpurlins have been accurately positioned within $1/16" \pm$ of the manufacturer's recommended spacing and are securely fastened.
3. Space form boards evenly between tees. Square cut ends shall fall over supporting purlin members and be driven tightly together.
4. Gypsum Mixing: Mix gypsum materials mechanically to produce a uniform distribution and to meet manufacturer's instructions and design requirements. Place fill the void around the bulb tee completely level with the top of the adjacent surfaces. Excess material shall be scraped off leaving a finished joint flush with the top surface of the roof deck.
5. Curing: Minimize traffic on the surface during the curing period.

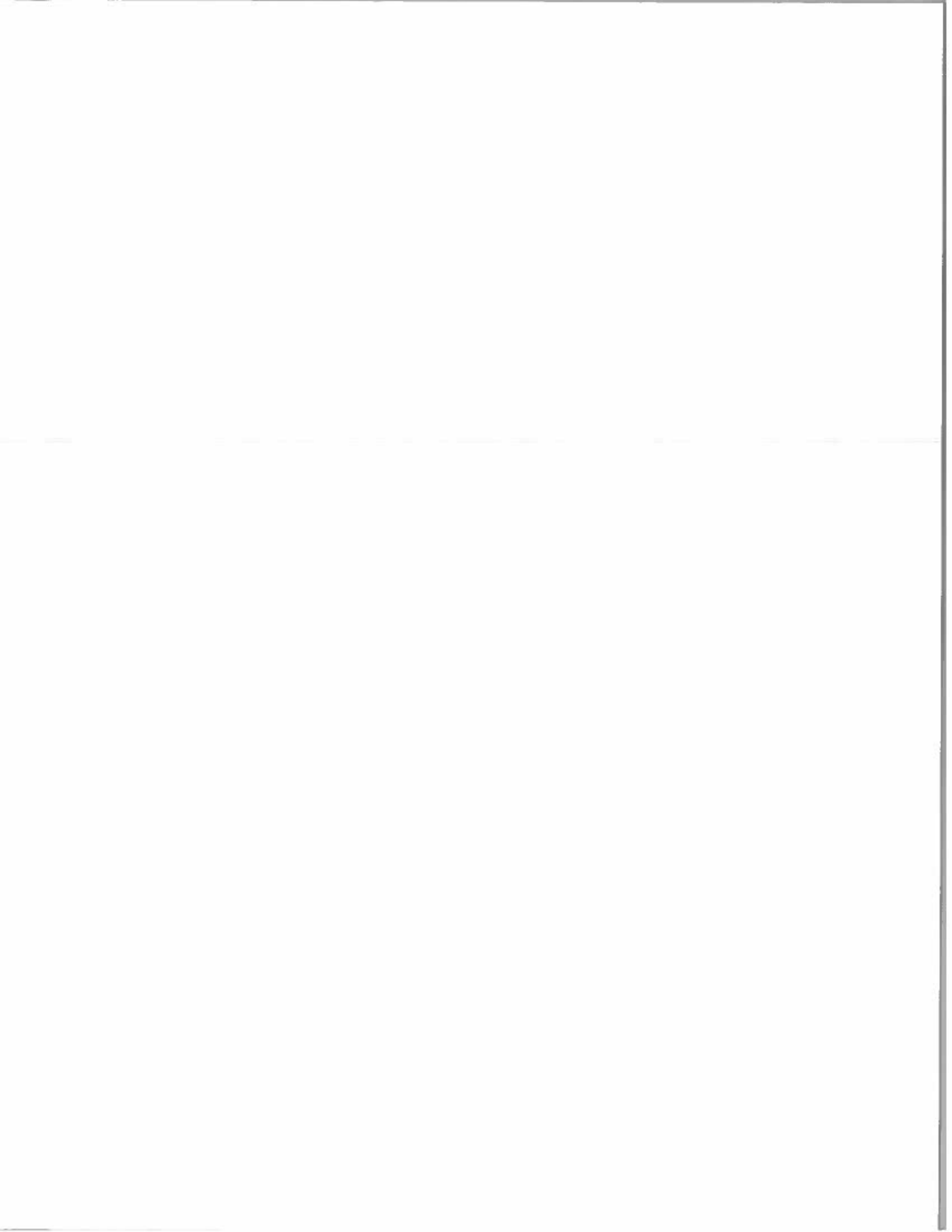
3.5 TEMPORARY PROTECTION

- A. Provide temporary protective sheeting over uncovered deck surfaces.
- B. Turn sheeting up and over parapets and curbing. Retain sheeting in position with weights.
- C. Provide for surface drainage from sheeting to existing drainage facilities.
- D. Do not permit traffic over unprotected or repaired deck surface.
- E. Provide temporary protective sheeting on furniture, equipment, flooring and other interior finishes in areas that will be subject to falling debris and underdeck materials. Professionally clean the interior spaces soiled by roofing removal and replacement operations before classes begin each day.

3.6 FIELD QUALITY CONTROL

- A. Inspection will identify the exact limits of material removal.

END OF SECTION



1 PART 1 – GENERAL

1.1 SECTION INCLUDES

- A. Mortar and grout for masonry

1.2 RELATED SECTIONS

- A. Section 04330 – Cavity Wall Masonry System
- B. Section 07600 – Flashing and Sheet Metal

1.3 REFERENCES

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

- 1. American Society for Testing and Materials (ASTM) Publications:

- C 5-10 Quicklime for Structural Purposes
- C 94-17 Ready-Mixed Concrete
- C 144-11 Aggregate for Masonry Mortar
- C 150-17 Portland Cement
- C 207-06 Hydrated Lime for Masonry Purposes
(R 2011)
- C 404-11 Aggregates for Masonry Grout
- C 476-16 Grout for Masonry

- 2. Brick Industry Association (BIA) Publications:

- MI-88 Portland Cement – Lime Mortar for Brick Masonry

1.4 SUBMITTALS

- A. Submit product data under provisions of Section 01300.
- B. Include design mix, required environmental conditions and admixture limitations.
- C. Submit test reports on mortar indicating conformance to BIA MI-88.
- D. Submit test reports on grout indicating conformance to ASTM C 476.

1.5 DELIVERY, STORAGE AND HANDLING

- A. Deliver to site, store and protect products under provisions of Section 01600.
- B. Maintain packaged materials clean, dry and protected against dampness, freezing and foreign matter.

1.6 ENVIRONMENTAL REQUIREMENTS

- A. Maintain materials and surrounding air temperatures to minimum 50 degrees F (10 degrees C) prior to, during and forty-eight (48) hours after completion of masonry work.

2 PART 2 – PRODUCTS

2.1 MATERIALS

- A. Portland Cement: ASTM C 150, Type I for mortar and Type II for grout, gray color.
- B. Sand for Grout: Clean, commercially pure silica sand which shall be a blend of equal parts of two (2) sizes; one hundred percent (100%) of one (1) size shall pass a standard No. 100 mesh laboratory sieve and one hundred percent (100%) of the other shall pass a standard No. 200 mesh laboratory sieve.
- C. Sand for Mortar: Clean, commercially pure silica sand which shall be a blend of equal parts of two (2) sizes; one hundred percent (100%) of one (1) of which shall pass a No. 30 sieve and one hundred percent (100%) of the other shall pass a No. 100 sieve.
- D. Grout and Mortar: Mixture of one (1) part of Portland cement to two (2) parts of sand thoroughly mixed to uniform composition before addition of liquids. Add acrylic liquid to the dry cement and sand mix at the rate of 1 gallon of acrylic liquid to 100 pounds of dry cement and sand mix. Add sufficient water to mortar as necessary for placement and compaction as specified. Add water to grout as required to produce a mixture of putty like consistency, and keep the mixture at that consistency during use.
- E. Acrylic Liquid: Acrylic mixing liquid for fill coat, MPI #10.
- F. Mortar Aggregate: ASTM C 144, standard masonry type.
- G. Hydrated Lime: ASTM C 207, Type S.
- H. Quicklime: ASTM C 5, non-hydraulic type.
- I. Grout Aggregate: ASTM C 404.
- J. Water: Clean and potable.

2.2 MORTAR COLOR

- A. Mortar Color: To be selected by the Architect and Owner, to match existing where required.

2.3 MORTAR MIXES

- A. Mortar Mixes: BIA MI-88, using the Property Method.

2.4 MORTAR MIXING

- A. Thoroughly mix mortar ingredients in quantities needed for immediate use in accordance with BIA MI-88.
- B. Add mortar color to match selected color and in accordance with manufacturer's instructions. Provide uniformity of mix and coloration.
- C. Do not use anti-freeze compounds to lower the freezing point of mortar.
- D. If water is lost by evaporation, re-temper only within two (2) hours of mixing.
- E. Use mortar within 2 hours after mixing at temperatures of 80 degrees F, or 2½ hours at temperatures under 50 degrees F.

2.5 GROUT MIXES

- A. Load Bearing Masonry: 3000 psi strength at twenty-eight (28) days; 7-8 inches slump; premixed type in accordance with ASTM C 94.

2.6 GROUT MIXING

- A. Mix concrete in accordance with ASTM C 94.
- B. Add admixtures in accordance with manufacturer's instructions. Provide uniformity of mix.
- C. Do not use anti-freeze compounds to lower the freezing point of grout.

3 PART 3 – EXECUTION

3.1 EXAMINATION

- A. Request inspection of spaces to be grouted.

3.2 INSTALLATION

- A. Install mortar and grout in accordance with manufacturer's instructions.
- B. Mortar joints are to match existing, in size and profile.
- C. Work grout into masonry cores and cavities to eliminate voids.
- D. Do not displace reinforcement while placing grout.
- E. Remove grout spaces of excess mortar.

3.3 SCHEDULES

- A. Exterior Walls: Type N for above grade.

END OF SECTION

I PART 1 – GENERAL

1.1 SECTION INCLUDES

- A. Brick units
- B. Reinforcement, anchorage and accessories

1.2 RELATED SECTIONS

- A. Section 04100 – Mortar
- B. Section 07531 – Elastomeric Sheet Roofing
- C. Section 07600 – Flashing and Sheet Metal
- D. Section 07900 – Sealants

1.3 REFERENCES

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

- 1. American Society for Testing and Materials (ASTM) Publications:

- C 216-17 Facing Brick (Solid Masonry Units Made From Clay or Shale)

1.4 SUBMITTALS

- A. Submit product data and samples under provisions of Section 01300.
- B. Submit product data for brick and fabricated wire reinforcement.
- C. Cleaning Plan: Written description of cleaning process, including materials, methods, equipment and sequencing of work.
- D. Submit four (4) samples of each color of face brick units to illustrate color, texture and extremes of color range.

1.5 QUALIFICATIONS

- A. Installer: Company specializing in performing the work of this Section with minimum five (5) years documented experience.

1.6 MOCK-UP

- A. Provide mock-up of brick wall to demonstrate patterning, finish, color contrast and texture. Include all jamb, sill and head conditions, control joints and caulking.

CAVITY WALL MASONRY SYSTEM

- B. Erect face brick to 3 x 4 feet panel size, include specified mortar, all types of block, masonry reinforcing and accessories.
- C. When accepted, mock-up will demonstrate minimum standard for the Work. Mock-up may not remain as part of the Work, but is to remain up until completion of project or until Architect directs its removal.

1.7 DELIVERY, STORAGE AND HANDLING

- A. Deliver to site, store and protect products under provisions of Section 01600.

1.8 ENVIRONMENTAL REQUIREMENTS

- A. Maintain materials and surrounding air temperature to minimum 50 degrees F (10 degrees C) prior to, during and 48 hours after completion of masonry work.

2 PART 2 – PRODUCTS

2.1 MANUFACTURERS – BRICK UNITS

- A. Mack Brick Company, Enfield, CT (860.627.6625)
- B. Watson Brick, Watson, PA (800.538.2040)
- C. The Belden Brick Company, Canton, OH (330.456.0031)
- D. Substitutions: Under provisions of Section 01600.

2.2 BRICK UNITS

- A. Face Brick (Red Blended Veneer): ANSI/ASTM C 216, Type FBX, Grade SW, extruded and wire cut. Color: In two (2) colors in range as selected by Architect and Owner to match existing.
- B. Units that are to be cut or exposed to view must be solid units.

2.3 MANUFACTURERS – REINFORCEMENT AND ANCHORAGE

- A. Dur-O-Wal, Inc., Aurora, IL (877.851.8400)
- B. AA Wire Products Company, Chicago, IL (312.586.6700)
- C. Heckman Building Products, Inc., Chicago, IL (800.621.4140)
- D. Hohmann & Barnard, Inc., Hauppauge, NY (800.645.0616)
- E. Substitutions: Under provisions of Section 01600.

2.4 REINFORCEMENT AND ANCHORAGE

- A. Formed Steel Wire Wall Ties: 3/16-inch diameter thick, galvanized steel finish.

- B. Adjustable Veneer Anchor: ½-inch to 3-inch plate and 3/16-inch diameter wire; adjustable hooks, up to 3-5/8 inches; clips to hold wire reinforcement; hot dip galvanized steel.

2.5 FLASHINGS – MANUFACTURERS

- A. Advanced Building Products, Springvale, ME (207.490.2306)
- B. Polytite Manufacturing Corp, Cambridge, MA (800.776.0930)
- C. Sandell Manufacturing Company, Schenectady, NY (800.283.3888)
- D. Substitutions: Under provisions of Section 01600.

2.6 FLASHINGS

- A. Thru-Wall Copper/Kraft Paper Flashings: 3 oz./sq. ft. sheet copper bonded to fiber reinforced asphalt treated Kraft paper.

2.7 ACCESSORIES

- A. Preformed Control Joints: Rubber material. Provide with corner and tee accessories, cement fused joints.
- B. Joint Filler: Closed cell polyvinylchloride; oversized fifty percent (50%) to joint width; self-expanding; ¼-inch-wide by maximum lengths.
- C. Building Paper: #15 asphalt saturated felt.
- D. Cellular Plastic Weep Vents: One-piece, flexible extrusion made from UV-resistant polypropylene copolymer, full height and width of head joint and depth 1/8-inch less than depth of outer wythe, in color selected from manufacturer's full range.
 - 1. Manufacturers:
 - a. Advanced Building Products Inc.; **Mortar Maze weep vent**
 - b. Heckmann Building Products Inc.; **No. 85 Cell Vent**
 - c. Hohmann & Barnard, Inc.; **Quadro-Vent**
 - d. Substitutions: Under provisions of Section 01600.
- E. Cleaning Solutions: Non-acidic, not harmful to masonry work or adjacent materials.

3 PART 3 – EXECUTION

3.1 EXAMINATION

- A. Verify that field conditions are acceptable and are ready to receive work.

- B. Verify items provided by other Sections of work are properly sized and located.
- C. Verify that built-in items are in proper location, and ready for roughing into masonry work.
- D. Beginning of installation means installer accepts existing conditions.

3.2 PREPARATION

- A. Provide temporary bracing during installation of masonry work. Maintain in place until entire structure provides permanent bracing.

3.3 COURSING

- A. Establish lines, levels and coursing indicated. Protect from displacement.
- B. Maintain masonry courses to uniform dimension. Form vertical and horizontal joints of uniform thickness.
- C. Lay brick units in bond to match existing. Course three (3) brick units and three (3) mortar joints to equal 8 inches.

3.4 PLACING AND BONDING

- A. Lay solid masonry units in full bed of mortar, with full head joints, uniformly jointed with other work.
- B. Buttering corners of joints or excessive furrowing of mortar joints are not permitted.
- C. Remove excess mortar as Work progresses.
- D. Interlock external corners.
- E. Do not shift or tap masonry units after mortar has achieved initial set. Where adjustment must be made, remove mortar and replace.
- F. Perform jobsite cutting of masonry units with proper tools to provide straight, clean, unchipped edges. Prevent broken masonry unit corners or edges.

3.5 REINFORCEMENT AND ANCHORAGES – REINFORCED UNIT MASONRY

- A. Install horizontal joint reinforcement 8 inches o.c.
- B. Place joint reinforcement continuous in first and second joint below top of walls.
- C. Lap joint reinforcement ends minimum 6 inches.

3.6 WEEP VENTS

- A. Install weep vents in veneer at 24 inches on center horizontally above shelf angles and at bottom of walls.
- B. Do not permit mortar to drop or accumulate into cavity air space or to plug weep vents.

3.7 MASONRY FLASHINGS

- A. Extend flashings under veneer, turn up minimum 8 inches and seal to back-up. Continue vapor barrier to top of cavity wall, forming a continuous vapor tight barrier by overlapping joints by at least 12 inches, and sealing the joints with spray or taped adhesive.
- B. Lap end joints minimum 6 inches and seal watertight.
- C. Use flashing manufacturer's recommended adhesive and sealer.

3.8 CONTROL AND EXPANSION JOINTS

- A. Do not continue horizontal joint reinforcement through control and expansion joints.
- B. Install preformed control joint device in continuous lengths. Seal butt and corner joints in accordance with manufacturer's instructions.
- C. Size control joint in accordance with Section 07900 for sealant performance.

3.9 TOLERANCES

- A. Maximum Variation from Unit to Adjacent Unit: 1/32-inch.
- B. Maximum Variation from Plumb: ¼-inch over total height.
- C. Maximum Variation from Level Coursing: 1/8-inch in 3 feet, ¼-inch in 10 feet and ½-inch in 30 feet.
- D. Maximum Variation of Joint Thickness: 1/8-inch in 3 feet.
- E. Maximum Variation from Cross Sectional Thickness of Walls: ¼-inch.

3.10 CLEANING

- A. Remove excess mortar and mortar smears.
- B. Replace defective mortar. Match adjacent work.
- C. Clean soiled surfaces with cleaning solution.

CAVITY WALL MASONRY SYSTEM

D. Use non-metallic tools in cleaning operations.

3.11 PROTECTION OF FINISHED WORK

A. Without damaging completed work, provide protective boards at exposed external corners which may be damaged by construction activities.

END OF SECTION

1 PART 1 – GENERAL

1.1 SECTION INCLUDES

- A. Roof curbs and nailers
- B. Blocking in roof openings
- C. Preservative treatment of wood

1.2 RELATED SECTIONS

- A. Section 03500 – Gypsum Roof Deck Systems (Concrete Deck Repairs)
- B. Section 07212 – Roof Insulation Board
- C. Section 07531 – Elastomeric Sheet Roofing
- D. Section 07565 – Roofing Removals and Preparation
- E. Section 07600 – Flashing and Sheet Metal

1.3 REFERENCES

- A. Reference Standards: The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.
 - 1. American Society of Mechanical Engineers (ASME) Publications:
 - B18.2.1-12 Square, Hex, Heavy Hex, and Askew Head Bolts and Hex, Heavy Hex, Hex Flange, Lobed Head, and Lag Screws (Inch Series)
 - B18.6.1-81 Wood Screws (Inch Series)
 - 2. American Wood Preservers' Association (AWPA) Standards:
 - T1-17 Processing and Treatment Standard
 - M6-13 Brands Used on Preservative Treated Materials
 - 3. American Society for Testing and Materials (ASTM) Publications:
 - A 36-14 Carbon Structural Steel
 - A 307-14 Carbon Steel Bolts, Studs, and Threaded Rod 60,000 PSI Tensile Strength
 - F 1667-17 Driven Fasteners: Nails, Spikes, and Staples
 - 4. Commercial Item Description (CID) Publications:
 - A-A-1922A-95 Shield, Expansion (Caulking Anchors, Single Lead)

5. Military and Government Specs & Standards (Naval Publications & Form Center (NPFC) Publications:

MIL-L-19140-84 Shield, Expansion (Caulking Anchors, Single Lead)

1.4 SUBMITTALS

- A. Submit under provisions of Section 01300.
- B. Product Data: Provide technical data on wood preservative materials and application instructions.
- C. Certificates of Grade: Attesting that products meet the grade requirements specified in lieu of grade markings where appearance is important and grade marks will deface material.

1.5 DELIVERY AND STORAGE

- A. Deliver materials to the site in an undamaged condition. Carefully store materials off the ground to provide proper ventilation, drainage and protection against dampness. Remove defective and damaged materials and provide new materials.

1.6 GRADING AND MARKING

- A. Lumber: Mark each piece of board lumber or each bundle of small pieces of lumber with the grade mark of a recognized association or independent inspection agency. Such association or agency shall be certified by the Board of Review, American Lumber Standards Committee, to grade the species used.
- B. Preservative-Treated Lumber: The Contractor shall be responsible for the quality of treated wood products. Each treated piece shall be permanently marked or branded, by the producer, in accordance with AWPA M6. The Contractor shall provide the Owner with the inspection report of an independent inspection agency, approved by the Owner, that offered products comply with applicable AWPA Standards. The AWPB Quality Mark "LP-22" on each piece will be accepted, in lieu of inspection reports, as evidence of compliance with applicable AWPA treatment standards.
- C. Fire-Retardant Treated Lumber: Mark each piece in accordance with NPFC MIL-L-19140, except pieces that are to be natural or transparent finished. In addition, exterior fire-retardant lumber shall be distinguished by a permanent penetrating blue stain. Labels of a nationally recognized independent testing agency will be accepted as evidence of conformance to the fire-retardant requirements of NPFC MIL-L-19140.

1.7 SIZES AND SURFACING: Lumber shall be surfaced four (4) sides. Size references, unless otherwise specified, are nominal sizes, and actual sizes shall be within manufacturing tolerances allowed by the standard under which the product is produced.

1.8 MOISTURE CONTENT: Air-dry or kiln-dry lumber. Kiln-dry treated lumber after treatment. Maximum moisture content of wood products shall be as follows at the time of delivery to the job site:

- A. Lumber and Boards: Nineteen percent (19%) maximum.
- B. Materials other than lumber – Moisture content shall be in accordance with standard under which the product is produced.

1.9 PRESERVATIVE TREATMENT

A. Lumber shall be treated in accordance with T1. All wood shall be air or kiln dried after treatment. Specific treatments shall be verified by the report of an approved independent inspection agency, or the AWPB Quality Mark on each piece. Do not incise surfaces of lumber that will be exposed. Brush coat areas that are cut or drilled after treatment with either the same preservative used in the treatment or with a two percent (2%) copper naphthenate solution. The following items shall be preservative treated:

- 1. Nailers, edge strips, crickets and curbs for roof decks.
- 2. Wood blocking and sills that are less than 24 inches from the ground and/or set into or in contact with concrete or masonry.

1.10 QUALITY ASSURANCE

A. Perform Work in accordance with the following agencies:

- 1. Lumber Grading Agency: Certified by ALSC.

2 PART 2 – PRODUCTS

2.1 ROUGH LUMBER

A. Lumber: Preservative treated lumber such as blocking, studs and board lumber shall be one (1) of the species listed in the table below. Minimum grade of species shall be as listed. Finger-jointed lumber may be used in the same applications as solid lumber of an equivalent species and grade, provided the finger-jointed lumber meets all the requirements of the certification and the quality control programs of the rules writing agency having jurisdiction and all applicable requirements of PS 56.

Table of Grades for Framing and Board Lumber

<u>Grading Rules</u>	<u>Species</u>	<u>Framing/Board Lumber</u>
WWPA standard 1 grading rules No. 3 Common	Mountain Hemlock Douglas Fir-Larch Douglas Fir South	All Species: Standard Light Framing or No. 3 Structural Light Framing (Stud Grade for 2 x 4 size, 10 feet and shorter)
WCLIB standard grading rules	Douglas Fir-Larch Hem-Fir	All Species: Standard Light Standard

2.3 ROUGH HARDWARE: Unless otherwise indicated or specified, rough hardware shall be of the type and size necessary for the project requirements. Sizes, types and spacing of fastenings of manufactured building materials shall be as recommended by the product manufacturer unless otherwise indicated or specified. Rough hardware exposed to the weather or embedded in or in contact with preservative treated wood, exterior masonry or concrete slabs shall be zinc-coated.

- A. Bolts and Nuts: ASTM A 307.
- B. Expansion Anchors: CID A-A-1922A; except as shown otherwise, maximum size of devices in Groups IV, V, VI and VII shall be as indicated on the drawings.
- C. Adhesive Anchors: ASTM A 36; the adhesive capsules shall contain a vinylester resin as supplied in then Hilti HEA adhesive capsule.
- D. Lag Screws and Lag Bolts: ANSI B18.2.1.
- E. Wood Screws: ANSI B18.6.1.
- F. Wire Nails: ASTM F 1667.

3 PART 3 – EXECUTION

3.1 INSTALLATION

- A. Fit rough carpentry, set accurately to the required lines and levels and secure in place in a rigid manner. Provide as necessary for the proper completion of the work all framing members not indicated or specified. Spiking and nailing not indicated or specified otherwise shall be in accordance with the Nailing Schedule contained in UBC; perform bolting in an approved manner. Spikes, nails and bolts shall be drawn up tight.

- B. Construct curb members of single pieces.
- C. Curb roof openings except where prefabricated curbs exist. Form corners by alternating lapping side members.
- D. Anchors in Masonry: Except where indicated otherwise, embed anchor bolts not less than 15 inches in masonry unit walls and provide each with a nut and a 2-inch-diameter washer at bottom end. Fully grout bolts with mortar.
- E. Anchors in Concrete: Except where indicated otherwise, embed anchor bolts as indicated on the drawings in poured concrete walls and provide each with a nut and a 2-inch-diameter washer at bottom end. A bent end may be substituted for the nut and washer; bend shall be not less than 90 degrees.
- F. Miscellaneous
 - 1. Wood Roof Nailers, Edge Strips and Curbs: Provide sizes and configurations indicated or specified and anchored securely to continuous construction.
 - 2. Roof Edge Strips and Nailers: Provide at perimeter of roof, around openings through roof and where roofs abut walls, curbs and other vertical surfaces. Except where indicated otherwise, nailers shall be 6 inches wide and the same thickness as the insulation. Strips shall be grooved for edge venting; install at walls, curbs and other vertical surfaces with a ¼ to ½ inch air space. Where applicable, utilize existing anchor bolts that are firmly welded or attached to roof structural elements to anchor the base members before applying additional blocking. Provide additional galvanized nuts and washers as required to complement the existing anchor bolts. In the event that the perimeter wood blocking on the roof cannot be fastened to the structure utilizing existing anchor bolts or fasteners, the fastening schedule and details shall be completed in accordance with NRCA standards, which incorporates the Factory Mutual Loss Prevention Data Sheet 1-49 (1985) for perimeter flashing.
 - 3. Curbs: Provide wood curbs for scuttles and ventilators and wood nailers bolted to tops of masonry curbs and at expansion joints, as indicated.
 - 4. Wood Blocking: Provide proper sizes and shapes at proper locations for the installation and attachment of wood and other finish materials, fixtures, equipment and items indicated or specified.

3.2 SITE APPLIED WOOD TREATMENT

- A. Apply preservative treatment in accordance with manufacturer's instructions.
- B. Brush apply one (1) coat of preservative treatment on wood in contact with cementitious materials, roofing and related metal flashing. Treat site-sawn cuts.

- C. Allow preservative to dry prior to erecting members.

END OF SECTION

1 PART 1 – GENERAL

1.1 RELATED SECTIONS

- A. Section 03500 – Gypsum Roof Deck Systems (Concrete Deck Repairs)
- B. Section 06100 – Rough Carpentry
- C. Section 07531 – Elastomeric Sheet Roofing
- D. Section 07565 – Roofing Removals and Preparation
- E. Section 15410 – Plumbing Piping

1.2 REFERENCES

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

1. American Society for Testing and Materials (ASTM) Publications:

- C 1177-17 Glass Mat Gypsum Substrate for Use as Sheathing
- D 2178-15 Asphalt Glass Felt Used in Roofing and Waterproofing
- D 5643-06 Coal Tar Roof Cement, Asbestos Free
(R 2012)
- E 84-17 Surface Burning Characteristics of Building Materials

2. Underwriters' Laboratories, Inc. (UL) Publication:

- 1256-02 Standard for Fire Test of Roof Deck Constructions

1.3 QUALIFICATION OF INSTALLER: Certified by the manufacturer as qualified to install roof insulation systems.

1.4 SUBMITTALS

- A. Samples: One (1) not larger than 12 inches square of each type of proposed insulating material and two (2) each of nails and mechanical fasteners, when used to install insulation.
- B. Shop Drawings: Show complete description of the procedures for the installation of the roof insulation system indicating the type of materials, thicknesses, location of ridges and valleys, special methods for cutting and fitting of insulation and special precautions. Manufacturer's drawings based on field measurements may be submitted to supplement the information shown on the shop drawings. Provide calculations verifying the total "U" value of the insulation assembly.
- C. Certified Test Reports: Flame spread and smoke developed ratings for insulation in accordance with ASTM E 84 and/or UL 1256. Provide certifications that

materials or systems conform to listed UL and material/manufacturing standards as listed in this section per Section 1508 of the 2005 CSBC.

- D. **Manufacturer's Recommendations:** Two (2) current copies of insulation manufacturer's recommendations for the following:
1. Location and spacing of wood nailers.
 2. Minimum thickness and fastener pattern for insulation.
 3. Type of insulation material(s).

1.5 DELIVERY AND STORAGE

- A. **Delivery:** In compliance with Section 2603.2 of the 2005 Connecticut State Building Code (CSBC), deliver materials to the site in original sealed containers or packages bearing manufacturer's name and brand designation. Where materials are covered by a referenced specification, containers or packages shall bear specification number, type and class as applicable. Deliver materials in sufficient quantity to allow continuity of work.
- B. **Storage:** Store, handle and install materials in a manner to protect them from damage, exposure to open flame or other ignition sources and from wetting and moisture absorption during entire construction period. Store materials on pallets or platforms and cover with waterproof tarpaulins. For twenty-four (24) hours immediately before laying, store felt rolls on ends in an area maintained at a temperature above 49 degrees F. Bundle insulation board by manufacturer's identity codes. Replace damaged material with new material.

1.6 **ENVIRONMENTAL CONDITIONS:** Do not install roof insulation during inclement weather or when air temperature is below 40 degrees F or is expected to go below 40 degrees F, within twenty-four (24) hours after installation, or when there is ice, frost or dampness visible on the roof deck.

1.7 **PROTECTION OF PROPERTY:** Provide protection as specified herein and in the General Conditions of this project.

- A. **Protective Coverings:** Install protective coverings at paving and building walls adjacent to hoist prior to starting the work. Lap protective coverings at least 6 inches, secure against wind and vent to prevent collection of moisture on covered surfaces. Maintain protective coverings in place for duration of roofing work.
- B. **Special Protection:** Provide approved special protection or avoid heavy traffic on completed work when ambient temperature is above 80 degrees F.
- C. **Damaged Work and Materials:** Restore work and materials damaged to their original condition or replace with new materials.

1.8 QUALITY ASSURANCE

- A. The applicator shall be licensed by the roofing manufacturer and shall present evidence of certification in writing to the Owner before beginning the work.
- B. The foreman of the crew performing the work of this Section shall be a qualified roofing journeyman with at least five (5) years experience in placing insulation roofing systems.

2 PART 2 – PRODUCTS

2.1 MATERIALS: Shall conform to the respective specifications and standards and to requirements specified herein. All roof insulations shall be supplied by the roofing manufacturer.

- A. Roof Insulation: One (1) of or an assembly of not more than three (3), of the following materials. Provide starter, flat boards and filler blocks as required to provide the total thickness of insulation necessary to meet the specified thermal conductance. Mitered joints shall be factory fabricated and shall consist of two (2) diagonally cut boards. Identify each piece of tapered insulation board by color or other identity coding system which will allow identifying the different sizes of tapered insulation board required to complete the roof insulation system. The top layer of insulation shall be a flat sheet of cover board.
 - 1. Polyisocyanurate Board: ASTM C 1289, Type II, Class 1, Grade 3, glass fiber mat facer on both major surfaces.
 - a. Firestone Building Products, Indianapolis, IN (800.428.4442); **ISO 95+/Rhoflex**
 - b. Johns Manville, Denver, CO (800.654.3103); **E'NRG'Y 3**
 - c. Substitutions: Under provisions of Section 01600.
 - 2. Cover Board: ASTM C 1289, Type II, Class 4, Grade 2, polyisocyanurate board substrate with glass-fiber mat facer on both major surfaces:
 - a. Firestone Building Products; **ISOGARD HD**
 - b. Carlisle Syntec Incorporated
 - c. Substitutions: Under provisions of Section 01600.
- B. Tapered insulation board shall be:
 - 1. ¼ inch per foot tapered polyisocyanurate as indicated in the documents, manufactured by Firestone, Johns Manville or approved equal.
 - 2. ½ inch per foot tapered polyisocyanurate on counter slopes of polyisocyanurate to provide a minimum ¼ inch counter slope to valleys

indicated in the drawings for positive drainage to the roof drains as manufactured by Firestone, Johns Manville or approved equal.

- C. **Insulation Thickness:** The entire insulation assembly shall provide minimum thermal conductance ("C" value) as translated from the thermal ratings indicated in the construction documents for the average thickness of the rigid insulation system (including tapered insulation @ ¼ inch per foot slope), except the thickness at the low point shall be not less than 1½ inches.
- D. **Fire Safety Requirements:** Rigid insulation board shall have a flame spread rating not greater than 25 and a smoke developed rating not greater than 50, exclusive of facing, when tested in accordance with ASTM E 84. Insulation listed in the UL Building Materials Directory and bearing labels indicating compliance with the flame spread and smoke developed ratings specified will be accepted in lieu of copies of certified test reports. Compliance with flame spread and smoke developed ratings will not be required when the insulation has been tested as a part of a roof construction assembly of the type used for this project and the construction is listed as being Fire-Classified in the UL Building Materials Directory, or listed as Class I roof deck construction in the FM Approval Guide.
- E. **Preformed Cants and Tapered Edge Strips:** Of the same material as the roof insulation. If unavailable, provide standard machine cut fiberboard strips or wood to suit the details as recommended by the roofing manufacturer.
- F. **Asphalt Roof Cement:** ASTM D 5643, Type I.
- G. **Asphalt-Coated Glass Felt:** ASTM D 2178, Type IV.

3 PART 3 – EXECUTION

3.1 CONDITION OF SURFACES

- A. **Inspection of Surfaces:** Surfaces on which insulation is to be installed shall be clean, smooth and dry. Condition of surfaces shall be inspected and approved by the Owner immediately before installation is started.
- B. **Preparation of Surfaces:** Correct all deficiencies in roof deck surfaces prior to start of work.

3.2 INSTALLATION

- A. **Keep roof insulating materials dry before, during and after installation. Keep insulation ½ inch clear of vertical surfaces penetrating and projecting from the roof surface.**

B. Wood Nailers: Pressure preservative treated wood nailers for securing insulation or for nailing of roofing felts, are specified in Section 06100. Verify prior to the installation of insulation that nailers the same thickness as insulation have been provided at eaves, edges, curbs, walls and roof openings for securing gravel stops and flashing flanges.

C. Insulation

1. Insulation Installation: Lay insulation so that end joints of each course break with those of adjoining courses. When using multiple layers of insulation, joints of each succeeding layer shall be parallel and broken in both directions with respect to the layer below.
 - a. Insulation on Concrete Decks: After priming the concrete deck as directed by the manufacturer's recommendations, adhere the layer of insulation to the concrete deck as specified using the adhesive as recommended by the manufacturer and as recommended in FM Loss Prevention Data Sheets. When multiple layers of insulation are used, adhere in the second layer and all succeeding layers as specified herein for adhering layers of insulation in place.
 - b. Insulation over Top Surface of Polyisocyanurate Board: Install cover board or expanded perlite board over the top surface of the polyisocyanurate board. Adhere the overlayment board as specified herein for adhering layers of insulation in place. Joints of the overlayment board shall be staggered at least 6 inches with respect to the polyisocyanurate board below.
 - c. Cant Strips: Where indicated, provide cant strips at intersections of the roof with walls, parapets and curbs extending above the roof. The face of cant strips shall have an incline of 45 degrees and the minimum dimensions shall be 4 inches by 4 inches. Cant strips shall bear on the wood nailers and fit flush against vertical surfaces. Where possible, nail cant strips to adjoining surfaces. Where cant strips are installed against non-nailable materials, install cant strips with adhesive or set in asphalt roof cement in accordance with manufacturer's recommendations.
 - d. Tapered Edge Strips: Where indicated, provide edge strips in the right-angle formed by the junction of the roof and wood nailing strips that extend above the level of the roof. Edge strips shall be tapered from top of wood nailing strips to approximately 1/8 inch at a slope of one to 1½ inches per foot. Install edge strips flush against vertical surfaces of wood nailing strips. Where possible, nail edge strips to adjoining surfaces. Where installed against non-nailable materials, install edge strips with adhesive or set in asphalt roof cement in accordance with manufacturer's recommendations.

3.3 PROTECTION OF APPLIED INSULATION

- A. Completely cover each day's installation of insulation with roofing as specified in Section 07531. Apply glaze coat at the rate of 10 pounds per 100 square feet of area. Protect open ends of each day's work with temporary water cut-offs; remove cut-offs when work is resumed. Protect open spaces between insulation and parapets or other walls and spaces at curbs and expansion joints, until permanent roofing and flashing is applied. Storing, walking, wheeling or trucking will not be permitted directly on insulation or on roofed surfaces. Board or plank walkways, runways and platforms shall be provided and located near supports, as necessary, to distribute weight to conform to indicated live load limits of roof construction.

END OF SECTION

1 PART 1 – GENERAL

1.1 SECTION INCLUDES

- A. Fireproof firestopping and firesafing materials and accessories

1.2 RELATED SECTIONS

- A. Section 15410 – Plumbing Piping
- B. Section 16120 – Low-Voltage Electrical Power Conductors and Cables

1.3 REFERENCES

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

- 1. American Society for Testing and Materials (ASTM) Publications:

- C 665-17 Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing
- E 84-17 Surface Burning Characteristics of Building Materials
- E 119-16 Fire Tests of Building Construction and Materials
- E 814-13 Fire Tests of Through-Penetration Fire Stops
(R 2017)

1.4 PERFORMANCE REQUIREMENTS

- A. Fireproofing Materials: ASTM E 119 and ASTM E 814 to achieve a fire rating as noted on Drawings.
- B. Surface Burning: ASTM E 84 with a flame spread/fuel contributed/smoke developed rating of 5/0/0.

1.5 SUBMITTALS

- A. Submit under provisions of Section 01300.
- B. Product Data: Provide data on product characteristics, performance and limitation criteria.
- C. Manufacturer's Installation Instructions: Indicate preparation and installation instructions.
- D. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

1.6 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing the products specified in this Section with minimum three (3) years documented experience.
- B. Applicator: Company specializing in performing the work of this Section with minimum five (5) years documented experience.

1.7 REGULATORY REQUIREMENTS

- A. Conform to applicable State Building code for fire resistance ratings and surface burning characteristics.
- B. UL Classifications for these systems shall be (all two (2) hours or more):

Duct Penetrations: W-L-7001
Pipe Penetrations: W-L-5044
Cable Penetrations: W-L-3034
Conduit Penetrations: W-L-1065

1.8 MOCK-UP

- A. Provide mock-up of applied firestopping material.
- B. Apply 1 lineal ft to a representative substrate surface.
- C. If accepted, mock-up will demonstrate minimum standard for the Work.

1.9 ENVIRONMENTAL REQUIREMENTS

- A. Do not apply materials when temperature of substrate material and ambient air is below 60 degrees F.
- B. Maintain this minimum temperature before, during and for three (3) days after installation of materials.
- C. Provide ventilation in areas to receive solvent cured materials.

1.10 SEQUENCING

- A. Sequence Work to permit firestopping materials to be installed after adjacent and surrounding work is complete.

2 PART 2 – PRODUCTS

2.1 MANUFACTURERS

- A. Thermal Ceramics, Augusta, GA (706.796.4200); **Firemaster Putty, Bulk and Blankets**
- B. Tremco Incorporated, Medina, OH (866.209.2404); **Fyre-shield and Cerablanket FS**
- C. United States Gypsum, Chicago, IL (800.874.4968); **Thermafiber Safing Insulation and FIRECODE compound**
- D. 3M Corporation; **FireDam Spray 200**
- E. Substitutions: Under provisions of Section 01600.

2.2 MATERIALS

- A. Firestopping Material: Single component silicone elastomeric compounds; conforming to the following:
 - 1. Elongation & Shrinkage: Five percent (5%).
 - 2. Tensile Strength: 300 psi.
 - 3. Density: 8 lb/cu ft.
 - 4. Surface Durability: 35 (Shore Hardness).
 - 5. Durability and Longevity: Permanent.
 - 6. Side Effects during Installation: Non-toxic.
 - 7. Long Term Side Effects: None.
- B. Primer: Type recommended by firestopping manufacturer for specific substrate surfaces.
- C. Firesafing Blankets: ASTM C 665; 4 psf nominal density firesafing insulation.
- D. Putty Pads: UL CLIV; acoustic, intumescent pad; 3.2mm thickness.
- E. Spray Firesafing: FireDam Spray 200, water-based, dries to form a elastomeric coating. Use as part of an assembly.

2.3 ACCESSORIES

- A. Dam Material: Mineral fiber matting, permanent.
- B. Retainers: Stainless clips to support mineral fiber matting.

2.4 FINISHES

- A. Color: Dark gray or manufacturer's standard color.

3 PART 3 – EXECUTION

3.1 EXAMINATION

- A. Verify that openings are ready to receive the Work of this Section.

3.2 PREPARATION

- A. Clean substrate surfaces of dirt, dust, grease, oil, loose material or other matter which may affect bond of firestopping material.
- B. Remove incompatible materials which affect bond.
- C. Install backing materials to arrest liquid material leakage.

3.3 APPLICATION

- A. Apply firestopping material to all wall and floor penetrations through rated assemblies. These penetrations include electrical conduit and raceways, plumbing and heating system penetrations, ducts and other system chases.
- B. Apply primer and materials in accordance with manufacturer's instructions.
- C. Apply firestopping material in sufficient thickness to achieve rating to a density of fifty percent (50%) to uniform density and texture.
- D. Install material at walls or partition openings which contain penetrating sleeves, piping, ductwork, conduit and other items requiring firestopping.
- E. Remove dam material after firestopping material has cured.

3.4 CLEANING

- A. Clean Work under provisions of Section 01700.
- B. Clean adjacent surfaces of firestopping materials.

3.5 PROTECTION OF FINISHED WORK

- A. Protect adjacent surfaces from damage by material installation.

3.6 RATING SCHEDULES

- A. See Construction Documents for rating information and construction details and conditions.
- B. Firesafe all penetrations through new and existing masonry and gypsum board construction in the project work areas, equal to the one (1) or two (2) hour rating of the appropriate spaces.

END OF SECTION

1 PART 1 – GENERAL

1.1 SECTION INCLUDES

- A. Single-ply membrane roofing and related flashings

1.2 RELATED SECTIONS

- A. Section 04100 – Mortar
- B. Section 04330 – Cavity Wall Masonry System
- C. Section 06100 – Rough Carpentry
- D. Section 07212 – Roof Insulation Board
- E. Section 07565 – Roofing Removals and Preparation
- F. Section 07600 – Flashing and Sheet Metal
- G. Section 07900 – Sealants
- H. Section 15410 – Plumbing Piping

1.3 REFERENCES

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

- 1. American Society for Testing and Materials (ASTM) Publications:

- C 864-05 Dense Elastomeric Compression Seal Gaskets, Setting Blocks, and Spacers (R 2015)
- D 412-16 Vulcanized Rubber and Thermoplastic Elastomers – Tension
- D 624-00 Tear Strength of Conventional Vulcanized Rubber and Thermoplastic Elastomers (R 2012)
- D 746-14 Brittleness Temperature of Plastics and Elastomers by Impact
- D 2628-91 Preformed Polychloroprene Elastomeric Joint Seals for Concrete Pavements (R 2016)
- D 4637-15 EPDM Sheet Used In Single-Ply Roof Membrane

1.4 SYSTEM DESCRIPTION

- A. Elastomeric Sheet Membrane Conventional Roofing System: One (1) ply membrane system and adhesive applied membrane.

1.5 SUBMITTALS

- A. Submit under provisions of Section 01300.
- B. Shop Drawings: Indicate setting plan for insulation, joint or termination detail conditions and conditions of interface with other materials.

- C. Product Data: Provide characteristics on membrane and flashing materials.
- D. Samples: Submit two (2) 4 x 4 inch in size illustrating membrane and accessories.
- E. Manufacturer's Installation Instructions: Indicate special precautions required for seaming the membrane.

1.6 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing the products specified in this section with five (5) years' experience.
- B. Applicator: Company specializing in performing the work of this section with three (3) years documented experience and approved by system manufacturer.
- C. Work of this section to conform to NRCA Roofing and Waterproofing Manual and the manufacturer's instructions.

1.7 REGULATORY REQUIREMENTS

- A. Conform to the Connecticut State Building and Fire Safety codes for roof assembly fire hazard requirements.
- B. Underwriters Laboratories, Inc. (UL): Class C Fire Hazard Classification.
- C. Roofing System Design: Tested by a qualified testing agency to resist the uplift requirements as indicated on the Drawings.

1.8 DELIVERY, STORAGE AND HANDLING

- A. Deliver products in manufacturer's original containers, dry, undamaged, seals and labels intact.
- B. Store products in weather protected environment, clear of ground and moisture.

1.9 ENVIRONMENTAL REQUIREMENTS

- A. Do not apply roofing membrane during inclement weather, ambient temperatures below 40 degrees F degrees or above 95 degrees F.
- B. Do not apply roofing membrane to damp or frozen deck surface.
- C. Do not expose materials vulnerable to water or sun damage in quantities greater than can be weatherproofed during same day.

1.10 COORDINATION

- A. Coordinate the work with the installation of associated metal flashings, as the work of this section proceeds.

1.11 WARRANTY

- A. Upon completion of the work, provide the manufacturers' non-prorated, no-dollar-limit thirty (30) year, minimum, system warranty for materials, labor and workmanship (membrane, insulation and metal flashings) insuring a weather and watertight roofing system. This warranty will not contain a pre-determined dollar limitation.

2 PART 2 – PRODUCTS

2.1 MANUFACTURERS – MEMBRANE MATERIAL

- A. Basis of Design:
 - 1. Firestone Building Products, Indianapolis, IN (800.428.4442);
RubberGard EcoWhite Platinum EPDM
- B. Substitutions: Under provisions of Section 01600.

2.2 MEMBRANE AND ASSOCIATED MATERIALS

- A. Membrane: FM Approved, Type 1, Class A EPDM; non-reinforced 90 mil thick; white-on-black color; conforming to the following criteria:

<u>Properties:</u>	<u>Test:</u>	<u>Results:</u>
Tensile Strength:	ASTM D 412	1305 Min.
Elongation:	ASTM D 412	300% Min.
Tear Resistance:	ASTM D 624	150 lbf/in
Brittleness Point:	ASTM D 746	-49 F Max.
UV Weather Resistance:	ASTM D 4637	Pass (1000 hours)

- B. Seaming Materials: **EcoWhite QuickSeam** (or other manufacturer's equivalent), with primer and cleaning agents as recommended by membrane manufacturer.
- C. Washer Disc: Membrane material with adhesive backing.

2.3 ADHESIVE MATERIALS

- A. Surface Conditioner: Solvent type, compatible with membrane.

ELASTOMERIC SHEET ROOFING

- B. Supplemental Membrane Adhesives: As recommended by membrane manufacturer to supplement seaming tape specified.
- C. Thinner and Cleaner: As recommended by adhesive manufacturer, compatible with sheet membrane.

2.4 FLASHINGS

- A. Flexible Flashings: **EcoWhite QuickSeam Flashings** or flashings of same material as membrane; white color. See Section 07600 for metal flashing.

2.5 ACCESSORIES

- A. Sealants: As recommended by membrane manufacturer.
- B. Vent Stack Boots: Provide manufacturer's standard rubber boots and flashing collars appropriate for purpose intended.
- C. Other Counter Flashings: As specified in Section 07600.
- D. Walkway Pads: Selected system's walkway pads, cut in sizes recommended per manufacturer and as indicated in the documents, in contrasting color selected by Architect. EPDM material laid as a continuous strip material is not acceptable.
- E. Roof Expansion Joint: ASTM C 864, Silicone extrusion or black, non-reinforced, form-supported, closed cell neoprene extrusions, with a bifurcated waterproof attachment to metal flanges. Compression seals shall conform to ASTM D 2628, black. Flange metal shall be 26-gauge galvanized steel and shall extend over the top of curbs with a minimum of 2-inch flange metal.
 - 1. Approved Manufacturers:
 - a. GAF Materials Corporation, Hampstead, NH (877.270.7663)
 - b. Johns Manville
 - c. Substitutions: Under provisions of Section 01600.
- F. Rubber Pipe Support Curbs: Provide manufacturer's standard low-profile rubber pipe support curbs, **EcoCurb REC 9S** manufactured by Advanced Support Products, Tomball, TX (800.941.5737) or approved equal.

3 PART 3 – EXECUTION

3.1 EXAMINATION

- A. Verify that surfaces and site conditions are ready to receive work.

- B. Verify deck is supported and secure.
- C. Verify deck is clean and smooth, free of depressions, waves or projections, properly sloped to drains.
- D. Verify deck surfaces are dry and free of snow or ice. Confirm dry deck by moisture meter with twelve percent (12%) moisture maximum.
- E. Verify proper placement of roof openings, pipes, curbs, sleeves, ducts, vents and other penetrations.

3.2 MEMBRANE APPLICATION

- A. Apply membrane in accordance with manufacturer's instructions.
- B. Roll out membrane, free from air pockets, wrinkles or tears. Lay material in accordance with manufacturer's recommendations. Apply bonding adhesive with roller to provide an even and uniform film thickness. Firmly press sheet into place without stretching.
- C. Bond sheet to substrate.
- D. Overlap edges and ends and seal by **EcoWhite QuickSeam** or **EcoWhite Splice Tape**, as recommended by manufacturer. Seal permanently waterproof. Apply uniform bead of sealant to joint edge.
- E. Shingle joints on sloped substrate in direction of drainage.
- F. Extend membrane up cant strips and minimum of 6 inches and as indicated in the construction documents onto vertical surfaces.
- G. Seal membrane around roof penetrations.

3.3 FLASHINGS AND ACCESSORIES

- A. Apply flexible flashings to seal membrane to vertical elements.
- B. Provide lap edge sealant at wall termination in accordance with NRCA Detail "EPDM Single Ply 1989-E".
- C. Install walkway pads as recommended by manufacturer and place as indicated in the construction documents.

3.4 FIELD QUALITY CONTROL

- A. Correct identified defects or irregularities.

ELASTOMERIC SHEET ROOFING

- B. Require site attendance of roofing materials manufacturers once during installation of the Work.

3.5 CLEANING

- A. In areas where finished surfaces are soiled by Work of this section, consult manufacturer of surfaces for cleaning advice and conform to their instructions.
- B. Repair or replace defaced or disfigured finishes caused by Work of this section.

3.6 PROTECTION

- A. Protect building surfaces against damage from roofing work.
- B. Where traffic must continue over finished roof membrane, protect surfaces.

END OF SECTION

1 PART 1 – GENERAL

1.1 SECTION INCLUDES

- A. Removal of existing roofing in preparation for a new partial roof system where indicated in Drawings. This will include the removal of existing membrane roofing, insulation, caps and flashings, blocking, disposal of removed materials, protection of areas over which work traffic will move, work called for in the Drawings and other work necessitated by their operations.

1.2 RELATED SECTIONS

- A. Section 06100 – Rough Carpentry
- B. Section 07212 – Roof Insulation Board
- C. Section 07531 – Elastomeric Sheet Roofing
- D. Section 07600 – Flashing and Sheet Metal
- E. Section 07900 – Sealants

1.3 QUALIFICATIONS

- A. Materials Removal Firm: Company specializing in performing the work of this Section with minimum ten (10) years documented experience. The foreman of the crew performing roofing removals shall be a qualified roofing or waterproofing journeyman with at least five (5) years experience in roofing removals.

1.4 ENVIRONMENTAL REQUIREMENTS

- A. Do not remove existing roofing system when weather conditions threaten the integrity of the building contents or intended continued occupancy.
- B. Maintain continuous temporary protection during and prior to installation of new roofing system.
- C. Coordinate the Work so that removal of the existing roofing system and the installation of the new roofing system proceed in an orderly and timely manner.

1.5 SCHEDULING

- A. Schedule work under the provisions of Section 01300.
- B. Schedule work to coincide with commencement of installation of new roofing system.
- C. Remove only existing roofing materials that can be replaced with new materials the same day and as the weather will permit.

1.6 COORDINATION

- A. Coordinate work with other affected mechanical and electrical work associated with roof penetrations.

2 PART 2 – PRODUCTS

2.1 MATERIALS

- A. Temporary Protection: Sheet polyethylene. Provide weights to retain sheeting in position.

3 PART 3 – EXECUTION

3.1 EXAMINATION

- A. Verify existing site conditions under provisions of the general conditions of this contract.
- B. Verify that existing roof surface is clear and ready for work of this Section.

3.2 PREPARATION

- A. Sweep roof surface clean of loose matter. Remove loose refuse and dispose off site.
- B. Control dust, noise and debris to the satisfaction of the Owner.

3.3 MATERIALS REMOVAL

- A. Remove metal counter flashings. At the existing reglets scheduled to remain, fold up metal counter flashings to permit access to top edge of base flashings.
- B. Remove roofing, perimeter base flashings and flashings around roof protrusions, pitch pans and pockets.
- C. Remove blocking and related material.
- D. Remove membranes, insulation and associated components.
- E. Repair existing deck surfaces to provide smooth working surface for new roof system.

ROOFING REMOVALS AND PREPARATION

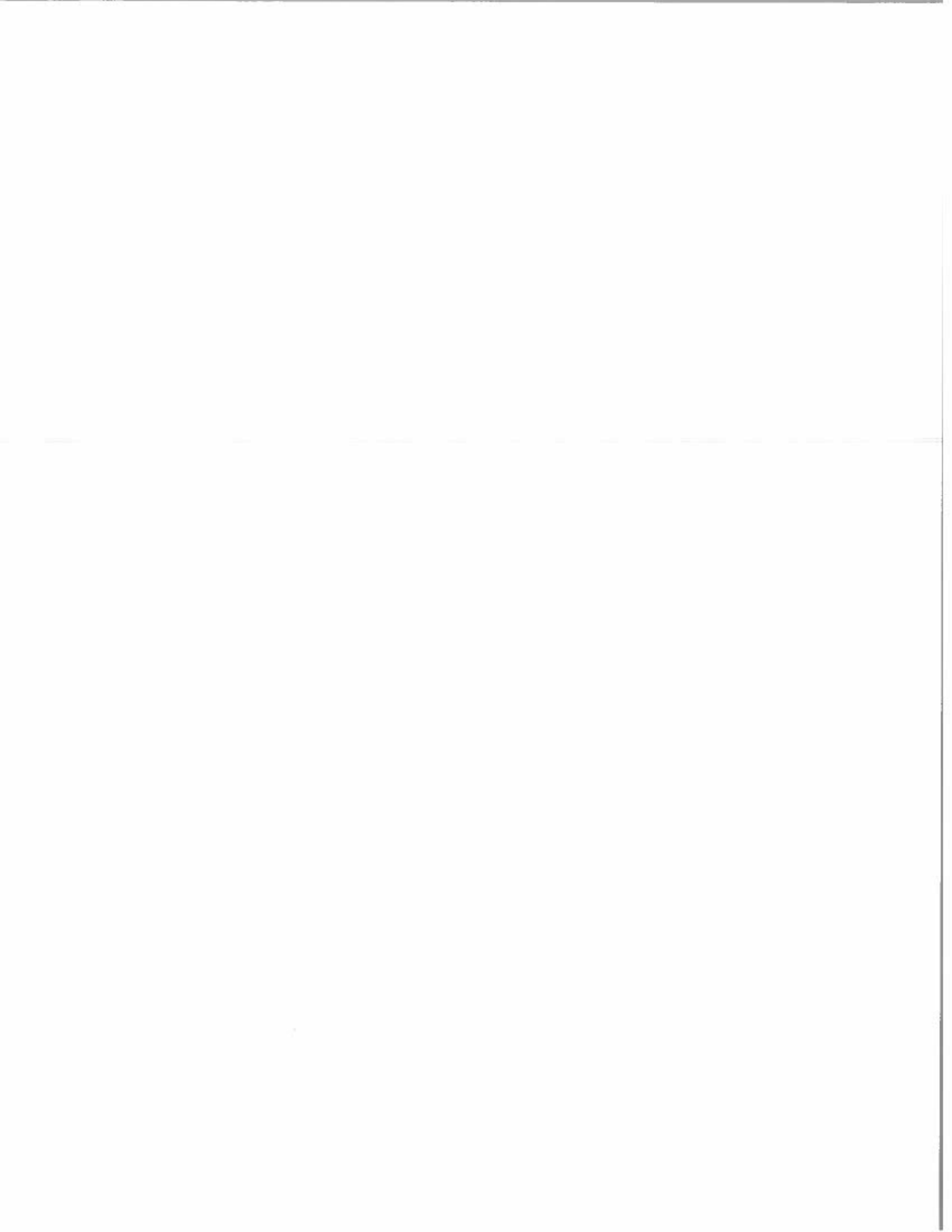
3.4 TEMPORARY PROTECTION

- A. Provide temporary protective sheeting over uncovered deck surfaces.
- B. Turn sheeting up and over parapets and curbing. Retain sheeting in position with weights.
- C. Provide for surface drainage from sheeting to existing drainage facilities.
- D. Do not permit traffic over unprotected or repaired deck surface.
- E. Provide temporary protective sheeting on furniture, equipment, flooring and other interior finishes in areas that will be subject to falling debris and underdeck materials. Professionally clean the interior spaces soiled by roofing removal and replacement operations before classes begin each day.

3.5 FIELD QUALITY CONTROL

- A. Inspection will identify the exact limits of material removal.

END OF SECTION



1 PART I – GENERAL

1.1 WORK INCLUDED

- A. Manufactured roof edges
- B. Roof flashings, reglets and termination bars
- C. Caps, fascia, scuppers and collection boxes

1.2 RELATED SECTIONS

- A. Section 04100 – Mortar
- B. Section 04330 – Cavity Wall Masonry System
- C. Section 06100 – Rough Carpentry
- D. Section 07212 – Roof Insulation Board
- E. Section 07531 – Elastomeric Sheet Roofing
- F. Section 07631 – Gutters and Downspouts
- G. Section 07900 – Sealants

1.3 REFERENCES

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

1. American Society for Testing and Materials (ASTM) Publications:

- | | |
|-----------------------|---|
| B 209-14 | Aluminum and Aluminum-Alloy Sheet and Plate |
| D 41-11
(R 2016) | Asphalt Primer Used in Roofing, Dampproofing and
Waterproofing |
| D 5643-06
(R 2012) | Coal Tar Roof Cement, Asbestos Free |

2. Federal Specification (FS)

- UU-B-790A-68 Building Paper, Vegetable Fiber

1.4 REGULATORY REQUIREMENTS

- A. Wind Design Standard: Manufacture and install roof edge flashings tested according to Chapter 16 of the International Building Code and capable of resisting the following design pressure:

- 1. Design Pressure: As indicated on Drawings.

1.5 SUBMITTALS

A. Samples:

1. Sheet Metal Materials: Two (2) pieces, 6 by 10 inches, of each type.
2. Manufactured Edges: One (1) piece, 6 inches long.
3. Nails and Other Fastenings: Two (2) each.

B. Shop Drawings: Indicate thicknesses, dimensions, fastenings and anchoring methods, expansion joints and other provisions necessary for thermal expansion and contraction. Scaled catalog cuts may be submitted for factory fabricated items.

1. Manufactured edges.
2. Flashing at roof penetrations.
3. Base and cap flashing (counter flashing).
4. Reglets and termination bars.
5. Scuppers and collection boxes.

C. Certificates of Compliance: Manufacturer's certificates attesting that materials meet specified requirements.

1.6 DELIVERY, HANDLING AND STORAGE: Package and protect materials during shipment. Uncrate and inspect materials for damage, dampness and wet-storage stains upon delivery to the job site. Remove from the site and replace damaged materials that cannot be restored to like-new condition. Handle sheet metal items to avoid damage to surfaces, edges, and ends. Store materials in dry, weather-tight, ventilated areas until immediately before installation.

1.7 WARRANTY

A. Warranty all work against defects in materials and workmanship for two (2) years following final acceptance.

1. Provide duplicate original warranties in writing on Contractor's letterhead.

2 PART 2 – PRODUCTS

2.1 MATERIALS

A. Furnish sheet metal items in 8- to 10-foot lengths. Single pieces less than 8 feet long may be used to connect to factory-fabricated inside and outside corners, and at ends of runs. Provide accessories and other items essential to complete the sheet metal installation. These accessories shall be made of the same materials as the items to which they are applied. Fabricate sheet metal items of the materials

FLASHING AND SHEET METAL

specified below and to the gauge, thickness or weight specified. Sheet metal items shall have manufacturer's durinodic coating finish unless specified otherwise.

- B. Exposed Sheet Metal Items: Shall be of the same material. The following items shall be considered as exposed sheet metal: Caps, fascia, drip edges, scuppers, collections boxes, roof flashings and all associated accessories.
- C. Caps, Fascia, Drip Edges, Scuppers, Collection Boxes, Roof and other Exposed Flashings: ASTM B 209; 0.050-inch-thick aluminum, with two (2) coat Kynar finish (or approved equal), color to be selected by Architect and Owner from manufacturer's full range, meeting alloy standards 6063-T52. Provide for expansion and contraction, as well as cleats and other related items as recommended by the manufacturer.
 - 1. Approved manufacturers:
 - a. Architectural Products Company, Wood Ridge, NJ (800.631.8375)
 - b. Cheney Flashing Company, Trenton, NJ (800.322.2873)
 - c. Southern Aluminum Finishing Company, Atlanta, GA (800.241.7429)
 - d. Substitutions: Under provision of Section 01600.
- D. Reglets: Recessed; 0.064-inch Kynar finished aluminum formed as indicated in NRCA and SMACNA manuals, where indicated on the construction documents.
- E. Roof-Edge Fascia: Manufactured, two-piece, roof-edge fascia consisting of snap-on metal fascia cover in section lengths not exceeding 12 feet and a continuous formed- or extruded-aluminum anchor bar with integral drip-edge cleat to engage fascia cover. Provide matching corner units.
 - 1. Basis-of-Design Product:
 - a. Firestone Building Products
 - 2. 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. Johns Manville
 - b. Perimeter Systems; a division of Southern Aluminum Finishing Company, Inc.
 - c. Substitutions: Under provisions of Section 01600.
 - 3. Fascia Cover: Fabricated from the following exposed metal:
 - a. Formed Aluminum: 0.050-inch-thick.

4. Anchor Bar: Fabricated from the following exposed metal:
 - a. Formed Aluminum: 0.060-inch-thick.
 5. Corners: Factory mitered and continuously welded.
 6. Splice Plates: Concealed, of same material, finish, and shape as fascia cover.
- F. Bituminous Plastic Cement: ASTM D 5643.
- G. Building Paper: FS UU-B-790, Style 4, Grade B.
- H. Asphalt Primer: ASTM D 41.
- I. Fastener: Use the same metal or a metal compatible with the item fastened. Use stainless steel fasteners to fasten dissimilar materials.

3 PART 3 – EXECUTION

3.1 INSTALLATION

- A. Requirements: Make surfaces to receive sheet metal plumb and true, clean, even, smooth, dry and free of defects and projections which might affect the application. For installation of items not shown in detail or not covered by specifications conform to the applicable requirements of the SMACNA Architectural Sheet Metal Manual. Join sheet metal together as recommended by the manufacturer or by the SMACNA manual.
- B. Workmanship: Make lines, arises and angles sharp and true. Free exposed surfaces from visible wave, warp and buckle and tool marks. Fold back exposed edges neatly to form a ½-inch hem on the concealed side. Make sheet metal exposed to the weather watertight with provisions for expansion and contraction.
- C. Nailing: Confine nailing of sheet metal generally to sheet metal having a maximum width of 18 inches. Confine nailing or flashing to one (1) edge only. Space nails evenly not over 3 inches on centers and approximately ½ inch from edge unless otherwise specified or indicated. Face nailing will not be permitted. Where sheet metal is applied to other than wood surfaces, include in shop drawings, the locations for nailing strips required to secure the work. Nailing strips are specified in Section 06100.
- D. Cleats: Provide cleats for sheet metal 18 inches and over in width. Cleats shall be continuous and fastened not over 12 inches on centers unless otherwise specified or indicated. Cleating shall be of the same material and thickness as the sheet metal being installed. Secure one (1) end of the cleat with two (2) nails and the

cleat folded back over the nail heads. Lock the other end into the seam.

- E. **Bolts, Rivets and Screws:** Install bolts, rivets and screws where indicated or required. Provide compatible washers where required to protect surface of sheet metal and to provide a watertight connection.
- F. **Flat-Lock Seams:** Finish not less than ¼-inch-wide.
- G. **Protection from Contact with Dissimilar Materials:**
 - 1. **Metal Surfaces:** Paint surfaces in contact with mortar, concrete or other masonry materials with alkali-resistant coatings such as heavy-bodied bituminous paint.
 - 2. **Wood or Other Absorptive Materials:** Paint surfaces that may become repeatedly wet and in contact with metal with two (2) coats of aluminum paint or a coat of heavy-bodied bituminous paint.
- H. **Expansion and Contraction:** Provide expansion and contraction joints at not more than 32-foot intervals for aluminum and at not more than 40-foot intervals for other metals. Where the distance between the last expansion joint and the end of the continuous run is more than half the required interval, an additional joint shall be provided. Space joints evenly.
- I. **Base Flashing:** Extend up vertical surfaces of the flashing not less than 8 inches and not less than 4 inches under the roof covering. Where finish wall coverings form a counter flashing, extend the vertical leg of the flashing up behind the applied wall covering not less than 6 inches. Overlap the flashing strips with the previously laid flashing not less than 3 inches. Fasten the strips at their upper edge to the deck, with compatible, large-head roofing nails. Install and fit the flashings so as to be completely weather-tight. Base flashing for interior and exterior corners shall be factory fabricated.
- J. **Counter Flashing:** Except where indicated or specified otherwise, insert counter flashing in new cut-out reglets located from 9 to 10 inches above the new roof deck in the existing masonry walls, extend down vertical surfaces over upturned vertical leg of base flashings not less than 3 inches. Fold the exposed edges of counter flashings ½ inch. Where stepped counter flashings are required, they may be installed in short lengths or may be of the preformed one-piece type. Provide end laps in counter flashings not less than 3 inches and make it weather-tight with plastic cement. Do not make lengths of metal counter flashings exceed 10 feet. Form the flashings to the required shapes before installation. Factory-form the corners not less than 12 inches from the angle. Secure the flashings in the reglets with lead wedges and space not more than 18 inches apart; on short runs, place wedges closer together. Fill caulked-type reglets or raked joints which receive counter flashing with caulking compound. Caulking is covered in Section 07900. Turn up the concealed edge of counter flashings built into masonry or concrete

walls not less than ¼-inch and extend not less than 2 inches into the walls. Install counter flashing to provide a spring action against base flashing.

- K. Counter Flashing: End counter flashing at termination bars as indicated on Drawings. Seal termination bar with sealant as specified in Section 07900.
- L. Caps, Fascia, Drip Edges, Scuppers, Collection Boxes, Roof and other Exposed Flashings: Prefabricate in the shapes and sizes indicated and in lengths not less than 8 feet. Extend flange at least 4 inches onto roofing. Provide prefabricated, mitered corners internal and external corners. Nail flange securely to wood nailer with large-head, barbed-shank roofing nails 1.5 inches long spaced not more than 3 inches on centers.
 - 1. Edge Strip: Hook the lower edge of fasciae at least ¾ inch over a continuous strip of the same material bent outward at an angle not more than 45 degrees to form a drip. Nail hook strip to a wood nailer at 6 inches maximum on centers. Where fastening is made to concrete or masonry, use screws spaced 12 inches on centers driven in expansion shields set in the concrete or masonry. Where horizontal wood nailers are slotted to provide for insulation venting, install strips to prevent obstruction of vent slots. Where necessary, install strips over 1/16-inch-thick compatible spacer or washers.
 - 2. Joints: Leave open the section ends of gravel stops and fascias ¼-inch and backed with a formed flashing plate, mechanically fastened in place and lapping each section end a minimum of 4 inches set laps in plastic cement. Face nailing will not be permitted.
- M. Flashing at Roof Penetrations and Equipment Supports: Provide metal flashing for all pipes, ducts and conduits projecting through the roof surface and for equipment supports, guy wire anchors and similar items supported by or attached to the roof deck. Provide new or salvage existing rain hoods, ventilator shields, etc.
 - 1. Single Pipe Vents: Set flange of sleeve in cement and nail 3 inches on centers. Bend the top of sleeve over and extend down into the vent pipe a minimum of 2 inches. For long runs or long rises above the deck, where it is impractical to cover the vent pipe with lead, use a two-piece formed metal housing. Set metal housing with a metal sleeve having a 4-inch roof flange in bituminous plastic cement and nailed 3 inches on centers. Extend sleeve a minimum of 8 inches above the roof deck and lapped a minimum of 3 inches by a metal hood secured to the vent pipe by a draw band. Seal the area of hood in contact with vent pipe with an approved sealant. Sealants are covered under Section 07900.
- N. Manufactured Edges: Install according to manufacturer's written instructions. Anchor securely in place, with provisions for thermal and structural movement.

Use fasteners, protective coatings, separators, sealants, and other miscellaneous items as required to complete system.

1. Install cleats, cants, and other anchoring and attachment accessories and devices at 24 inches on center with No. 8 screws that are long enough to penetrate the wood blocking $\frac{3}{4}$ -inch per FM Data Sheet 1-49, *Perimeter Flashing*.
2. Anchor roof edgings with manufacturer's required devices, fasteners, and fastener spacing to meet performance requirements.
3. Install level, plumb, true to line and elevation; with limited oil-canning and without warping, jogs in alignment, buckling, or tool marks.
4. Provide uniform, neat seams with minimum exposure of sealant.
5. Install fit substrates and to result in watertight performance. Verify shapes and dimensions of surfaces to be covered before manufacture.
6. Torch cutting is not permitted.
7. Do not use graphite pencils to mark metal surfaces.

3.2 PAINTING: Field-paint sheet metal for separation of dissimilar materials.

3.3 CLEANING

- A. Clean exposed sheet metal work at completion of installation. Remove grease and oil films, handling marks, contamination from steel wool, fittings and drilling debris and scrub-clean. Free the exposed metal surfaces of dents, creases, waves, scratch marks and solder or weld marks.

3.4 REPAIRS TO FINISH

- A. Scratches, abrasions and minor surface defects of finish may be repaired in accordance with the manufacturer's printed instructions and as approved. Repair damaged surfaces caused by scratches, blemishes and variations of color and surface texture. Replace items which cannot be repaired.

3.5 FIELD QUALITY CONTROL

- A. Establish and maintain a quality control procedure for sheet metal used in conjunction with roofing to assure compliance of the installed sheet metalwork with the contract requirements. Work not in compliance with the contract shall be promptly removed and replaced or corrected. Quality control shall include, but not be limited to, the following:
 1. Observation of environmental conditions; number and skill level of sheet metal workers; condition of substrate.
 2. Verification of compliance before, during and after installation.
 3. Inspection of sheet metalwork, for proper size and thickness, fastening and joining and proper installation.

FLASHING AND SHEET METAL

- B. Procedure: Submit for approval prior to start of roofing work. Include a checklist of points to be observed. Document the actual quality control observations and inspections.

END OF SECTION

1 PART 1 – GENERAL

1.1 SECTION INCLUDES

- A. Aluminum gutters and downspouts

1.2 RELATED SECTIONS

- A. Section 06100 – Rough Carpentry
- B. Section 07531 – Elastomeric Sheet Roofing
- C. Section 07600 – Flashing and Sheet Metal
- D. Section 07900 – Sealants

1.3 REFERENCES

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

- 1. American Society for Testing and Materials (ASTM) Publications:

- B 209-14 Aluminum and Aluminum Alloy Sheet and Plate

- 2. Sheet Metal and Air Conditioning Contractors National Association, Incorporated (SMACNA) Publication:

- 2012 Architectural Sheet Metal Manual

1.4 SUBMITTALS

- A. Submit shop drawings, product data, samples and manufacturer's installation instructions under provisions of Section 01300.
- B. Indicate on shop drawings, general construction, configurations, jointing methods and locations, fastening methods, locations and installation details.
- C. Provide product data on prefabricated components.
- D. Submit two (2) samples 6 inches in size illustrating component design, finish, color and configuration.

1.5 QUALITY ASSURANCE

- A. Conform to SMACNA Manual Drawings for nominal sizing of components for rainfall intensity determined by a storm occurrence of one (1) in ten (10) years.

1.6 DELIVERY, STORAGE AND HANDLING

- A. Deliver to site, store and protect products under provisions of Section 01600.
- B. Stack preformed and prefinished material to prevent twisting, bending or abrasion, and to aid ventilation. Slope to drain.
- C. Prevent contact with materials during storage which may cause discoloration, staining or damage.

2 PART 2 – PRODUCTS

2.1 MATERIALS

- A. Aluminum Sheet: ASTM B 209, 0.050-inch (gutters) or 0.040-inch (downspouts) thick aluminum (or greater if recommended by NRCA standards for exposure), with two (2) coat Kynar finish (or approved equal), color to be selected by Architect and Owner from manufacturer's full range, meeting alloy standards 6063-T52. Provide for expansion and contraction, as well as cleats and other related items as recommended by the manufacturer.

2.2 COMPONENTS

- A. Gutters: SMACNA standards, profile as indicated in the Drawings.
- B. Downspouts: SMACNA standard, 3 inch by 4 inch rectangular profile, smooth finish.
- C. End Caps, Downspout Outlets, Straps, Strainers, Header and Support Brackets, Joint Fasteners: Profiled to suit downspouts.

2.3 ACCESSORIES

- A. Anchorage Devices: Type recommended by fabricator.
- B. Downspout Boots: Of material and profile to align with and connect to storm water pipe riser.
- C. Concrete Splash Blocks: 2-feet-long x 1-foot-wide flared concrete splash block pitched to drain away from the building, with side walls and textured finish.

2.4 FABRICATION

- A. Form gutters and downspouts of profiles and size to SMACNA requirements.

GUTTERS AND DOWNSPOUTS

- B. Field measure site conditions prior to fabricating work.
- C. Fabricate with required connection pieces.
- D. Form sections square, true, and accurate in size, in maximum possible lengths and free of distortion or defects detrimental to appearance or performance. Allow for expansion at joints.
- E. Hem exposed edges of metal.
- F. Fabricate gutter and downspout accessories; seal watertight.

3 PART 3 – EXECUTION

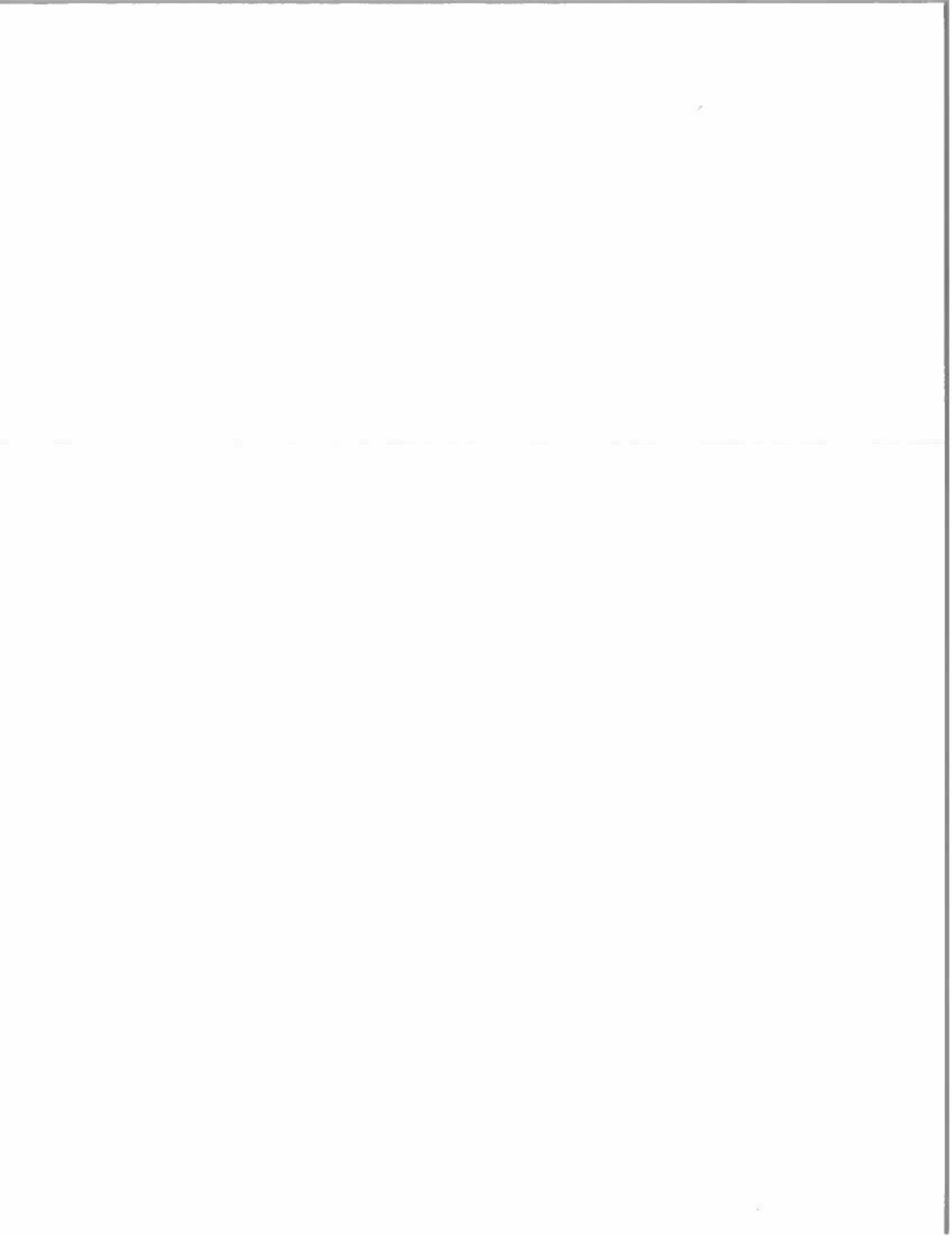
3.1 EXAMINATION

- A. Verify that surfaces are ready to receive work and conditions are as indicated on shop drawings.
- B. Beginning of installation means acceptance of existing conditions.

3.2 INSTALLATION

- A. Install gutters, downspouts and accessories in accordance with manufacturer's instructions.
- B. Flash and seal gutters to downspouts and accessories.
- C. Join lengths with formed seams sealed watertight. Flash and seal gutters to downspouts and accessories.
- D. Apply bituminous protective backing on surfaces in contact with dissimilar materials.
- E. Seal metal joints watertight.
- F. Slope gutters to drain.

END OF SECTION



1 PART 1 – GENERAL

1.1 SECTION INCLUDES

- A. Building and site sealants

1.2 RELATED SECTIONS

- A. Section 04100 – Mortar
- B. Section 04330 – Cavity Wall Masonry System
- C. Section 07531 – Elastomeric Sheet Roofing
- D. Section 07600 – Flashing and Sheet Metal
- E. Section 07631 – Gutters and Downspouts
- F. Section 15410 – Plumbing Piping

1.3 REFERENCES

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

- 1. American Society for Testing and Materials (ASTM) Publications:

- C 920-14 Elastomeric Joint Sealants

1.4 SUBMITTALS

- A. Certificates of Conformance: Submit certificates from the manufacturers attesting that materials meet the specified requirements.
- B. Manufacturers' Data: Clearly mark data to identify material type to be provided.
- C. Sealants: Data for sealant shall include:
 - 1. Application instructions and precautions.
 - 2. Shelf life.
 - 3. Mixing instructions for multi-component sealants.
 - 4. Recommended cleaning solvents.
- D. Primer(s).
- E. Backstop Material(s).
- F. Colors: Submit not less than three (3) different samples of manufacturers' full range for selection by Architect and Owner.

- G. **Manufacturer's Test Report:** Indicate sealant compatibility with commonly used substrates.
- 1.5 **SAMPLE JOINTS:** Before sealant work is started, provide a sample of each type of finished joint where directed. Sample shall show the workmanship, bond and color of sealant. The workmanship, bond and color of sealant throughout the project shall match the approved sample joints.
- 1.6 **ENVIRONMENTAL CONDITIONS:** The ambient temperature shall be within the limits of 40 and 100 degrees F when sealant is applied.
- 1.7 **DELIVERY AND STORAGE:** Deliver materials to the job site in unopened manufacturers' external shipping containers, with brand names, date of manufacture, color and material designation clearly marked thereon. Elastomeric sealant containers shall be labeled to identify type, class, grade and use. Carefully handle and store materials to prevent inclusion of foreign materials or subjection to sustained temperatures exceeding 100 degrees F or less than 40 degrees F.

2 PART 2 – PRODUCTS

- 2.1 **SEALANTS:** Provide one-part polysulfide sealants that have been tested and found suitable for the substrates to which it will be applied.
 - A. For joints in vertical surfaces, provide ASTM C 920, Type S, Class 25, Grade NS, Use NT. For joints at aluminum surfaces, provide ASTM C 920, Type S, Class 25, Grade NS, Use A. For joints in horizontal surfaces, provide ASTM C 920, Type S, Class 25, Use T. Location(s) shall be as follows, at a minimum:
 - 1. Metal-to-metal joints where sealant is indicated or specified.
 - 2. Joints between ends of gravel stops and adjacent walls.
 - B. **Manufacturers:** The following manufacturers are approved for use:
 - 1. Tremco Incorporated, Ashland, OH (800.321.7906)
 - 2. Pecora Corporation, Harleysville, PA (800.523.6688)
 - 3. Sika Corporation, Lyndhurst, NJ (800.933.7452)
 - 4. Substitutions: In accordance with Section 01300
- 2.2 **PRIMER FOR SEALANT:** Provide a non-staining, quick-drying type of consistency recommended by the sealant manufacturer for the particular application.
- 2.3 **BOND BREAKERS:** Provide the type and consistency recommended by the sealant manufacturer for the particular application.

- 2.4 BACKSTOPS: Provide glass fiber roving or neoprene, butyl, polyurethane or polyethylene foams free from oil or other staining elements as recommended by sealant manufacturer. Backstop material shall be compatible with sealant.
- 2.5 CLEANING SOLVENTS: Provide type(s) recommended by the sealant manufacturer.

3 PART 3 – EXECUTION

3.1 SURFACE PREPARATION: Surfaces shall be clean, dry to the touch and free from dirt frost, moisture, grease, oil, wax, lacquer, paint and other foreign matter that would tend to destroy or impair adhesion. When resealing an existing joint, remove existing caulk or sealant prior to applying new sealant.

- A. Steel Surfaces: Remove loose mill scale by sandblasting or, if sandblasting is impractical or would damage finish work, scraping and wire brushing. Remove protective coatings by sandblasting or using a residue-free solvent.
- B. Aluminum or Bronze Surfaces: Remove temporary protective coatings from surfaces that will be in contact with sealant. When masking tape is used as a protective coating, remove tape and any residual adhesive just prior to sealant application. For removing protective coatings and final cleaning, use non-staining solvents recommended by the manufacturer of the item(s) containing aluminum or bronze surfaces.

3.2 SEALANT PREPARATION: Do not add liquids, solvents, or powders to the sealant. Mix multi-component elastomeric sealants in accordance with manufacturer's instructions.

3.3 APPLICATION

A. Joint Width-To-Depth Ratios:

1. Acceptable Ratios:

<u>JOINT WIDTH</u>	<u>JOINT DEPTH</u>	
	Minimum	Maximum
For metal, glass, or other nonporous surfaces:		
¼ inch (minimum)	¼ inch	¼ inch
Over ¼ inch	½ of width	Equal to width
For wood:		
¼ inch (minimum)	¼ inch	¼ inch
Over ¼ inch to ½ inch	¼ inch width	Equal to width

Over ½ inch to 2 inches
Over 2 inches

½ inch 5/8 inch
(As recommended by sealant
manufacturer)

2. **Unacceptable Ratios:** Where joints of acceptable width-to-depth ratios have not been provided, clean out joints to acceptable depths and grind or cut to acceptable widths without damage to the adjoining work. Grinding shall not be required on metal surfaces.
- B. Backstops:** Install backstops dry and free of tears or holes. Tightly pack the back or bottom of joint cavities with backstop material to provide a joint of the depth specified. Install backstops in the following locations:
1. Where indicated.
 2. Where backstop is not indicated but joint cavities exceed the acceptable maximum depths specified in paragraph entitled, "Joint Width-to-Depth Ratios."
- C. Primer:** Immediately prior to application of sealant, clean out loose particles from joints. Where recommended by sealant manufacturer, apply primer to joints in concrete masonry units, wood and other porous surfaces in accordance with sealant manufacturer's instructions. Do not apply primer to exposed finish surfaces.
- D. Bond Breaker:** Provide bond breakers to the back or bottom of joint cavities, as recommended by the sealant manufacturer for each type of joint and sealant used, to prevent sealant from adhering to these surfaces. Carefully apply the bond breaker to avoid contamination of adjoining surfaces or breaking bond with surfaces other than those covered by the bond breaker.
- E. Sealants:** Provide a sealant compatible with the material(s) to which it is applied. Do not use a sealant that has exceeded shelf life or has jelled and can not be discharged in a continuous flow from the gun. Apply the sealant in accordance with the manufacturer's instructions with a gun having a nozzle that fits the joint width. Force sealant into joints to fill the joints solidly without air pockets. Tool sealant after application to ensure adhesion. Sealant shall be uniformly smooth and free of wrinkles. Upon completion of sealant application, roughen partially filled or unfilled joints, apply sealant and tool smooth as specified.

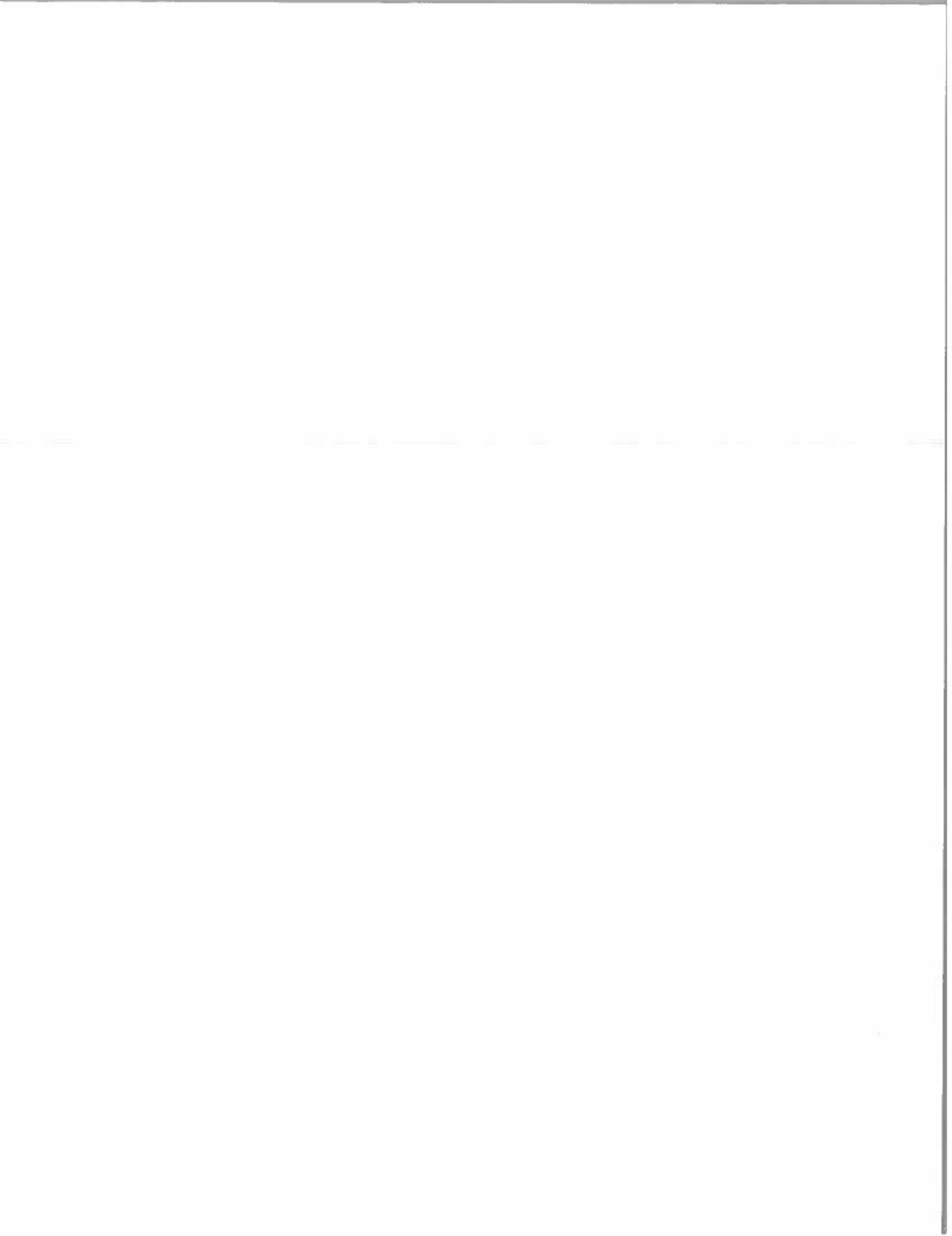
3.4 PROTECTION AND CLEANING

- A. Protection:** Protect areas adjacent to joints from sealant smears. Masking tape may be used for this purpose if removed 5 to 10 minutes after the joint is filled.
- B. Final Cleaning:** Upon completion of sealant application, remove remaining smears and stains and leave the work in a clean and neat condition.

SEALANTS

1. **Masonry and Other Porous Surfaces:** Immediately scrape off fresh sealant that has been smeared on masonry and rub clean with a solvent as recommended by the sealant manufacturer. Allow excess sealant to cure for 24 hours then remove by wire brushing or sanding.
2. **Metal and Other Non-Porous Surfaces:** Remove excess sealant with a solvent-moistened cloth.

END OF SECTION



1 PART 1 – GENERAL

1.1 SECTION INCLUDES

- A. Surface preparation and field application of paints and coatings

1.2 REFERENCES

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

- 1. American Society for Testing and Materials (ASTM) Publications:

- D 16-16 Paint, Related Coatings, Materials, and Applications

1.3 DEFINITIONS

- A. Conform to ASTM D 16 for interpretation of terms used in this Section.

1.4 SUBMITTALS

- A. Submit under provisions of Section 01300.
- B. Product Data: Provide data on all finishing products.
- C. Samples: Submit two (2) sample sleeves, illustrating range of colors available for each surface finishing product scheduled. Architect will select colors from manufacturer's full color line.
- D. Manufacturer's Instructions: Indicate special surface preparation procedures and substrate conditions requiring special attention.

1.5 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing the Products specified in this section with minimum three (3) years documented experience.
- B. Applicator: Company specializing in performing the work of this section with minimum five (5) years documented experience.

1.6 REGULATORY REQUIREMENTS

- A. Conform to Connecticut Building Code for flame and smoke rating requirements for finishes.

1.7 DELIVERY, STORAGE AND HANDLING

- A. Deliver, store, protect and handle products to site under provisions of Section 01600.
- B. Deliver products to site in sealed and labeled containers; inspect to verify acceptability.
- C. Container label to include manufacturer's name, type of paint, brand name, lot number, brand code, coverage, surface preparation, drying time, cleanup requirements, color designation and instructions for mixing and reducing.
- D. Store paint materials at minimum ambient temperature of 45 degrees F and a maximum of 90 degrees F, in ventilated area, and as required by manufacturer's instructions.

1.8 ENVIRONMENTAL REQUIREMENTS

- A. Do not apply materials when surface and ambient temperatures are outside the temperature ranges required by the paint product manufacturer.
- B. Minimum Application Temperatures for Latex Paints: 45 degrees F for interiors; 50 degrees F for exterior; unless required otherwise by manufacturer's instructions.

2 PART 2 – PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers – Paint
 - 1. ICI Paints, Cleveland, OH (800.454.3336)
 - 2. Sherwin Williams Stores Division (800.474.3794)
 - 3. PPG Industries, Inc., Pittsburgh, PA (412.434.3131)
- B. Manufacturers – Paint (Metal Surfaces)
 - 1. Hunting Specialty Products; **Hammerite**
 - 2. Benjamin Moore & Co., Montvale, NJ (800.344.0400); **Eggshell Finish House Paint with IronClad Galvanized Metal Latex Primer**
- C. Substitutions: Under provisions of Section 01600.

2.2 MATERIALS

- A. Coatings: Ready mixed, except field catalyzed coatings. Process pigments to a soft paste consistency, capable of being readily and uniformly dispersed to a homogeneous coating; good flow and brushing properties; capable of drying or curing free of streaks or sags.
- B. Accessory Materials: Linseed oil, shellac, turpentine, paint thinners and other materials not specifically indicated but required to achieve the finishes specified, of commercial quality.
- C. Fastener Head Cover Materials: Latex filler.

2.3 FINISHES

- A. Finish ratings of interior paints and coatings shall conform to the following criteria:
 - 1. Exits: Class A
 - a. All other Areas: Class A or B

3 PART 3 – EXECUTION

3.1 EXAMINATION

- A. Verify that surfaces and substrate conditions are ready to receive work as instructed by the product manufacturer.
- B. Examine surfaces scheduled to be finished prior to commencement of work. Report any condition that may potentially affect proper application.
- C. Test shop applied primer for compatibility with subsequent cover materials.
- D. Measure moisture content of surfaces using an electronic moisture meter. Do not apply finishes unless moisture content of surfaces is below the following maximums:
 - 1. Masonry, Concrete and Concrete Unit Masonry: Twelve percent (12%).

3.2 PREPARATION

- A. Remove or mask electrical plates, hardware, light fixture trim, escutcheons and fittings prior to preparing surfaces or finishing.

- B. Correct defects and clean surfaces which affect work of this section. Remove existing coatings that exhibit loose surface defects.
- C. Seal with shellac and seal marks which may bleed through surface finishes.
- D. Existing Coatings: Remove surface irregularities by scraping or sanding to produce uniform substrate for coating application.
- E. Impervious Surfaces: Remove mildew by scrubbing with solution of tri-sodium phosphate and bleach. Rinse with clean water and allow surface to dry.
- F. Galvanized Surfaces: Remove surface contamination and oils and wash with solvent. Apply coat of etching primer.
- G. Shop Primed Steel Surfaces: Sand and scrape to remove loose primer and rust. Feather edges to make touch-up patches inconspicuous. Clean surfaces with solvent. Prime bare steel surfaces. Prime metal items including shop primed items with incompatible surfaces to the finished coating system.
- H. Concrete and Unit Masonry Surfaces Scheduled to Receive Paint Finish: Remove dirt, loose mortar, scale, salt or alkali powder and other foreign matter. Remove oil and grease with a solution of tri-sodium phosphate; rinse well and allow to dry. Remove stains caused by weathering of corroding metals with a solution of sodium metasilicate after thoroughly wetting with water. Allow to dry.

3.3 APPLICATION

- A. Apply products in accordance with manufacturer's instructions.
- B. Do not apply finishes to surfaces that are not dry.
- C. Apply each coat to uniform finish.
- D. Apply each coat of paint slightly darker than preceding coat unless otherwise approved.
- E. Sand wood and metal lightly between coats to achieve required finish.
- F. Vacuum clean surfaces free of loose particles. Use tack cloth just prior to applying next coat.
- G. Allow applied coat to dry before next coat is applied.

3.4 FINISHING MECHANICAL, PLUMBING, FIRE PROTECTION AND ELECTRICAL EQUIPMENT

- A. Paint shop primed equipment. Paint shop pre-finished items occurring at interior areas.
- B. Remove unfinished louvers, grilles, covers and access panels on mechanical and electrical components and paint separately.
- C. Prime and paint insulated and exposed pipes, conduit, boxes, insulated and exposed ducts, hangers, brackets, collars and supports except where items are pre-finished.
- D. Paint exposed conduit and electrical equipment occurring in finished areas.
- E. Color code equipment, piping, conduit and exposed duct work in accordance with requirements indicated.
- F. Reinstall electrical cover plates, hardware, light fixture trim, escutcheons and fittings removed prior to finishing.
- G. Prime and paint (flat black, one (1) coat) interiors of duct sections which are visible from finished spaces through return grilles or diffusers, eliminating reflectivity and color cast by these metal surfaces.

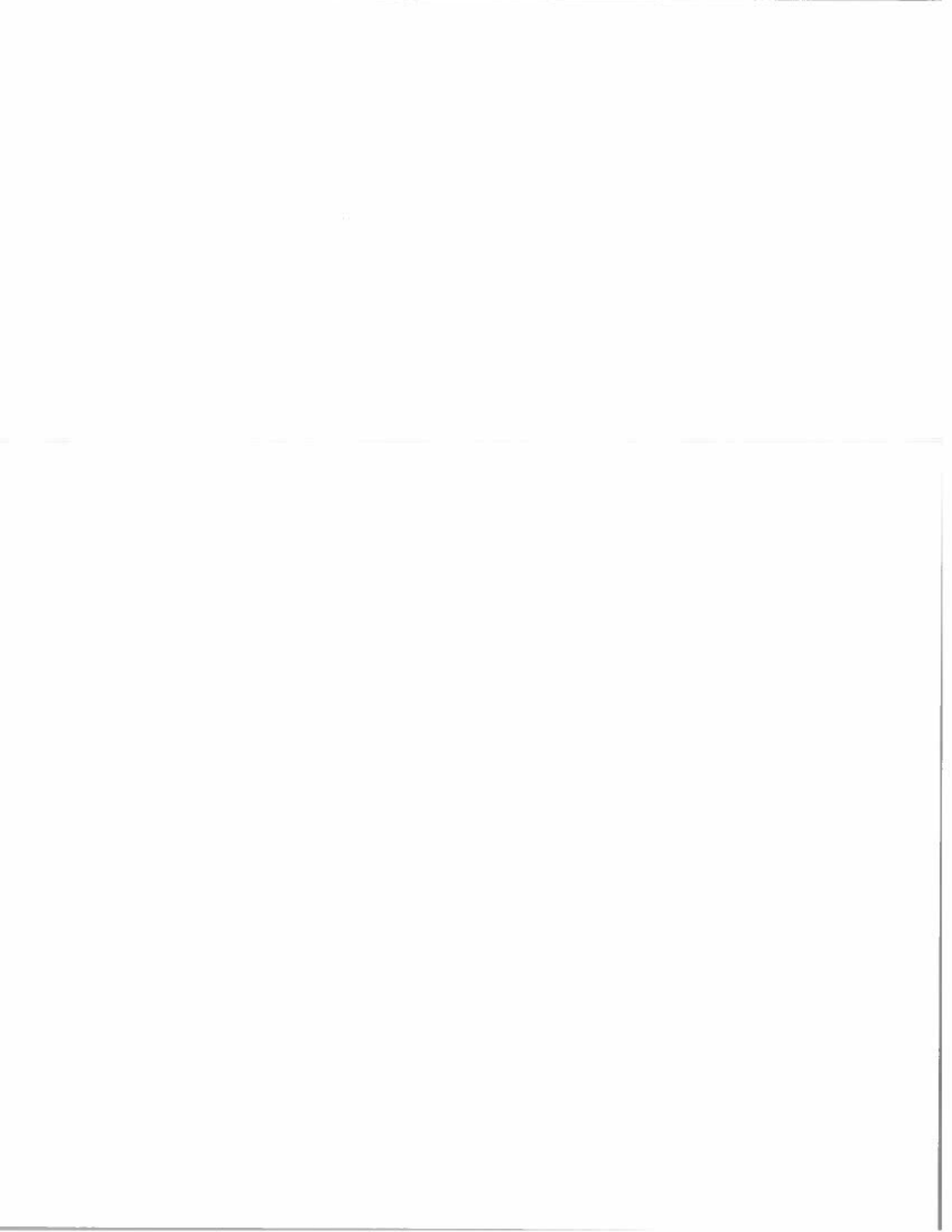
3.5 CLEANING

- A. Clean work under provisions of 01700.
- B. Collect waste material which may constitute a fire hazard, place in closed metal containers and remove daily from site.

3.6 SCHEDULE – EXTERIOR SURFACES

- A. Steel – Galvanized:
 - 1. One (1) coat galvanized primer.
 - 2. Two (2) coats of alkyd enamel, gloss.
- B. Concrete, Concrete Block:
 - 3. One (1) coat of primer sealer latex.
 - 4. Two (2) coat of acrylic latex, gloss.

END OF SECTION



PART 1 - GENERAL

1.1 SUMMARY

- A. Refrigerant pipes and fittings.
- B. Refrigerant piping valves and specialties.
- C. Refrigerants.

1.2 SUBMITTALS

- A. **Product Data:** For each type of valve and refrigerant piping specialty indicated. Include pressure drop, based on manufacturer's test data, for thermostatic expansion valves, solenoid valves, and pressure-regulating valves.
- B. **Shop Drawings:** Show layout of refrigerant piping and specialties, including pipe, tube, and fitting sizes, flow capacities, valve arrangements and locations, slopes of horizontal runs, oil traps, double risers, wall and floor penetrations, and equipment connection details. Show interface and spatial relationship between piping and equipment.
- C. Welding and brazing certificates.
- D. Field quality-control test reports.
- E. Operation and maintenance data.

1.3 QUALITY ASSURANCE

- A. **Welding:** Qualify procedures and personnel according to ASME Boiler and Pressure Vessel Code: Section IX; "Welding and Brazing Qualifications."
- B. **ASHRAE Standard:** Comply with ASHRAE 15, "Safety Code for Mechanical Refrigeration."
- C. **ASME Standard:** Comply with ASME B31.5, "Refrigeration Piping."
- D. **UL Standard:** Provide products complying with UL 207, "Refrigerant-Containing Components and Accessories, Nonelectrical"; or UL 429, "Electrically Operated Valves."

1.4 PRODUCT STORAGE AND HANDLING

- A. Store piping with end caps in place to ensure that piping interior and exterior are clean when installed.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. Refrigerants:
 - a. Allied Signal, Inc./Fluorine Products; Genetron Refrigerants
 - b. DuPont Company; Fluorochemicals Div.
 - c. Elf Atochem North America, Inc.; Fluorocarbon Div.
 - d. ICI Americas Inc./ICI KLEA; Fluorochemicals Bus
 - 2. Refrigerant Valves and Specialties:
 - a. Climate & Industrial Controls Group; Parker-Hannifin Corp.; Refrigeration & Air Conditioning Division
 - b. Danfoss Electronics, Inc.
 - c. Emerson Electric Company; Alco Controls Div.
 - d. Henry Valve Company
 - e. Sporlan Valve Company

2.2 COPPER TUBE AND FITTINGS

- A. Drawn-Temper Copper Tube: ASTM B 88, Type L.
- B. Annealed-Temper Copper Tube: ASTM B 88, Type L.
- C. Wrought-Copper Fittings: ASME B16.22.
- D. Wrought-Copper Unions: ASME B16.22.
- E. Bronze Filler Metals: AWS A5.8, Classification BAg-1 (silver), BAg-2 (silver)

2.3 VALVES

- A. Diaphragm Packless Valves: 500-psig working pressure and 275 deg F working temperature; globe design with straight-through or angle pattern; forged-brass or bronze body and bonnet, phosphor bronze and stainless-steel diaphragms, rising stem and handwheel, stainless-steel spring, nylon seat disc, and with solder-end connections.
- B. Packed-Angle Valves: 500-psig working pressure and 275 deg F working temperature; forged-brass or bronze body, forged-brass seal caps with copper gasket, back seating, rising stem and seat, molded stem packing, and with solder-end connections.
- C. Check Valves Smaller Than NPS 1: 400-psig operating pressure and 285 deg F operating temperature; cast-brass body, with removable piston,

polytetrafluoroethylene seat, and stainless-steel spring; globe design. Valve shall be straight-through pattern, with solder-end connections.

- D. Check Valves, NPS 1 and Larger: 400-psig operating pressure and 285 deg F operating temperature; cast-bronze body, with cast-bronze or forged-brass bolted bonnet; floating piston with mechanically retained polytetrafluoroethylene seat disc. Valve shall be straight-through or angle pattern, with solder-end connections.
- E. Service Valves: 500-psig pressure rating; forged-brass body with copper stubs, brass caps, removable valve core, integral ball check valve, and with solder-end connections.
- F. Solenoid Valves: Comply with ARI 760; 250 deg F temperature rating and 400-psig working pressure; forged brass, with polytetrafluoroethylene valve seat, 2-way, straight-through pattern, and solder-end connections; manual operator; fitted with suitable NEMA 250 enclosure of type required by location, with ½-inch conduit adapter and 2-V, normally closed holding coil.
- G. Pressure-Regulating Valves: Comply with ARI 770; pilot operated, forged brass or cast bronze, stainless-steel bottom spring, pressure-gage tappings, 24-V dc standard coil, and wrought-copper fittings for solder-end connections; suitable for refrigerant specified.
- H. Pressure-Regulating Valves: Comply with ARI 770; direct acting, brass; with pilot operator, stainless-steel diaphragm, standard coil, and solder-end connection; suitable for refrigerant specified.
- I. Pressure Relief Valves: Straight-through or angle pattern, brass body and disc, neoprene seat, and factory sealed and ASME labeled for standard pressure setting.
- J. Thermostatic Expansion Valves: Comply with ARI 750; brass body with stainless-steel parts; thermostatic-adjustable, modulating type; size and operating characteristics as recommended by manufacturer of evaporator, and factory set for superheat requirements; solder-end connections; with sensing bulb, distributor having side connection for hot-gas bypass line, and external equalizer line.
- K. Hot-Gas Bypass Valve: Pulsating-dampening design, stainless-steel bellows and polytetrafluoroethylene valve seat; adjustable; sized for capacity equal to last step of compressor unloading; with solder-end connections.

2.4 REFRIGERANT PIPING SPECIALITIES

- A. Straight- or Angle-Type Strainers: 500-psig working pressure; forged-brass or steel body with stainless-steel wire or brass-reinforced Monel screen of 80 to 100 mesh in liquid lines up to 1-1/8 inches, 60 mesh in larger liquid lines, and 40 mesh in suction lines; with screwed cleanout plug and solder-end connections.

- B. Moisture/Liquid Indicators: 500-psig maximum working pressure and 200 deg F operating temperature; all-brass body with replaceable, polished, optical viewing window with color-coded moisture indicator; with solder-end connections.
- C. Replaceable-Core Filter-Dryers: 500-psig maximum working pressure; heavy gage protected with corrosion-resistant-painted steel shell, flanged ring and spring, ductile-iron cover plate with steel cap screws; wrought-copper fittings for solder-end connections; with replaceable-core kit, including gaskets and the following:
 - 1. Filter Cartridge: Pleated media with integral end rings, stainless-steel support, ARI 730 rated for capacity.
 - 2. Filter-Dryer Cartridge: Pleated media with solid-core sieve with activated alumina, ARI 730 rated for capacity.
 - 3. Wax Removal Cartridge: Molded, bonded core of activated charcoal and desiccant with integral gaskets.
- D. Permanent Filter-Dryer: 350-psig maximum operating pressure and 225 deg F maximum operating temperature; steel shell and wrought-copper fittings for solder-end connections; molded-felt core surrounded by desiccant.
- E. Mufflers: 500-psig operating pressure, welded-steel construction with fusible plug; sized for refrigeration capacity.

2.5 RECEIVERS

- A. Receivers, 6-Inch Diameter and Smaller: ARI 495, UL listed, steel, brazed, 400-psig pressure rating, with tappings for inlet, outlet, and pressure relief valve.

2.6 REFRIGERANTS

- A. ASHRAE 34, R-410A: Pentafluoroethane/Difluoromethane.

PART 3 - EXECUTION

3.1 PIPING APPLICATIONS

- A. Aboveground, within Building: Type L drawn-copper tubing.

3.2 VALVE APPLICATIONS

- A. Install diaphragm packless or packed-angle valves in suction and discharge lines of compressor, for gage taps at hot-gas bypass regulators, on each side of strainers.
- B. Install check valves in compressor discharge lines and in condenser liquid lines on multiple condenser systems.

- C. Install packed-angle valve in liquid line between receiver shutoff valve and thermostatic expansion valve for system charging.
- D. Install diaphragm packless or packed-angle valves on each side of strainers and dryers, in liquid and suction lines at evaporators, and elsewhere as indicated.
- E. Install a full-sized, three-valve bypass around each dryer.
- F. Install solenoid valves upstream from each expansion valve and hot-gas bypass valve.
 - 1. Install solenoid valves in horizontal lines with coil at top.
 - 2. Electrical wiring for solenoid valves is specified in Division 16 Sections. Coordinate electrical requirements and connections.
- G. Install thermostatic expansion valves as close as possible to evaporator.
 - 1. If refrigerant distributors are used, install them directly on expansion-valve outlet.
 - 2. Install valve so diaphragm case is warmer than bulb.
 - 3. Secure bulb to clean, straight, horizontal section of suction line using two bulb straps. Do not mount bulb in a trap or at bottom of the line.
 - 4. If external equalizer lines are required, make connection where it will reflect suction-line pressure at bulb location.
- H. Install pressure-regulating and pressure relief valves as required by ASHRAE 15. Pipe pressure relief valve discharge to outside.

3.3 SPECIALTY APPLICATIONS

- A. Install liquid indicators in liquid line leaving condenser, in liquid line leaving receiver, and on leaving side of liquid solenoid valves.
- B. Install strainers immediately upstream from each automatic valve, including expansion valves, solenoid valves, hot-gas bypass valves, and compressor suction valves.
- C. Install strainers in main liquid line where multiple expansion valves with integral strainers are used.
- D. Install strainers in suction line of steel pipe.
- E. Install moisture-liquid indicators in liquid lines between filter-dryers and thermostatic expansion valves and in liquid line to receiver.
- F. Install pressure relief valves on ASME receivers; pipe discharge to outdoors.

- G. Install replaceable-core filter-dryers in vertical liquid line adjacent to receivers and before each solenoid valve.
- H. Install permanent filter-dryers in low-temperature systems, in systems using hermetic compressors, and before each solenoid valve.
- I. Install solenoid valves in liquid line of systems operating with single pump-out or pump-down compressor control, in liquid line of single or multiple evaporator systems, and in oil bleeder lines from flooded evaporators to stop flow of oil and refrigerant into suction line when system shuts down.
- J. Install flexible connectors at or near compressors where piping configuration does not absorb vibration.

3.4 PIPING INSTALLATION

- A. Install refrigerant piping according to ASHRAE 15.
- B. Install piping as short and direct as possible, with a minimum number of joints, elbows, and fittings.
- C. Arrange piping to allow inspection and service of compressor and other equipment. Install valves and specialties in accessible locations to allow for service and inspection.
- D. Install piping with adequate clearance between pipe and adjacent walls and hangers or between pipes for insulation installation. Use sleeves through floors, walls, or ceilings, sized to permit installation of full-thickness insulation.
- E. Belowground, install copper tubing in protective conduit. Vent conduit outdoors.
- F. Install copper tubing in rigid or flexible conduit in locations where copper tubing will be 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. Install unions to allow removal of solenoid valves, pressure-regulating valves, and expansion valves and at connections to compressors and evaporators.

- I. When brazing, 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.
- J. Install the following pipe attachments:
 1. Adjustable steel clevis hangers for individual horizontal runs less than 20 feet long.
 2. Roller hangers and spring hangers for individual horizontal runs 20 feet or longer.
 3. Pipe rollers for multiple horizontal runs 20 feet or longer, supported by a trapeze.
 4. Spring hangers to support vertical runs.

3.5 PIPE JOINT CONSTRUCTION

- A. Fill pipe and fittings with an inert gas (nitrogen or carbon dioxide) during brazing to prevent scale formation.

3.6 FIELD QUALITY CONTROL

- A. Test and inspect refrigerant piping according to ASME B31.5, Chapter VI.
 1. Test refrigerant piping, specialties, and receivers. Isolate compressor, condenser, evaporator, and safety devices from test pressure.
 2. Test high- and low-pressure side piping of each system at not less than the lower of the design pressure or the setting of pressure relief device protecting high and low side of system.
 - a. System shall maintain test pressure at the manifold gage throughout duration of test.
 - b. Test joints and fittings by brushing a small amount of soap and glycerine solution over joint.
 - c. Fill system with nitrogen to raise a test pressure of 150 psig or higher as required by authorities having jurisdiction.
 - d. Remake leaking joints using new materials, and retest until satisfactory results are achieved.

3.7 SYSTEM CHARGING

- A. Charge system using the following procedures:
 1. Install core in filter-dryer after leak test but before evacuation.
 2. Evacuate entire refrigerant system with a vacuum pump to a vacuum of 500 micrometers. If vacuum holds for twelve (12) hours, system is ready for charging.
 3. Break vacuum with refrigerant gas, allowing pressure to build up to 2 psig.

REFRIGERANT PIPING

4. Charge system with a new filter-dryer core in charging line. Provide full-operating charge.

END OF SECTION

1 PART 1 – GENERAL

1.1 SECTION INCLUDES

- A. Piping insulation, jackets and accessories. Insulate new roof drain bodies and sections of piping installed or disturbed by the new work.

1.2 RELATED SECTIONS

- A. Section 15183 – Refrigerant Piping
- B. Section 15410 – Plumbing Piping

1.3 REFERENCES

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

- 1. American Society for Testing and Materials (ASTM) Publications:

- C 534-16 Preformed Flexible Elastomeric Cellular Thermal Insulation in Sheet and Tubular Form
- C 547-17 Mineral Fiber Pipe Insulation
- D 1784-11 Rigid Poly(Vinyl Chloride) (PVC) Compounds and Chlorinated Poly(Vinyl Chloride) (CPVC) Compounds
- E 84-17 Surface Burning Characteristics of Building Materials

1.4 SUBMITTALS

- A. Submit under provisions of Section 01300.
- B. Product Data: Provide product description, list of materials and thickness for each service and locations.
- C. Samples: Submit two (2) samples of any representative size illustrating each insulation type.
- D. Manufacturer's Installation Instructions: Indicate procedures which ensure acceptable workmanship and installation standards will be achieved.

1.5 QUALITY ASSURANCE

- A. Materials: Flame spread/smoke developed rating of 25/50 or less in accordance with ASTM E 84.

1.6 QUALIFICATIONS

- A. Applicator: Company specializing in performing the work of this section with minimum three (3) years' experience.

1.7 PRODUCT STORAGE AND HANDLING

- A. Store insulation in original wrapping and protect from weather and construction traffic.
- B. Protect insulation against dirt, water, chemical and mechanical damage.

1.8 ENVIRONMENTAL REQUIREMENTS

- A. Maintain ambient temperatures and conditions required by manufacturers of adhesives, mastics and insulation cements.

1.9 SCHEDULING

- A. Schedule insulation application after testing piping systems and, where required, after installing and testing heat-trace tape. Insulation application may begin on segments of piping that have satisfactory test results.

2 PART 2 – PRODUCTS

2.1 PIPE INSULATIONS AND JACKETS

- A. Manufacturers:
 - 1. Johns Manville, Denver, CO (800.654.3103)
 - 2. Armstrong World Industries, Inc.
 - 3. Rubatex Corp.
 - 4. Substitutions: Under provisions of Section 01600.
- B. Glass Fiber: **Micro-Lok** meeting ASTM C 547; rigid molded, noncombustible.
 - 1. 'K' ('ksi') Value: 0.23 at 75 degrees F.
 - 2. Maximum Service Temperature: 850 degrees F
 - 3. Vapor Retarder Jacket: **AP-T PLUS** White Kraft paper reinforced with glass fiber yarn and bonded to aluminum foil, secure with self sealing longitudinal laps and butt strips or AP Jacket with outward clinch expanding staples or vapor barrier mastic as needed.
- C. Flexible Elastomeric Thermal Insulation: Closed-cell, sponge- or expanded-rubber materials. Comply with ASTM C 534, Type I for tubular materials and

Type II for sheet materials.

1. Adhesive: As recommended by insulation material manufacturer.
- D. PVC: Ceel-Co[®] 550 PVC jackets and fittings meeting ASTM D 1784; high impact, gloss white, UV resistant.
1. Thickness: 30 mil.

3 PART 3 – EXECUTION

3.1 EXAMINATION AND PREPARATION

- A. Verify that all surfaces are clean, dry and free of foreign material.

3.2 INSTALLATION

- A. Install materials in accordance with manufacturer's recommendations, building codes and industry standards.
- B. Continue insulation vapor barrier through penetrations except where prohibited by code.
- C. Interior Piping Insulation:
1. Locate insulation and cover seams in least visible locations.
 2. Neatly finish insulation at supports, protrusions and interruptions.
 3. Provide insulated dual temperature pipes or cold pipes conveying fluids below ambient temperature with vapor retardant jackets with self sealing laps. Insulate complete system.
 4. Provide insert between support shield and piping on piping 1½ inches diameter or larger. Fabricate of Johns Manville **Thermo-12** or other heavy density insulating material suitable for temperature. Insulation inserts shall not be less than the following lengths:

3-inch to 6-inch pipe size	12 inches long
----------------------------	----------------
- D. Exterior Piping Insulation:
1. Apply insulation to straight pipes and tubes as follows:
 - a. Follow manufacturer's written instructions for applying insulation.
 - b. Seal longitudinal seams and end joints with manufacturer's recommended adhesive. Cement to avoid openings in insulation that will allow passage of air to the pipe surface.

2. Apply insulation to flanges as follows:
 - a. Apply pipe insulation to outer diameter of pipe flange.
 - b. Make width of insulation segment the same as overall width of the flange and bolts, plus twice the thickness of the pipe insulation.
 - c. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with cut sections of sheet insulation of the same thickness as pipe insulation.
 - d. Secure insulation to flanges and seal seams with manufacturer's adhesive. Cement to avoid openings in insulation that will allow passage of air to the pipe surface.

3. Apply insulation to fittings and elbows as follows:
 - a. Apply mitered sections of pipe insulation.
 - b. Secure insulation materials and seal seams with manufacturer's recommended adhesive. Cement to avoid openings in insulation that will allow passage of air to the pipe surface.

4. Apply insulation to valves and specialties as follows:
 - a. Apply preformed valve covers manufactured of the same material as pipe insulation and attached according to the manufacturer's written instructions.
 - b. Apply cut segments of pipe and sheet insulation to valve body. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation. For check valves, fabricate removable sections of insulation arranged to allow access to strainer basket.
 - c. Apply insulation to flanges as specified for flange insulation application.
 - d. Secure insulation to valves and specialties and seal seams with manufacturer's recommended adhesive. Cement to avoid openings in insulation that will allow passage of air to the pipe surface.

5. Apply PVC jacket with 1-inch overlap at longitudinal seams and end joints. Seal with manufacturers recommended adhesive.

3.3 PIPING INSULATION SCHEDULE

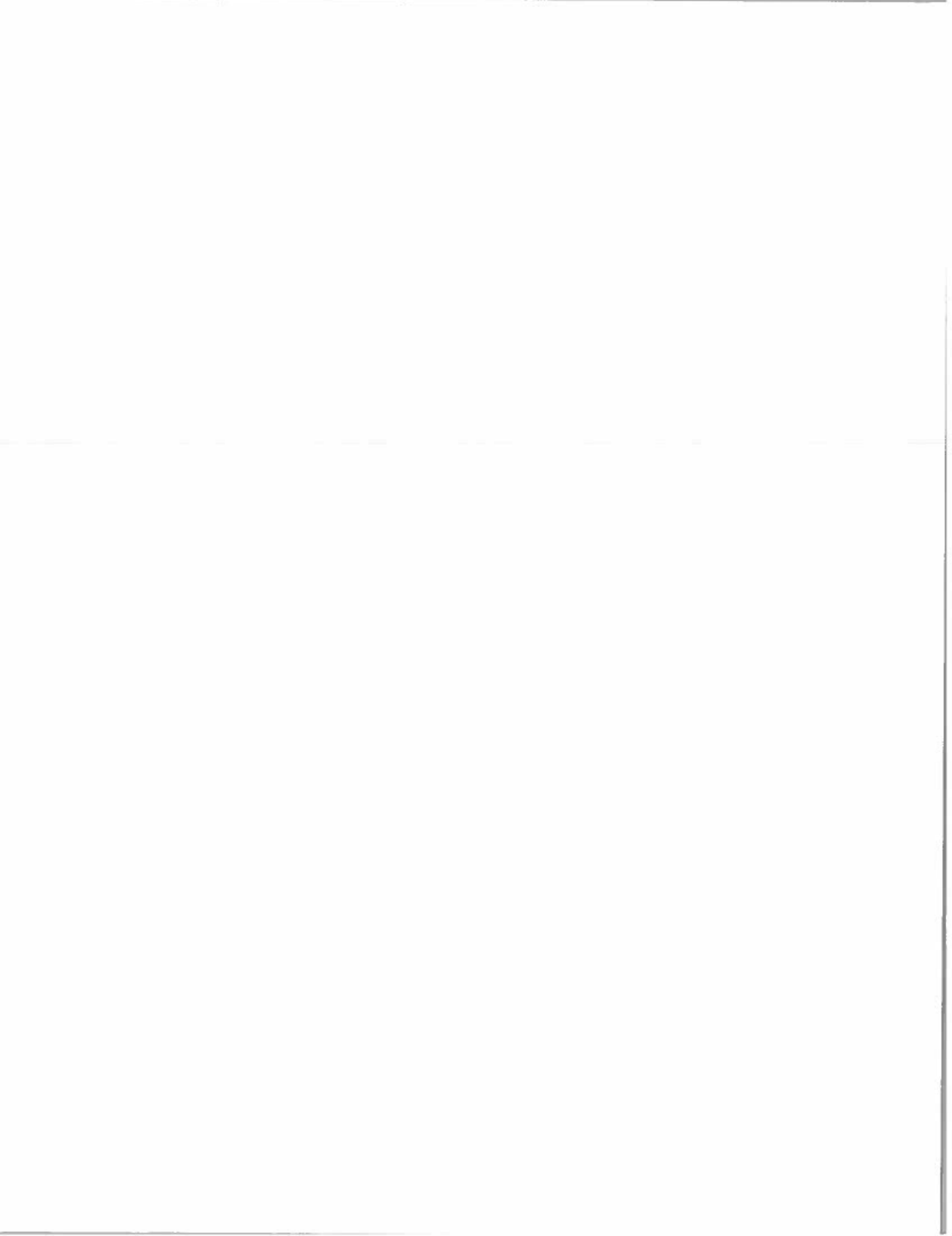
	PIPE SIZE <u>Inch</u>	THICKNESS <u>Inch</u>
A. Fiber Glass Insulation Roof Drain Bodies/Bowls	all sizes	1

PIPING INSULATION

**B. Flexible Elastomeric Insulation
Roof Drainage Piping**

all sizes 1½

END OF SECTION



1 PART 1 – GENERAL

1.1 SECTION INCLUDES

- A. Pipe and pipe fittings (replacing sections damaged by new work and new leader extensions)
- B. Pipe hangers, supports, isolators and associated anchors
- C. Storm water drainage system (roof drains)

1.2 RELATED SECTIONS

- A. Section 03500 – Gypsum Roof Deck Systems (Concrete Deck Repairs)
- B. Section 07212 – Rigid Insulation Board
- C. Section 07531 – Elastomeric Sheet Roofing
- D. Section 07900 – Sealants
- E. Section 15260 – Piping Insulation

1.3 REFERENCES

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

1. American Society for Testing and Materials (ASTM) Publications:

C 1460-17	Shielded Transition Couplings for Use with Dissimilar DWV Pipe and Fittings above Ground
D 2564-12	Solvent Cements for Polyvinyl Chloride (PVC) Plastic Piping Systems
D 2665-14	Polyvinyl Chloride (PVC) Plastic Drain, Waste, and Vent Pipe and Fittings
D 2855-15	Joining Poly(Vinyl Chloride) (PVC) or Chlorinated Poly(Vinyl Chloride) (CPVC) Pipe and Piping Components with Tapered Sockets
D 3311-17	Drain, Waste, and Vent (DWV) Plastic Fittings Patterns
F 402-05 (R 2012)	Safe Handling of Solvent Cements, Primers, and Cleaners Used for Joining Thermoplastic Pipe and Fittings
F 656-15	Primers for Use in Solvent Cement Joints of Polyvinyl Chloride (PVC) Plastic Pipe and Fittings
F 891-16	Coextruded Poly(Vinyl Chloride) (PVC) Plastic Pipe with a Cellular Core

2. American Society of Mechanical Engineers (ASME) Publications:
A112.6.4-03 Roof, Deck and Balcony Drains
3. International Association of Plumbing and Mechanical Official (IAPMO) Publications:
IGC 187-12 Roof Drains with Integral Overflows or Air Vents

1.4 SUBMITTALS

- A. Submit under provisions of Section 01300.
- B. Product Data: Provide data on pipe materials, pipe fittings, valves and accessories. Provide manufacturers catalog information. Indicate valve data and ratings.
- C. Submit manufacturer's product data on the roof drains.

1.5 PROJECT RECORD DOCUMENTS

- A. Submit under provisions of Section 01700.

1.6 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing the Products specified in this section with minimum three (3) years documented experience.
- B. Installer: Company specializing in performing the work of this section with minimum three (3) years experience.

2 PART 2 – PRODUCTS

2.1 STORM WATER PIPING, ABOVE GRADE

- A. Cellular-Core PVC Pipe: ASTM F 891, Schedule 40.
 1. Fittings: ASTM D 2665, made to ASTM D 3311, drain, waste, and vent patterns and to fit Schedule 40 pipe.
 2. Adhesive Primer: ASTM F 656.
 3. Solvent Cement: ASTM D 2564.
- B. 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. Shielded, Non-pressure Transition Couplings:
 - a. Manufacturers: Subject to compliance with requirements, provide products by one (1) of the following:
 - 1) Cascade Waterworks Mfg. Co.
 - 2) Mission Rubber Company, LLC; a division of MCP Industries
 - 3) Substitutions: Under provisions of Section 01600.
 - 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.

2.2 ROOF DRAINS

A. Manufacturers

1. Standard Roof Drain:
 - a. Zurn Industries, Inc., Falconer, NY (716.665.1132); **Series Z-100**
 - b. Josam Company, Michigan City, ID (800.365.6726); **Series 21500**
 - c. Tyler Pipe, Wade Division, Tyler, TX (800.638.9537); **Series 3000**
2. Substitutions: Under provisions of Section 01600.

B. Roof Drain:

1. Compliance: ANSI/ASME A112.6.4 and IAPMO IGC 187.
2. Provide drain with adjustable extensions and underdeck clamp. Provide with cast iron dome(s), no hub outlet(s) and combined flashing clamp(s) and gravel stop(s). Size for conditions in the field. The Contractor will verify all roof leader sizes required and match drain outlet size to existing pipe size before submitting shop drawings.

2.3 PIPE HANGERS AND SUPPORTS

A. Pipe Hangers: Carbon steel, adjustable, clevis.

B. Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods.

- C. Shield for Insulated Storm Piping 3 Inches and Larger: Pipe covering protective saddles.

2.4 HANGER RODS

- A. Steel Hanger Rods: Galvanized, threaded both ends, threaded one (1) end or continuous threaded.

3 PART 3 – EXECUTION

3.1 PREPARATION

- A. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.
- B. Remove scale and dirt, on inside and outside, before assembly.

3.2 INSTALLATION

- A. Install in accordance with manufacturer's instructions and in accordance with ASTM D 2665.
- B. Provide non-conducting dielectric connections wherever jointing dissimilar metals.
- C. Route piping in orderly manner and maintain gradient.
- D. Install piping to conserve building space and not interfere with use of space.
- E. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.
- F. Provide clearance for installation of insulation.
- G. Plastic, Non-Pressure-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. PVC Piping: Join according to ASTM D 2855 and ASTM D 2665 Appendixes.
- H. Transition Couplings:
 - 1. Install transition couplings at joints of piping with small differences in OD's.
 - 2. In Drainage Piping: Shielded, non-pressure transition couplings.

3.3 ROOF DRAIN INSTALLATION

- A. Remove the existing drain body assemblies and fittings, removing all deleterious material from the roof opening.
- B. Cut or adjust the opening in the roof deck to accommodate the new roof drain assembly, including adjusting the underdeck area to permit the proper installation of the underdeck clamp.
- C. Install the roof drain in accordance with the manufacturer's instructions, adjusting the fitting to the existing roof leader. Adjust the extension ring to clamp onto the roof insulation and roofing membrane as required by the roof drain manufacturer and roofing membrane manufacturer.

3.4 PIPE HANGERS AND SUPPORTS

- A. Support horizontal piping as follows:

<u>PIPE SIZE</u>	<u>MAX. HANG. SPACING</u>	<u>HANG. DIAMETER</u>
All sizes	4'-0"	Per pipe size

- B. Install hangers to provide minimum ½ inch space between finished covering and adjacent work.
- C. Use hangers with 1½ inch minimum vertical adjustment.
- D. Install supports for vertical PVC piping every 48 inches.
- E. Where several pipes can be installed in parallel and at same elevation, provide multiple or trapeze hangers.
- F. Support riser piping independently of connected horizontal piping.

3.5 ERECTION TOLERANCES

- A. Establish invert elevations, slopes for drainage to ¼ inch per foot minimum. Maintain gradients.

3.6 SERVICE CONNECTIONS

- A. Provide new storm drain branches, connecting to existing storm leaders. Before commencing work check elevations required for storm drain connections, confirming ceiling elevations and ensure that the storm branches can be properly connected with slope for drainage above the existing ceiling systems.

3.7 JOB COMPLETION

- A. Inspect completed drain network and correct all defects to meet the specification requirements.
- B. Clean up all debris, excess materials and equipment and remove from site.
- C. Replace damaged or removed ceiling tiles and underlayment with ceiling materials to match existing. Touch up paint wall and ceilings damaged by Contractor's operations and as permitted by the Owner.
- D. Repair or replace defaced or disfigured other finishes and equipment caused by work of this Section.
- E. Restrict construction traffic and equipment movement within the classrooms and buildings to only essential personnel. Provide appropriate protection against traffic and construction activities.

END OF SECTION

I PART 1 – GENERAL

1.1 WORK INCLUDED

- A. Basic Electrical Requirements specifically applicable to Division 16 Sections

1.2 REFERENCES

- A. ANSI/NFPA 70 – National Electrical Code
- B. NFPA 101 – Code for Safety to Life from Fire in Buildings
- C. Connecticut Basic Building Code
- D. Connecticut Fire Safety Code

1.3 SUBMITTALS

- A. Submit under provisions of Division 1 Sections.
- B. Include products as required by individual sections.
- C. Submit Shop Drawings and Product Data grouped to include complete submittals of related systems, products and accessories in a single submittal.
- D. Mark dimensions and values in units to match those specified.
- E. Delete or cross-out information not applicable to project.

1.4 DRAWINGS AND COORDINATION

- A. It is not the intention of the drawings to show every item, piece of equipment and detail. Provide complete, operating systems.
- B. Dimensions, elevations and locations are shown approximately. Verify dimensions in field.
- C. Install work as closely as possible to layouts shown on drawings. Modify work as necessary to meet job conditions and to clear other equipment. Consult Architect before making changes which affect the function or appearance of systems.
- D. Sleeves for penetrations through fire rated and fire resistive floors and walls, and fireproofing:
 - 1. Prefabricated fire rated sleeves including seals, UL listed.
 - 2. Schedule 40 steel pipe with UL-listed fire caulk.
- E. Architect reserves the right to order changes in layout of such items as switches, fixtures and outlets if such changes do not substantially affect costs and if

BASIC ELECTRICAL REQUIREMENTS

affected items have not been fabricated or installed.

- F. In some cases, drawings are based on products of one or several manufacturers, as listed on Contract Documents. Contractor shall be responsible for modifications made necessary by substitution of products of other manufacturers.
- G. Do not install part of a system until all critical components of the system and related systems have been approved. Coordinate parts of systems.
- H. Install products in accordance with manufacturer's instructions. Notify Architect if Contract Documents conflict with manufacturer's instructions. Comply with Architect's interpretations.
- I. Provide brackets, supports, anchors and frames required for installation of work specified in this division.
- J. Where Contract Documents provide conflicting information, Contractor shall be responsible for design having highest cost.

1.5 PROJECT RECORD DRAWINGS

- A. Prepare project Record Drawings in conformance with the requirements of General Conditions & Division 1 Sections.

1.6 EQUIPMENT CLEARANCES

- A. Deliver equipment knocked down, if necessary, to place it in proper position.
- B. Install equipment with adequate clearances for maintenance and operation, both of the equipment and of adjacent equipment.

1.7 PRELIMINARY OPERATION

- A. Operate electrical systems with required supervision for at least two full days prior to substantial completion. Make necessary adjustments and check proper operation.

1.8 TESTS PRIOR TO SUBSTANTIAL COMPLETION

- A. Tests shall be attended by representatives of electrical subcontractors, equipped with instruments required to demonstrate proper functioning of systems, as specified. Demonstrate the following:
 - 1. Equipment installed and operating in accordance with manufacturer's specifications and instructions and with these specifications.
 - 2. Safety controls operating as specified.

BASIC ELECTRICAL REQUIREMENTS

3. Motors equipped with proper overload protection and not operating under overload. Obtain ammeter readings.
4. Instruments recording properly.
5. Signaling and communicating devices operating as specified.
6. Submit report listing system tested, date, results and description of fault corrections, if any.
7. Lockdown buttons properly operating including interface with door hardware and system reset.

1.9 WARRANTY

- A. Submit written warrant or warranties covering work specified in Division 16.
- B. Warranty period shall be one (1) year from the date of Substantial Completion of the building or of the equipment being warranted, whichever is later.
- C. Owner is to receive full use of equipment for period of warranty.

1.10 OPERATING AND MAINTENANCE

- A. Prepare Operating and Maintenance Manuals for equipment requiring maintenance and operation.
 1. List replacement parts and order procedure.
 2. Include lubrication instructions and schedule with types of lubricant to be used.
 3. Document scheduled maintenance and troubleshooting procedures.
 4. Include copy of Warranty.
 5. Instruct Owner's personnel in use of equipment specified in Division 16.

1.11 REGULATORY REQUIREMENTS

- A. Conform to applicable provisions of the Connecticut State Building Code which include the following:
 1. International Building Code/2003.
 2. National Electric Code/2011 of the National Fire Protection Association (NFPA 70/2011).
 3. Amendments, alterations, deletions and additions of certain provisions to the above as indicated in the 2005 and 2009 Connecticut Supplements.
- B. Conform to applicable provisions of the Connecticut State Fire Safety Code which include the following:
 1. International Fire Code/2003.

BASIC ELECTRICAL REQUIREMENTS

2. Code for Safety to Life from Fire in Buildings, National Fire Protection Association, Inc., Standard 101 (NFPA 101), 2003 Edition.
 3. Amendments, alterations, deletions and additions of certain provisions to the above as indicated in the 2005 and 2009 Connecticut Supplements.
- C. Conform to applicable Town of West Hartford requirements.
- D. Obtain and pay for permits and inspections from authorities having jurisdiction.

2 PART 2 – PRODUCTS

Not Used

3 PART 3 – EXECUTION

Not Used

END OF SECTION

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 systems and equipment.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. As-Built Data: Plans showing dimensioned as-built locations of grounding features specified in "Field Quality Control" Article, including the following:
- C. Qualification Data: For qualified testing agency and testing agency's field supervisor.
- D. Field quality-control reports.
- E. Operation and Maintenance Data: For grounding to include in emergency, operation, and maintenance manuals. In addition to items specified in Section 01730, include the following:
 - 1. Instructions for periodic testing and inspection of grounding features at test wells, ground rings, and grounding connections for separately derived systems based on NETA MTS and NFPA 70B.
 - a. Tests shall determine if ground-resistance or impedance values remain within specified maximums, and instructions shall recommend corrective action if values do not.
 - b. Include recommended testing intervals.

1.4 QUALITY ASSURANCE

- A. Testing Agency Qualifications: Member company of NETA or an NRTL.
 - 1. Testing Agency's Field Supervisor: Currently certified by NETA to supervise on-site testing.
- B. 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.
- C. Comply with UL 467 for grounding and bonding materials and equipment.

GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 2 - PRODUCTS

2.1 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, ¼-inch 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 wide and 1/16 inch thick.
 - 7. Tinned Bonding Jumper: Tinned-copper tape, braided conductors terminated with copper ferrules; 1-5/8 inches wide and 1/16 inch thick.
- C. Bare Grounding Conductor and Conductor Protector for Wood Poles:
 - 1. No. 4 AWG minimum, soft-drawn copper.
 - 2. Conductor Protector: Half-round PVC or wood molding; if wood, use pressure-treated fir, cypress, or cedar.
- D. Grounding Bus: Predrilled rectangular bars of annealed copper, ¼ by 4 inches in cross section, with 9/32-inch holes spaced 1-1/8 inches apart. Stand-off insulators for mounting shall comply with UL 891 for use in switchboards, 600 V. Lexan or PVC, impulse tested at 5000 V.

2.2 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. Bolted Connectors for Conductors and Pipes: Copper or copper alloy, pressure type with at least two (2) bolts.
 - 1. Pipe Connectors: Clamp type, sized for pipe.
- C. Welded Connectors: Exothermic-welding kits of types recommended by kit manufacturer for materials being joined and installation conditions.
- D. Bus-bar Connectors: Mechanical type, cast silicon bronze, solderless compression and exothermic-type wire terminals, and long-barrel, two-bolt connection to ground bus bar.

GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

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. Isolated Grounding Conductors: Green-colored insulation with continuous yellow stripe. On feeders with isolated ground, identify grounding conductor where visible to normal inspection, with alternating bands of green and yellow tape, with at least three (3) bands of green and two (2) bands of yellow.
- C. Grounding Bus: Install in electrical and telephone equipment rooms, in rooms housing service equipment, and elsewhere as indicated.
 - 1. Install bus on insulated spacers 2 inches minimum from wall, 6 inches above finished floor unless otherwise indicated.
 - 2. Where indicated on both sides of doorways, route bus up to top of door frame, across top of doorway, and down to specified height above floor; connect to horizontal bus.
- D. 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 the following items, in addition to those required by NFPA 70:
 - 1. Feeders and branch circuits.
 - 2. Lighting circuits.
 - 3. Receptacle circuits.
 - 4. Single-phase motor and appliance branch circuits.
 - 5. Three-phase motor and appliance branch circuits.
 - 6. Flexible raceway runs.
 - 7. Armored and metal-clad cable runs.
- B. Air-Duct Equipment Circuits: Install insulated equipment grounding conductor to duct-mounted electrical devices operating at 120 V and more, including air cleaners, heaters, dampers, humidifiers, and other duct electrical equipment. Bond conductor to each unit and to air duct and connected metallic piping.

GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

- C. **Signal and Communication Equipment:** In addition to grounding and bonding required by NFPA 70, provide a separate grounding system complying with requirements in TIA/ATIS J-STD-607-A.
 - 1. For telephone, alarm, voice and data, and other communication equipment, provide No. 4 AWG minimum insulated grounding conductor in raceway from grounding electrode system to each service location, terminal cabinet, wiring closet, and central equipment location.
 - 2. **Service and Central Equipment Locations and Wiring Closets:** Terminate grounding conductor on a ¼-by-4-by-12-inch grounding bus.
 - 3. **Terminal Cabinets:** Terminate grounding conductor on cabinet grounding terminal.

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. **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.
- C. **Grounding and Bonding for Piping:**
 - 1. **Metal Water Service Pipe:** Install insulated copper grounding conductors, in conduit, from building's main service equipment, or grounding bus, to main metal water service entrances to building. Connect grounding conductors to main metal water service pipes; use a bolted clamp connector or bolt a lug-type connector to a pipe flange by using one (1) of the lug bolts of the flange. Where a dielectric main water fitting is installed, connect grounding conductor on street side of fitting. Bond metal grounding conductor conduit or sleeve to conductor at each end.
 - 2. **Water Meter Piping:** Use braided-type bonding jumpers to electrically bypass water meters. Connect to pipe with a bolted connector.
 - 3. Bond each aboveground portion of gas piping system downstream from equipment shutoff valve.
- D. **Bonding Interior Metal Ducts:** Bond metal air ducts to equipment grounding conductors of associated fans, blowers, electric heaters, and air cleaners. Install tinned bonding jumper to bond across flexible duct connections to achieve

continuity.

- E. **Grounding for Steel Building Structure:** Install a driven ground rod at base of each corner column and at intermediate exterior columns at distances not more than 60 feet apart.

3.4 LABELING

- A. Comply with requirements in Section 16075 Article for instruction signs. The label or its text shall be green.
 - 1. **Label Text:** "If this connector or cable is loose or if it must be removed for any reason, notify the facility manager."

3.5 FIELD QUALITY CONTROL

- A. Perform tests and inspections.
 - 1. **Manufacturer's Field Service:** Contractor shall 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. 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 service disconnect enclosure grounding terminal, at ground test wells, and at individual ground rods. Make tests at ground rods before any conductors are connected.
 - a. Measure ground resistance no fewer than two (2) 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.
- C. Grounding system will be considered defective if it does not pass tests and inspections.
- D. Prepare test and inspection reports.
- E. Report measured ground resistances that exceed the following values:

GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

1. Power and Lighting Equipment or System with Capacity of 500 kVA and Less: 10 ohms.
 2. Power and Lighting Equipment or System with Capacity of 500 to 1000 kVA: 5 ohms.
 3. Power and Lighting Equipment or System with Capacity More Than 1000 kVA: 3 ohms.
 4. Power Distribution Units or Panelboards Serving Electronic Equipment: 1 ohm(s).
 5. Substations and Pad-Mounted Equipment: 5 ohms.
 6. Manhole Grounds: 10 ohms.
- F. Excessive Ground Resistance: If resistance to ground exceeds specified values, notify Architect promptly and include recommendations to reduce ground resistance.

END OF SECTION

HANGERS AND SUPPORTS 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. This Section includes the following:
 - 1. Hangers and supports for electrical equipment and systems.
 - 2. Construction requirements for concrete bases.

1.3 DEFINITIONS

- A. EMT: Electrical metallic tubing.
- B. IMC: Intermediate metal conduit.
- C. RMC: Rigid metal conduit.

1.4 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Design supports for multiple raceways, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.
- B. Design supports for multiple raceways capable of supporting combined weight of supported systems and its contents.
- C. Design equipment supports capable of supporting combined operating weight of supported equipment and connected systems and components.
- D. Rated Strength: Adequate in tension, shear, and pullout force to resist maximum loads calculated or imposed for this Project, with a minimum structural safety factor of five times (5x) the applied force.

1.5 SUBMITTALS

- A. Product Data: For the following:
 - 1. Steel slotted support systems.
 - 2. Nonmetallic slotted support systems.
- B. Shop Drawings: Signed and sealed by a qualified professional engineer. Show fabrication and installation details and include calculations for the following:
 - 1. Trapeze hangers. Include Product Data for components.
 - 2. Steel slotted channel systems. Include Product Data for components.

HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

3. Nonmetallic slotted channel systems. Include Product Data for components.
 4. Equipment supports.
- C. Welding certificates.
- 1.6 QUALITY ASSURANCE
- A. Welding: Qualify procedures and personnel according to AWS D1.1, "Structural Welding Code - Steel."
 - B. Comply with NFPA 70.

PART 2 - PRODUCTS

2.1 SUPPORT, ANCHORAGE, AND ATTACHMENT COMPONENTS

- A. Steel Slotted Support Systems: Comply with MFMA 4, factory-fabricated components for field assembly.
 1. Available Manufacturers: Subject to compliance with requirements, 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.; a division of Cooper Industries
 - c. ERICO International Corporation
 - d. GS Metals Corp.
 - e. Thomas & Betts Corporation
 - f. Unistrut; Tyco International, Ltd.
 - g. Wesanco, Inc.
 2. Metallic Coatings: Hot-dip galvanized after fabrication and applied according to MFMA-4.
 3. Nonmetallic Coatings: Manufacturer's standard PVC, polyurethane, or polyester coating applied according to MFMA-4.
 4. Painted Coatings: Manufacturer's standard painted coating applied according to MFMA-4.
 5. Channel Dimensions: Selected for applicable load criteria.
- B. Nonmetallic Slotted Support Systems: Structural-grade, factory-formed, glass-fiber-resin channels and angles with 9/16-inch-diameter holes at a maximum of 8 inches o.c., in at least one (1) surface.
 1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

- a. Allied Tube & Conduit
 - b. Cooper B-Line, Inc.; a division of Cooper Industries
 - c. Fabco Plastics Wholesale Limited
 - d. Seasafe, Inc.
2. Fittings and Accessories: Products of channel and angle manufacturer and designed for use with those items.
 3. Fitting and Accessory Materials: Same as channels and angles, except metal items may be stainless steel.
 4. Rated Strength: Selected to suit applicable load criteria.
- C. Raceway and Cable Supports: As described in NECA 1 and NECA 101.
- D. Conduit and Cable Support Devices: Steel and malleable-iron hangers, clamps, and associated fittings, designed for types and sizes of raceway or cable to be supported.
- E. Support for Conductors in Vertical Conduit: Factory-fabricated assembly consisting of threaded body and insulating wedging plug or plugs for non-armored electrical conductors or cables in riser conduits. Plugs shall have number, size, and shape of conductor gripping pieces as required to suit individual conductors or cables supported. Body shall be malleable iron.
- F. Structural Steel for Fabricated Supports and Restraints: ASTM A 36, steel plates, shapes, and bars; black and galvanized.
- G. Mounting, Anchoring, and Attachment Components: Items for fastening electrical items or their supports to building surfaces include the following:
1. Powder-Actuated Fasteners: Threaded-steel stud, for use in hardened Portland cement concrete, steel, or wood, with tension, shear, and pullout capacities appropriate for supported loads and building materials where used.
 - a. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1) Hilti Inc.
 - 2) ITW Ramset/Red Head; a division of Illinois Tool Works, Inc.
 - 3) MKT Fastening, LLC
 - 4) Simpson Strong-Tie Co., Inc.; Masterset Fastening Systems Unit
 2. Mechanical-Expansion Anchors: Insert-wedge-type, zinc-coated and stainless steel, for use in hardened Portland cement concrete with tension, shear, and pullout capacities appropriate for supported loads and building materials in which used.

HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

- a. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1) Cooper B-Line, Inc.; a division of Cooper Industries
 - 2) Empire Tool and Manufacturing Co., Inc.
 - 3) Hilti Inc.
 - 4) ITW Ramset/Red Head; a division of Illinois Tool Works, Inc.
 - 5) MKT Fastening, LLC
- 3. Concrete Inserts: Steel or malleable-iron, slotted support system units similar to MSS Type 18; complying with MFMA-4 or MSS SP-58.
- 4. Clamps for Attachment to Steel Structural Elements: MSS SP-58, type suitable for attached structural element.
- 5. Through Bolts: Structural type, hex head, and high strength. Comply with ASTM A 325.
- 6. Toggle Bolts: All-steel springhead type.
- 7. Hanger Rods: Threaded steel.

2.2 FABRICATED METAL EQUIPMENT SUPPORT ASSEMBLIES

- A. Description: Welded or bolted, structural-steel shapes, shop or field fabricated to fit dimensions of supported equipment.
- B. Materials: Comply with requirements in Section 05500 for steel shapes and plates.

PART 3 - EXECUTION

3.1 APPLICATION

- A. Comply with NECA 1 and NECA 101 for application of hangers and supports for electrical equipment and systems except if requirements in this Section are stricter.
- B. Maximum Support Spacing and Minimum Hanger Rod Size for Raceway: Space supports for EMT, IMC, and RMC as required by scheduled in NECA 1, where it's Table 1 lists maximum spacings less than stated in NFPA 70. Minimum rod size shall be $\frac{1}{4}$ inch in diameter.
- C. Multiple Raceways or Cables: Install trapeze-type supports fabricated with steel slotted or other support system, sized so capacity can be increased by at least twenty-five percent (25%) in future without exceeding specified design load limits.
 - 1. Secure raceways and cables to these supports with two-bolt conduit clamps single-bolt conduit clamps single-bolt conduit clamps using spring friction

HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

action for retention in support channel.

- D. Spring-steel clamps designed for supporting single conduits without bolts may be used for 1½-inch and smaller raceways serving branch circuits and communication systems above suspended ceilings and for fastening raceways to trapeze supports.

3.2 SUPPORT INSTALLATION

- A. Comply with NECA 1 and NECA 101 for installation requirements except as specified in this Article.
- B. Raceway Support Methods: In addition to methods described in NECA 1, EMT, IMC, and RMC may be supported by openings through structure members, as permitted in NFPA 70.
- C. Strength of Support Assemblies: Where not indicated, select sizes of components so strength will be adequate to carry present and future static loads within specified loading limits. Minimum static design load used for strength determination shall be weight of supported components plus 200 lb.
- D. Mounting and Anchorage of Surface-Mounted Equipment and Components: Anchor and fasten electrical items and their supports to building structural elements by the following methods unless otherwise indicated by code:
 - 1. To Wood: Fasten with lag screws or through bolts.
 - 2. To New Concrete: Bolt to concrete inserts.
 - 3. To Masonry: Approved toggle-type bolts on hollow masonry units and expansion anchor fasteners on solid masonry units.
 - 4. To Existing Concrete: Expansion anchor fasteners.
 - 5. Instead of expansion anchors, powder-actuated driven threaded studs provided with lock washers and nuts may be used in existing standard-weight concrete 4 inches thick or greater. Do not use for anchorage to lightweight-aggregate concrete or for slabs less than 4 inches thick.
 - 6. To Steel: Welded threaded studs complying with AWS D1.1, with lock washers and nuts, Beam clamps (MSS Type 19, 21, 23, 25, or 27) complying with MSS SP-69, Spring-tension clamps.
 - 7. To Light Steel: Sheet metal screws.
 - 8. Items Mounted on Hollow Walls and Nonstructural Building Surfaces: Mount cabinets, panelboards, disconnect switches, control enclosures, pull and junction boxes, transformers, and other devices on slotted-channel racks attached to substrate by means that meet seismic-restraint strength and anchorage requirements.
- E. Drill holes for expansion anchors in concrete at locations and to depths that avoid reinforcing bars.

HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

3.3 INSTALLATION OF FABRICATED METAL SUPPORTS

- A. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor electrical materials and equipment.
- B. Field Welding: Comply with AWS D1.1.

3.4 CONCRETE BASES

- A. Construct concrete bases of dimensions indicated but not less than 4 inches larger in both directions than supported unit, and so anchors will be a minimum of 10 bolt diameters from edge of the base.
- B. Use 3000-psi, twenty-eight (28) day compressive-strength concrete.
- C. Anchor equipment to concrete base.
 - 1. Place and secure anchorage devices. Use supported equipment manufacturer's setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 - 2. Install anchor bolts to elevations required for proper attachment to supported equipment.
 - 3. Install anchor bolts according to anchor-bolt manufacturer's written instructions.

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 minimum dry film thickness of 2.0 mils.
- B. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.

END OF SECTION

VIBRATION AND SEISMIC CONTROLS 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. This Section includes the following:
 - 1. Isolation pads.
 - 2. Spring isolators.
 - 3. Restrained spring isolators.
 - 4. Channel support systems.
 - 5. Restraint cables.
 - 6. Hanger rod stiffeners.
 - 7. Anchorage bushings and washers.
- B. Related Sections include the following:
 - 1. Section 16073 – Hangers and Supports for Electrical Systems

1.3 DEFINITIONS

- A. The IBC: International Building Code.
- B. ICC-ES: ICC-Evaluation Service.
- C. OSHPD: Office of Statewide Health Planning and Development for the State of California.

1.4 PERFORMANCE REQUIREMENTS

- A. Seismic-Restraint Loading:
 - 1. Site Class as Defined in the IBC: E.
 - 2. Assigned Seismic Use Group or Building Category as Defined in the IBC: III.
 - a. Component Importance Factor: 1.5.
 - b. Component Response Modification Factor: 5.5.
 - c. Component Amplification Factor: 1.0.
 - 3. Design Spectral Response Acceleration at Short Periods (0.2 Second).

1.5 ACTION SUBMITTALS

- A. Product Data: For the following:

VIBRATION AND SEISMIC CONTROLS FOR ELECTRICAL SYSTEMS

1. Include rated load, rated deflection, and overload capacity for each vibration isolation device.
 2. Illustrate and indicate style, material, strength, fastening provision, and finish for each type and size of seismic-restraint component used.
 - a. Tabulate types and sizes of seismic restraints, complete with report numbers and rated strength in tension and shear as evaluated by an agency acceptable to authorities having jurisdiction.
 - b. Annotate to indicate application of each product submitted and compliance with requirements.
 3. Restrained-Isolation Devices: Include ratings for horizontal, vertical, and combined loads.
- B. Delegated-Design Submittal: For vibration isolation and seismic-restraint details 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. Design Calculations: Calculate static and dynamic loading due to equipment weight and operation, seismic forces required to select vibration isolators and seismic restraints.
 - a. Coordinate design calculations with wind-load calculations required for equipment mounted outdoors. Comply with requirements in other electrical Sections for equipment mounted outdoors.
 2. Indicate materials and dimensions and identify hardware, including attachment and anchorage devices.
 3. Field-fabricated supports.
 4. Seismic-Restraint Details:
 - a. Design Analysis: To support selection and arrangement of seismic restraints. Include calculations of combined tensile and shear loads.
 - b. Details: Indicate fabrication and arrangement. Detail attachments of restraints to the restrained items and to the structure. Show attachment locations, methods, and spacings. Identify components, list their strengths, and indicate directions and values of forces transmitted to the structure during seismic events. Indicate association with vibration isolation devices.
 - c. Preapproval and Evaluation Documentation: By an agency acceptable to authorities having jurisdiction, showing maximum ratings of restraint items and the basis for approval (tests or calculations).

VIBRATION AND SEISMIC CONTROLS FOR ELECTRICAL SYSTEMS

1.6 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Show coordination of seismic bracing for electrical components with other systems and equipment in the vicinity, including other supports and seismic restraints.
- B. Qualification Data: For professional engineer and testing agency.
- C. Welding certificates.
- D. Field quality-control test reports.

1.7 QUALITY ASSURANCE

- A. Testing Agency Qualifications: An independent agency, with the experience and capability to conduct the testing indicated, that is a nationally recognized testing laboratory (NRTL) as defined by OSHA in 29 CFR 1910.7, and that is acceptable to authorities having jurisdiction.
- B. Comply with seismic-restraint requirements in the IBC unless requirements in this Section are more stringent.
- C. Welding: Qualify procedures and personnel according to AWS D1.1 "Structural Welding Code - Steel."
- D. Seismic-restraint devices shall have horizontal and vertical load testing and analysis and shall bear anchorage preapproval OPA number from OSHPD, preapproval by ICC-ES, or preapproval by another agency acceptable to authorities having jurisdiction, showing maximum seismic-restraint ratings. Ratings based on independent testing are preferred to ratings based on calculations. If preapproved ratings are not available, submittals based on independent testing are preferred. Calculations (including combining shear and tensile loads) to support seismic-restraint designs must be signed and sealed by a qualified professional engineer.
- E. Comply with NFPA 70.

PART 2 - PRODUCTS

2.1 VIBRATION ISOLATORS

- A. Manufacturers: Subject to compliance with requirements, provide products by one (1) of the following:
 - 1. Ace Mountings Co., Inc.
 - 2. Amber/Booth Company, Inc.
 - 3. California Dynamics Corporation

VIBRATION AND SEISMIC CONTROLS FOR ELECTRICAL SYSTEMS

4. Isolation Technology, Inc.
 5. Kinetics Noise Control
 6. Mason Industries
 7. Vibration Eliminator Co., Inc.
 8. Vibration Isolation
 9. Vibration Mountings & Controls, Inc.
- B. Pads: Arrange in single or multiple layers of sufficient stiffness for uniform loading over pad area, molded with a nonslip pattern and galvanized-steel baseplates, and factory cut to sizes that match requirements of supported equipment.
1. Resilient Material: Oil- and water-resistant neoprene.
- C. Spring Isolators: Freestanding, laterally stable, open-spring isolators.
1. Outside Spring Diameter: Not less than eighty percent (80%) of the compressed height of the spring at rated load.
 2. Minimum Additional Travel: Fifty percent (50%) of the required deflection at rated load.
 3. Lateral Stiffness: More than eighty percent (80%) of rated vertical stiffness.
 4. Overload Capacity: Support two hundred percent (200%) of rated load, fully compressed, without deformation or failure.
 5. Baseplates: Factory drilled for bolting to structure and bonded to ¼-inch thick, rubber isolator pad attached to baseplate underside. Baseplates shall limit floor load to 500 psig.
 6. Top Plate and Adjustment Bolt: Threaded top plate with adjustment bolt and cap screw to fasten and level equipment.
- D. Restrained Spring Isolators: Freestanding, steel, open-spring isolators with seismic or limit-stop restraint.
1. Housing: Steel with resilient vertical-limit stops to prevent spring extension due to weight being removed; factory-drilled baseplate bonded to ¼-inch thick, neoprene or rubber isolator pad attached to baseplate underside; and adjustable equipment mounting and leveling bolt that acts as blocking during installation.
 2. Restraint: Seismic or limit-stop as required for equipment and authorities having jurisdiction.
 3. Outside Spring Diameter: Not less than eighty percent (80%) of the compressed height of the spring at rated load.
 4. Minimum Additional Travel: Fifty percent (50%) of the required deflection at rated load.
 5. Lateral Stiffness: More than eighty percent (80%) of rated vertical stiffness.

VIBRATION AND SEISMIC CONTROLS FOR ELECTRICAL SYSTEMS

6. **Overload Capacity:** Support two hundred percent (200%) of rated load, fully compressed, without deformation or failure.

2.2 SEISMIC-RESTRAINT DEVICES

- A. **Manufacturers:** Subject to compliance with requirements, provide products by one (1) of the following:
 1. Amber/Booth Company, Inc.
 2. California Dynamics Corporation
 3. Cooper B-Line, Inc.; a division of Cooper Industries
 4. Hilti Inc.
 5. Loos & Co.; Seismic Earthquake Division
 6. Mason Industries
 7. TOLCO Incorporated; a brand of NIBCO INC.
 8. Unistrut; Tyco International, Ltd.
- B. **General Requirements for Restraint Components:** Rated strengths, features, and application requirements shall be as defined in reports by an agency acceptable to authorities having jurisdiction.
 1. **Structural Safety Factor:** Allowable strength in tension, shear, and pullout force of components shall be at least four times (4x) the maximum seismic forces to which they will be subjected.
- C. **Channel Support System:** MFMA-3, shop- or field-fabricated support assembly made of slotted steel channels with accessories for attachment to braced component at one (1) end and to building structure at the other end and other matching components and with corrosion-resistant coating; and rated in tension, compression, and torsion forces.
- D. **Restraint Cables:** ASTM A 603 galvanized-steel cables with end connections made of steel assemblies with thimbles, brackets, swivels, and bolts designed for restraining cable service; and with a minimum of two (2) clamping bolts for cable engagement.
- E. **Hanger Rod Stiffener:** Steel tube or steel slotted-support-system sleeve with internally bolted connections to hanger rod. Do not weld stiffeners to rods.
- F. **Bushings for Floor-Mounted Equipment Anchor:** Neoprene bushings designed for rigid equipment mountings, and matched to type and size of anchors and studs.
- G. **Bushing Assemblies for Wall-Mounted Equipment Anchorage:** Assemblies of neoprene elements and steel sleeves designed for rigid equipment mountings, and matched to type and size of attachment devices.

VIBRATION AND SEISMIC CONTROLS FOR ELECTRICAL SYSTEMS

- H. Resilient Isolation Washers and Bushings: One-piece, molded, oil- and water-resistant neoprene, with a flat washer face.
- I. Mechanical Anchor: Drilled-in and stud-wedge or female-wedge type in zinc-coated steel for interior applications and stainless steel for exterior applications. Select anchors with strength required for anchor and as tested according to ASTM E 488. Minimum length of eight times (8x) diameter.
- J. Adhesive Anchor: Drilled-in and capsule anchor system containing polyvinyl or urethane methacrylate-based resin and accelerator, or injected polymer or hybrid mortar adhesive. Provide anchor bolts and hardware with zinc-coated steel for interior applications and stainless steel for exterior applications. Select anchor bolts with strength required for anchor and as tested according to ASTM E 488.

2.3 FACTORY FINISHES

- A. Finish: Manufacturer's standard paint applied to factory-assembled and -tested equipment before shipping.
 - 1. Powder coating on springs and housings.
 - 2. All hardware shall be galvanized. Hot-dip galvanize metal components for exterior use.
 - 3. Baked enamel or powder coat for metal components on isolators for interior use.
 - 4. Color-code or otherwise mark vibration isolation and seismic-control devices to indicate capacity range.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas and equipment to receive vibration isolation and seismic-control devices for compliance with requirements for installation tolerances and other conditions affecting performance.
- B. Examine roughing-in of reinforcement and cast-in-place anchors to verify actual locations before installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 APPLICATIONS

- A. Multiple Raceways or Cables: Secure raceways and cables to trapeze member with clamps approved for application by an agency acceptable to authorities having jurisdiction.

VIBRATION AND SEISMIC CONTROLS FOR ELECTRICAL SYSTEMS

- B. **Hanger Rod Stiffeners:** Install hanger rod stiffeners where indicated or scheduled on Drawings to receive them and where required to prevent buckling of hanger rods due to seismic forces.
- C. **Strength of Support and Seismic-Restraint Assemblies:** Where not indicated, select sizes of components so strength will be adequate to carry present and future static and seismic loads within specified loading limits.

3.3 SEISMIC-RESTRAINT DEVICE INSTALLATION

- A. **Equipment and Hanger Restraints:**
 - 1. Install restrained isolators on electrical equipment.
 - 2. Install resilient, bolt-isolation washers on equipment anchor bolts where clearance between anchor and adjacent surface exceeds 0.125 inch.
 - 3. Install seismic-restraint devices using methods approved by an agency acceptable to authorities having jurisdiction providing required submittals for component.
- B. **Install bushing assemblies for mounting bolts for wall-mounted equipment, arranged to provide resilient media where equipment or equipment-mounting channels are attached to wall.**
- C. **Attachment to Structure:** If specific attachment is not indicated, anchor bracing to structure at flanges of beams, at upper truss chords of bar joists, or at concrete members.
- D. **Drilled-in Anchors:**
 - 1. Identify position of reinforcing steel and other embedded items prior to drilling holes for anchors. Do not damage existing reinforcing or embedded items during coring or drilling. Notify the structural engineer if reinforcing steel or other embedded items are encountered during drilling. Locate and avoid prestressed tendons, electrical and telecommunications conduit, and gas lines.
 - 2. Do not drill holes in concrete or masonry until concrete, mortar, or grout has achieved full design strength.
 - 3. **Wedge Anchors:** Protect threads from damage during anchor installation. Heavy-duty sleeve anchors shall be installed with sleeve fully engaged in the structural element to which anchor is to be fastened.
 - 4. **Adhesive Anchors:** Clean holes to remove loose material and drilling dust prior to installation of adhesive. Place adhesive in holes proceeding from the bottom of the hole and progressing toward the surface in such a manner as to avoid introduction of air pockets in the adhesive.
 - 5. Set anchors to manufacturer's recommended torque, using a torque wrench.
 - 6. Install zinc-coated steel anchors for interior and stainless-steel anchors for exterior applications.

VIBRATION AND SEISMIC CONTROLS FOR ELECTRICAL SYSTEMS

3.4 ACCOMMODATION OF DIFFERENTIAL SEISMIC MOTION

- A. Install flexible connections in runs of raceways, cables, wireways, cable trays, and busways where they cross seismic joints, where adjacent sections or branches are supported by different structural elements, and where they terminate with connection to equipment that is anchored to a different structural element from the one supporting them as they approach equipment.

3.5 FIELD QUALITY CONTROL

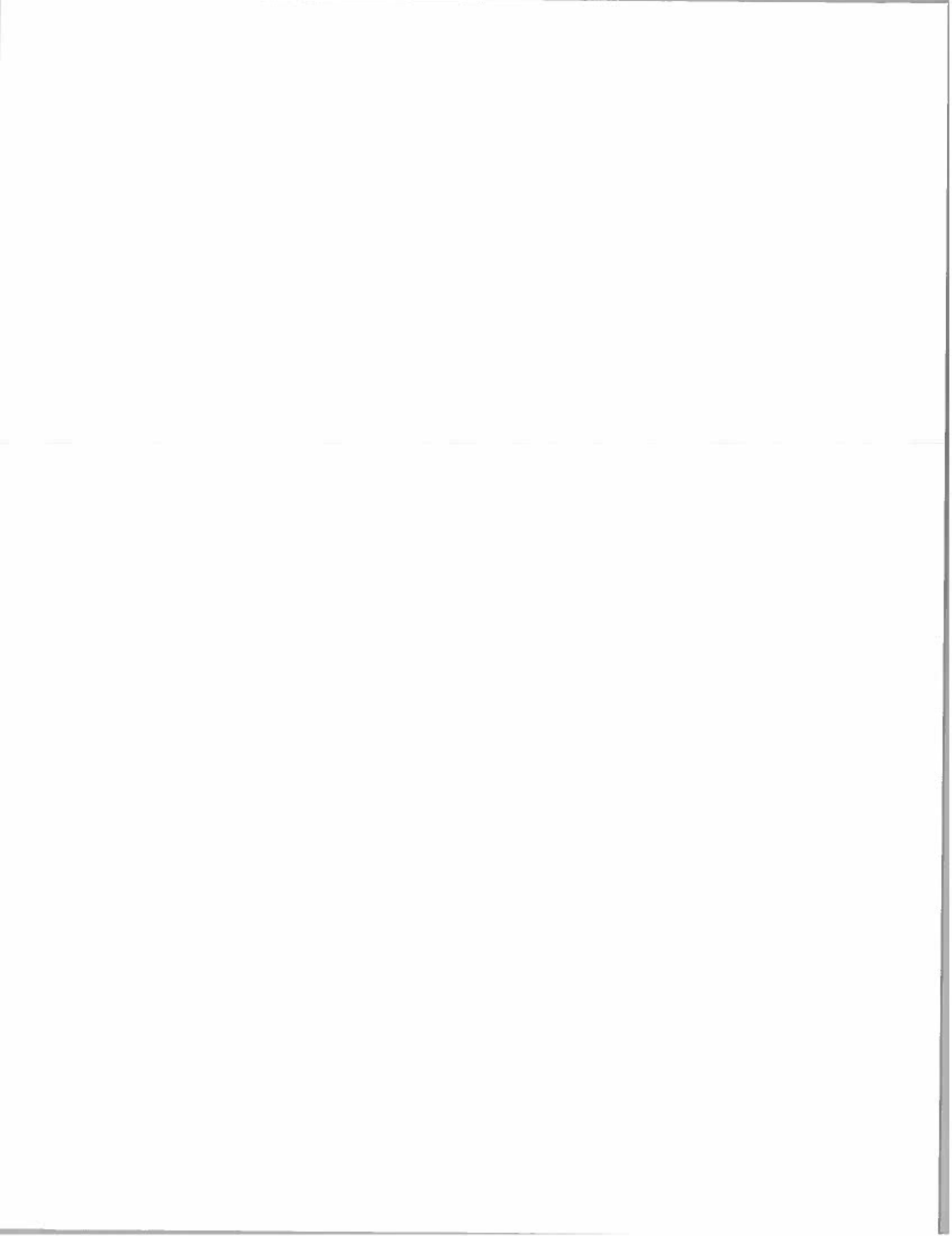
- A. Testing Agency: Contractor shall engage a qualified testing agency to perform tests and inspections and prepare test reports.
- B. Tests and Inspections:
 - 1. Provide evidence of recent calibration of test equipment by a testing agency acceptable to authorities having jurisdiction.
 - 2. Schedule test with Owner, through Architect, before connecting anchorage device to restrained component (unless postconnection testing has been approved), and with at least seven (7) days' advance notice.
 - 3. Obtain Architect's approval before transmitting test loads to structure. Provide temporary load-spreading members.
 - 4. Test at least four (4) of each type and size of installed anchors and fasteners selected by Architect.
 - 5. Test to ninety percent (90%) of rated proof load of device.
 - 6. Measure isolator restraint clearance.
 - 7. Measure isolator deflection.
 - 8. Verify snubber minimum clearances.
 - 9. If a device fails test, modify all installations of same type and retest until satisfactory results are achieved.
- C. Remove and replace malfunctioning units and retest as specified above.
- D. Prepare test and inspection reports.

3.6 ADJUSTING

- A. Adjust isolators after isolated equipment is at operating weight.
- B. Adjust limit stops on restrained spring isolators to mount equipment at normal operating height. After equipment installation is complete, adjust limit stops so they are out of contact during normal operation.
- C. Adjust active height of spring isolators.
- D. Adjust restraints to permit free movement of equipment within normal mode of operation.

VIBRATION AND SEISMIC CONTROLS FOR ELECTRICAL SYSTEMS

END OF SECTION



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. Identification for raceways.
 - 2. Identification of power and control cables.
 - 3. Identification for conductors.
 - 4. Underground-line warning tape.
 - 5. Warning labels and signs.
 - 6. Instruction signs.
 - 7. Equipment identification labels.
 - 8. Miscellaneous identification products.

1.3 SUBMITTALS

- A. Product Data: For each electrical identification product indicated.
- B. Samples: For each type of label and sign to illustrate size, colors, lettering style, mounting provisions, and graphic features of identification products.
- C. Identification Schedule: An index of nomenclature of electrical equipment and system components used in identification signs and labels.

1.4 QUALITY ASSURANCE

- A. Comply with ANSI A13.1 and IEEE C2.
- B. Comply with NFPA 70.
- C. Comply with 29 CFR 1910.144 and 29 CFR 1910.145.
- D. Comply with ANSI Z535.4 for safety signs and labels.
- E. Adhesive-attached labeling materials, including label stocks, laminating adhesives, and inks used by label printers, shall comply with UL 969.

1.5 COORDINATION

- A. Coordinate identification names, abbreviations, colors, and other features with requirements in other Sections requiring identification applications, Drawings, Shop Drawings, manufacturer's wiring diagrams, and the Operation and Maintenance Manual; and with those required by codes, standards, and 29 CFR 1910.145. Use consistent designations throughout Project.

IDENTIFICATION FOR ELECTRICAL SYSTEMS

- B. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.
- C. Coordinate installation of identifying devices with location of access panels and doors.
- D. Install identifying devices before installing acoustical ceilings and similar concealment.

PART 2 - PRODUCTS

2.1 POWER RACEWAY IDENTIFICATION MATERIALS

- A. Comply with ANSI A13.1 for minimum size of letters for legend and for minimum length of color field for each raceway size.
- B. Colors for Raceways Carrying Circuits at 600 V or Less:
 - 1. Black letters on an orange field.
 - 2. Legend: Indicate voltage and system or service type.
- C. Colors for Raceways Carrying Circuits at More Than 600 V:
 - 1. Black letters on an orange field.
 - 2. Legend: "DANGER CONCEALED HIGH VOLTAGE WIRING" with 3-inch-high letters on 20-inch centers.
- D. Self-Adhesive Vinyl Labels for Raceways Carrying Circuits at 600 V or Less: Preprinted, flexible label laminated with a clear, weather- and chemical-resistant coating and matching wraparound adhesive tape for securing ends of legend label.
- E. Snap-Around Labels for Raceways Carrying Circuits at 600 V or Less: Slit, pretensioned, flexible, preprinted, color-coded acrylic sleeve, with diameter sized to suit diameter of raceway or cable it identifies and to stay in place by gripping action.
- F. Snap-Around, Color-Coding Bands for Raceways Carrying Circuits at 600 V or Less: Slit, pretensioned, flexible, solid-colored acrylic sleeve, 2 inches long, with diameter sized to suit diameter of raceway or cable it identifies and to stay in place by gripping action.
- G. Tape and Stencil for Raceways Carrying Circuits More Than 600 V: 4-inch-wide black stripes on 10-inch centers diagonally over orange background that extends full length of raceway or duct and is 12 inches wide. Stop stripes at legends.
- H. Metal Tags: Brass or aluminum, 2 by 2 by 0.05 inch, with stamped legend, punched for use with self-locking cable tie fastener.

IDENTIFICATION FOR ELECTRICAL SYSTEMS

- I. Write-On Tags: Polyester tag, 0.015 inch thick, with corrosion-resistant grommet and cable tie for attachment to conductor or cable.
 - 1. Marker for Tags: Machine-printed, permanent, waterproof, black ink marker recommended by printer manufacturer.

2.2 ARMORED AND METAL-CLAD CABLE IDENTIFICATION MATERIALS

- A. Comply with ANSI A13.1 for minimum size of letters for legend and for minimum length of color field for each raceway and cable size.
- B. Colors for Raceways Carrying Circuits at 600 V and Less:
 - 1. Black letters on an orange field.
 - 2. Legend: Indicate voltage and system or service type.
- C. Colors for Raceways Carrying Circuits at More Than 600 V:
 - 1. Black letters on an orange field.
 - 2. Legend: "DANGER CONCEALED HIGH VOLTAGE WIRING" with 3-inch-high letters on 20-inch centers.
- D. Self-Adhesive Vinyl Labels: Preprinted, flexible label laminated with a clear, weather- and chemical-resistant coating and matching wraparound adhesive tape for securing ends of legend label.

2.3 POWER AND CONTROL CABLE IDENTIFICATION MATERIALS

- A. Comply with ANSI A13.1 for minimum size of letters for legend and for minimum length of color field for each raceway and cable size.
- B. Self-Adhesive Vinyl Labels: Preprinted, flexible label laminated with a clear, weather- and chemical-resistant coating and matching wraparound adhesive tape for securing ends of legend label.
- C. Metal Tags: Brass or aluminum, 2 by 2 by 0.05 inch, with stamped legend, punched for use with self-locking cable tie fastener.
- D. Write-On Tags: Polyester tag, 0.015 inch thick, with corrosion-resistant grommet and cable tie for attachment to conductor or cable.
 - 1. Marker for Tags: Machine-printed, permanent, waterproof, black ink marker recommended by printer manufacturer.
- E. Snap-Around Labels: Slit, pretensioned, flexible, preprinted, color-coded acrylic sleeve, with diameter sized to suit diameter of raceway or cable it identifies and to stay in place by gripping action.

IDENTIFICATION FOR ELECTRICAL SYSTEMS

- F. Snap-Around, Color-Coding Bands: Slit, pretensioned, flexible, solid-colored acrylic sleeve, 2 inches long, with diameter sized to suit diameter of raceway or cable it identifies and to stay in place by gripping action.

2.4 CONDUCTOR IDENTIFICATION MATERIALS

- A. Color-Coding Conductor Tape: Colored, self-adhesive vinyl tape not less than 3 mils thick by 1 to 2 inches wide.
- B. Self-Adhesive Vinyl Labels: Preprinted, flexible label laminated with a clear, weather- and chemical-resistant coating and matching wraparound adhesive tape for securing ends of legend label.
- C. Snap-Around Labels: Slit, pretensioned, flexible, preprinted, color-coded acrylic sleeve, with diameter sized to suit diameter of raceway or cable it identifies and to stay in place by gripping action.
- D. Snap-Around, Color-Coding Bands: Slit, pretensioned, flexible, solid-colored acrylic sleeve, 2 inches long, with diameter sized to suit diameter of raceway or cable it identifies and to stay in place by gripping action.
- E. Marker Tapes: Vinyl or vinyl-cloth, self-adhesive wraparound type, with circuit identification legend machine printed by thermal transfer or equivalent process.
- F. Write-On Tags: Polyester tag, 0.015 inch thick, with corrosion-resistant grommet and cable tie for attachment to conductor or cable.
 - 1. Marker for Tags: Machine-printed, permanent, waterproof, black ink marker recommended by printer manufacturer.

2.5 WARNING LABELS AND SIGNS

- A. Comply with NFPA 70 and 29 CFR 1910.145.
- B. Self-Adhesive Warning Labels: Factory-printed, multicolor, pressure-sensitive adhesive labels, configured for display on front cover, door, or other access to equipment unless otherwise indicated.
- C. Baked-Enamel Warning Signs:
 - 1. Preprinted aluminum signs, punched or drilled for fasteners, with colors, legend, and size required for application.
 - 2. ¼-inch grommets in corners for mounting.
 - 3. Nominal size, 7 by 10 inches.
- D. Metal-Backed, Butyrate Warning Signs:

IDENTIFICATION FOR ELECTRICAL SYSTEMS

1. Weather-resistant, nonfading, preprinted, cellulose-acetate butyrate signs with 0.0396-inch galvanized-steel backing; and with colors, legend, and size required for application.
 2. ¼-inch grommets in corners for mounting.
 3. Nominal size, 10 by 14 inches.
- E. Warning label and sign shall include, but are not limited to, the following legends:
1. Multiple Power Source Warning: "DANGER - ELECTRICAL SHOCK HAZARD - EQUIPMENT HAS MULTIPLE POWER SOURCES."
 2. Workspace Clearance Warning: "WARNING - OSHA REGULATION - AREA IN FRONT OF ELECTRICAL EQUIPMENT MUST BE KEPT CLEAR FOR 36 INCHES."

2.6 INSTRUCTION SIGNS

- A. Engraved, laminated acrylic or melamine plastic, minimum 1/16 inch thick for signs up to 20 sq. inches and 1/8 inch thick for larger sizes.
1. Engraved legend with black letters on white face.
 2. Punched or drilled for mechanical fasteners.
 3. Framed with mitered acrylic molding and arranged for attachment at applicable equipment.
- B. Adhesive Film Label: Machine printed, in black, by thermal transfer or equivalent process. Minimum letter height shall be 3/8 inch.
- C. Adhesive Film Label with Clear Protective Overlay: Machine printed, in black, by thermal transfer or equivalent process. Minimum letter height shall be 3/8 inch. Overlay shall provide a weatherproof and UV-resistant seal for label.

2.7 EQUIPMENT IDENTIFICATION LABELS

- A. Adhesive Film Label: Machine printed, in black, by thermal transfer or equivalent process. Minimum letter height shall be 3/8 inch.
- B. Adhesive Film Label with Clear Protective Overlay: Machine printed, in black, by thermal transfer or equivalent process. Minimum letter height shall be 3/8 inch. Overlay shall provide a weatherproof and UV-resistant seal for label.
- C. Self-Adhesive, Engraved, Laminated Acrylic or Melamine Label: Adhesive backed, with white letters on a dark-gray background. Minimum letter height shall be 3/8 inch.
- D. Engraved, Laminated Acrylic or Melamine Label: Punched or drilled for screw mounting. White letters on a dark-gray background. Minimum letter height shall be 3/8 inch.

IDENTIFICATION FOR ELECTRICAL SYSTEMS

- E. Stenciled Legend: In nonfading, waterproof, black ink or paint. Minimum letter height shall be 1 inch.

2.8 CABLE TIES

- A. General-Purpose Cable Ties: Fungus inert, self extinguishing, one piece, self locking, Type 6/6 nylon.
 - 1. Minimum Width: 3/16 inch.
 - 2. Tensile Strength at 73 deg F (23 deg C), According to ASTM D 638: 12,000 psi.
 - 3. Temperature Range: Minus 40 to plus 185 deg F (Minus 40 to plus 85 deg C).
 - 4. Color: Black except where used for color-coding.
- B. UV-Stabilized Cable Ties: Fungus inert, designed for continuous exposure to exterior sunlight, self extinguishing, one piece, self locking, Type 6/6 nylon.
 - 1. Minimum Width: 3/16 inch.
 - 2. Tensile Strength at 73 deg F (23 deg C), According to ASTM D 638: 12,000 psi.
 - 3. Temperature Range: Minus 40 to plus 185 deg F (Minus 40 to plus 85 deg C).
 - 4. Color: Black.
- C. Plenum-Rated Cable Ties: Self extinguishing, UV stabilized, one piece, self locking.
 - 1. Minimum Width: 3/16 inch.
 - 2. Tensile Strength at 73 deg F (23 deg C), According to ASTM D 638: 7000 psi.
 - 3. UL 94 Flame Rating: 94V-0.
 - 4. Temperature Range: Minus 50 to plus 284 deg F (Minus 46 to plus 140 deg C).
 - 5. Color: Black.

2.9 DATA RECEPTACLES

- A. Adhesive Film Label: Machine printed, in black, by thermal transfer or equivalent process. It should read "DATA ONLY". Minimum letter height shall be 3/8 inch.
- B. Adhesive Film Label with Clear Protective Overlay: Machine printed, in black, by thermal transfer or equivalent process. Minimum letter height shall be 3/8 inch. Overlay shall provide a weatherproof and UV-resistant seal for label.
- C. Self-Adhesive, Engraved, Laminated Acrylic or Melamine Label: Adhesive backed, with white letters on a dark-gray background. Minimum letter height

shall be 3/8 inch.

2.10 MISCELLANEOUS IDENTIFICATION PRODUCTS

- A. Fasteners for Labels and Signs: Self-tapping, stainless-steel screws or stainless-steel machine screws with nuts and flat and lock washers.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Verify identity of each item before installing identification products.
- B. Location: Install identification materials and devices at locations for most convenient viewing without interference with operation and maintenance of equipment.
- C. Apply identification devices to surfaces that require finish after completing finish work.
- D. Self-Adhesive Identification Products: Clean surfaces before application, using materials and methods recommended by manufacturer of identification device.
- E. Attach signs and plastic labels that are not self-adhesive type with mechanical fasteners appropriate to the location and substrate.
- F. System Identification Color-Coding Bands for Raceways and Cables: Each color-coding band shall completely encircle cable or conduit. Place adjacent bands of two-color markings in contact, side by side. Locate bands at changes in direction, at penetrations of walls and floors, at 50-foot maximum intervals in straight runs, and at 25-foot maximum intervals in congested areas.
- G. Aluminum Wraparound Marker Labels and Metal Tags: Secure tight to surface of conductor or cable at a location with high visibility and accessibility.
- H. Cable Ties: For attaching tags. Use general-purpose type, except as listed below:
 - 1. Outdoors: UV-stabilized nylon.
 - 2. In Spaces Handling Environmental Air: Plenum rated.

3.2 IDENTIFICATION SCHEDULE

- A. Concealed Raceways, Duct Banks, More Than 600 V, within Buildings: Tape and stencil 4-inch-wide black stripes on 10-inch centers over orange background that extends full length of raceway or duct and is 12 inches wide. Stencil legend "DANGER CONCEALED HIGH VOLTAGE WIRING" with 3-inch-high black letters on 20-inch centers. Stop stripes at legends. Apply to the following finished surfaces:

IDENTIFICATION FOR ELECTRICAL SYSTEMS

1. Floor surface directly above conduits running beneath and within 12 inches of a floor that is in contact with earth or is framed above unexcavated space.
 2. Wall surfaces directly external to raceways concealed within wall.
 3. Accessible surfaces of concrete envelope around raceways in vertical shafts, exposed in the building, or concealed above suspended ceilings.
- B. Accessible Raceways, Armored and Metal-Clad Cables, More Than 600 V: Self-adhesive vinyl labels. Install labels at 30-foot maximum intervals.
- C. Accessible Raceways and Metal-Clad Cables, 600 V or Less, for Service, Feeder, and Branch Circuits More Than 30 A, and 120 V to ground: Identify with self-adhesive vinyl label. Install labels at 30-foot maximum intervals.
- D. Power-Circuit Conductor Identification, 600 V or Less: For conductors in vaults, pull and junction boxes, manholes, and handholes, use color-coding conductor tape to identify the phase.
1. Color-Coding for Phase and Voltage Level Identification, 600 V or Less: Use colors listed below for ungrounded service, feeder, and branch-circuit conductors.
 - a. Color shall be factory applied or field applied for sizes larger than No. 8 AWG, if authorities having jurisdiction permit.
 - b. Colors for 208/120-V Circuits:
 - 1) Phase A: Black.
 - 2) Phase B: Red.
 - 3) Phase C: Blue.
 - c. Colors for 480/277-V Circuits:
 - 1) Phase A: Brown.
 - 2) Phase B: Orange.
 - 3) Phase C: Yellow.
 - d. Field-Applied, Color-Coding Conductor Tape: Apply in half-lapped turns for a minimum distance of 6 inches from terminal points and in boxes where splices or taps are made. Apply last two (2) turns of tape with no tension to prevent possible unwinding. Locate bands to avoid obscuring factory cable markings.
- E. Power-Circuit Conductor Identification, More than 600 V: For conductors in vaults, pull and junction boxes, manholes, and handholes, use write-on tags, nonmetallic plastic tag holder with adhesive-backed phase tags, and a separate tag with the circuit designation.
- F. Install instructional sign including the color-code for grounded and ungrounded conductors using adhesive-film-type labels.

IDENTIFICATION FOR ELECTRICAL SYSTEMS

- G. **Conductors to Be Extended in the Future:** Attach marker tape to conductors and list source.
- H. **Auxiliary Electrical Systems Conductor Identification:** Identify field-installed alarm, control, and signal connections.
 - 1. Identify conductors, cables, and terminals in enclosures and at junctions, terminals, and pull points. Identify by system and circuit designation.
 - 2. Use system of marker tape designations that is uniform and consistent with system used by manufacturer for factory-installed connections.
 - 3. Coordinate identification with Project Drawings, manufacturer's wiring diagrams, and the Operation and Maintenance Manual.
- I. **Workspace Indication:** Install floor marking tape to show working clearances in the direction of access to live parts. Workspace shall be as required by NFPA 70 and 29 CFR 1926.403 unless otherwise indicated. Do not install at flush-mounted panelboards and similar equipment in finished spaces.
- J. **Warning Labels for Indoor Cabinets, Boxes, and Enclosures for Power and Lighting:** Self-adhesive warning labels.
 - 1. Comply with 29 CFR 1910.145.
 - 2. Identify system voltage with black letters on an orange background.
 - 3. Apply to exterior of door, cover, or other access.
 - 4. For equipment with multiple power or control sources, apply to door or cover of equipment including, but not limited to, the following:
 - a. Power transfer switches.
 - b. Controls with external control power connections.
- K. **Operating Instruction Signs:** Install instruction signs to facilitate proper operation and maintenance of electrical systems and items to which they connect. Install instruction signs with approved legend where instructions are needed for system or equipment operation.
- L. **Emergency Operating Instruction Signs:** Install instruction signs with white legend on a red background with minimum 3/8-inch-high letters for emergency instructions at equipment used for power transfer and load shedding.
- M. **Equipment Identification Labels:** On each unit of equipment, install unique designation label that is consistent with wiring diagrams, schedules, and the Operation and Maintenance Manual. Apply labels to disconnect switches and protection equipment, central or master units, control panels, control stations, terminal cabinets, and racks of each system. Systems include power, lighting, control, communication, signal, monitoring, and alarm systems unless equipment is provided with its own identification.
 - 1. **Labeling Instructions:**

IDENTIFICATION FOR ELECTRICAL SYSTEMS

- a. Indoor Equipment: Adhesive film label. Unless otherwise indicated, provide a single line of text with ½-inch-high letters on 1½-inch-high label; where two (2) lines of text are required, use labels 2 inches high.
 - b. Outdoor Equipment: Engraved, laminated acrylic or melamine label. Stenciled legend 4 inches high.
 - c. Elevated Components: Increase sizes of labels and letters to those appropriate for viewing from the floor.
 - d. Unless provided with self-adhesive means of attachment, fasten labels with appropriate mechanical fasteners that do not change the NEMA or NRTL rating of the enclosure.
2. Equipment to Be Labeled:
- a. Panelboards: Typewritten directory of circuits in the location provided by panelboard manufacturer. Panelboard identification shall be self-adhesive and engraved laminated acrylic or melamine label.
 - b. Enclosures and electrical cabinets.
 - c. Access doors and panels for concealed electrical items.
 - d. Contactors.
 - e. Remote-controlled switches, dimmer modules, and control devices.

END OF SECTION

ELECTRICAL DEMOLITION REQUIREMENTS

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 involving electrical system as described in Contract Documents.
- B. Related Sections:
 - 1. Section 16010 – Basic Electrical Requirements
 - 2. New and replacement work specified in appropriate specification sections.

1.3 SCHEDULING

- A. Include on Construction Schedule sequence of individual electrical demolition operations.
- B. Coordinate with Owner for equipment and materials to be removed by Owner.

PART 2 - PRODUCTS

Not Used

PART 3 - EXECUTION

3.1 EXAMINATION

- A. All relocations, reconnections and removals are not necessarily indicated on Drawings. All such work shall be included without additional cost to Owner.

3.2 PREPARATION

- A. Disconnect equipment that is to be removed or relocated. Carefully remove, disassemble or dismantle as required, and store in approved location on site, existing items to be reused in completed work.
- B. Where affected by demolition or new construction, relocate, extend or repair raceways, conductors, outlets and apparatus to allow continued use of electrical system. Use methods and materials as specified for new construction.

ELECTRICAL DEMOLITION REQUIREMENTS

3.3 PERFORMANCE

- A. Perform drilling, cutting, block-offs and demolition work required for removal of necessary portions of electrical system. Do not cut joists, beams, girders, trusses or columns without prior written permission from Architect.
- B. Remove concealed wiring abandoned due to demolition or new construction. Remove circuits, conduits and conductors that are not to be re-used back to next active fixture, device or junction box.
- C. Patch, repair and finish surfaces affected by electrical demolition work, unless work is specifically called for under other Sections of the specifications.

3.4 CLEANING

- A. Remove obsolete raceways, conductors, apparatus and lighting fixtures promptly from site and dispose of legally.

END OF SECTION

LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

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. This Section includes the following:
 - 1. Building wires and cables rated 600 V and less.
 - 2. Connectors, splices, and terminations rated 600 V and less.
 - 3. Sleeves and sleeve seals for cables.

1.3 DEFINITIONS

- A. EPDM: Ethylene-propylene-diene terpolymer rubber.
- B. NBR: Acrylonitrile-butadiene rubber.

1.4 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Qualification Data: For testing agency.
- C. Field quality-control test reports.

1.5 QUALITY ASSURANCE

- A. Testing Agency Qualifications: An independent agency, with the experience and capability to conduct the testing indicated, that is a member company of the InterNational Electrical Testing Association or is a nationally recognized testing laboratory (NRTL) as defined by OSHA in 29 CFR 1910.7, and that is acceptable to authorities having jurisdiction.
 - 1. Testing Agency's Field Supervisor: Person currently certified by the InterNational Electrical Testing Association or the National Institute for Certification in Engineering Technologies to supervise on-site testing specified in Part 3.
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- C. Comply with NFPA 70.

LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

1.6 COORDINATION

- A. Set sleeves in cast-in-place concrete, masonry walls, and other structural components as they are constructed.

PART 2 - PRODUCTS

2.1 CONDUCTORS AND CABLES

- A. Manufacturers: Subject to compliance with requirements, provide products by one (1) of the following:
 - 1. Alcan Products Corporation; Alcan Cable Division
 - 2. American Insulated Wire Corp.; a Leviton Company
 - 3. General Cable Corporation
 - 4. Senator Wire & Cable Company
 - 5. Southwire Company
 - 6. Belden
- B. Copper Conductors: Comply with NEMA WC 70.
- C. Conductor Insulation: Comply with NEMA WC 70 for Types THHN-THWN.
- D. Multi-Conductor Cable: Comply with NEMA WC 70 for metal-clad cable, Type MC with ground wire.

2.2 CONNECTORS AND SPLICES

- A. Manufacturers: Subject to compliance with requirements, provide products by one (1) of the following:
 - 1. AFC Cable Systems, Inc.
 - 2. Hubbell Power Systems, Inc.
 - 3. O-Z/Gedney; EGS Electrical Group LLC
 - 4. 3M; Electrical Products Division
 - 5. Tyco Electronics Corp.
- B. Description: Factory-fabricated connectors and splices of size, ampacity rating, material, type, and class for application and service indicated.

2.3 SLEEVES FOR CABLES

- A. Steel Pipe Sleeves: ASTM A 53, Type E, Grade B, Schedule 40, galvanized steel, plain ends.
- B. Cast-Iron Pipe Sleeves: Cast or fabricated "wall pipe," equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop, unless otherwise indicated.

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- C. Sleeves for Rectangular Openings: Galvanized sheet steel with minimum 0.052- or 0.138-inch thickness as indicated and of length to suit application.

2.4 SLEEVE SEALS

- A. Manufacturers: Subject to compliance with requirements, provide products by one (1) of the following:
 - 1. Advance Products & Systems, Inc.
 - 2. Calpico, Inc.
 - 3. Metraflex Co.
 - 4. Pipeline Seal and Insulator, Inc.
- B. Description: Modular sealing device, designed for field assembly, to fill annular space between sleeve and cable.
 - 1. Sealing Elements: EPDM interlocking links shaped to fit surface of cable or conduit. Include type and number required for material and size of raceway or cable.
 - 2. Pressure Plates: Plastic, Carbon steel, Stainless steel. Include two (2) for each sealing element.
 - 3. Connecting Bolts and Nuts: Stainless steel of length required to secure pressure plates to sealing elements. Include one (1) for each sealing element.

PART 3 - EXECUTION

3.1 CONDUCTOR MATERIAL APPLICATIONS

- A. Feeders: Copper for all feeders. Solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.
- B. Branch Circuits: Copper. Solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.

3.2 CONDUCTOR INSULATION AND MULTICONDUCTOR CABLE APPLICATIONS AND WIRING METHODS

- A. Service Entrance: Type THHN-THWN, single conductors in raceway.
- B. Exposed Feeders: Type THHN-THWN, single conductors in raceway.
- C. Feeders Concealed in Ceilings, Walls, Partitions, and Crawlspace: Type THHN-THWN, single conductors in raceway.
- D. Feeders Concealed in Concrete, below Slabs-on-Grade, and Underground: Type THHN-THWN, single conductors in raceway.

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- E. Feeders in Cable Tray: Type THHN-THWN, single conductors in raceway and metal-clad cable, Type MC.
- F. Exposed Branch Circuits, Including in Crawlspace: Type THHN-THWN, single conductors in raceway.
- G. Branch Circuits Concealed in Ceilings, Walls, and Partitions: Type THHN-THWN, single conductors in raceway and metal-clad cable, Type MC.
- H. Branch Circuits Concealed in Concrete, below Slabs-on-Grade, and Underground: Type THHN-THWN, single conductors in raceway.
- I. Branch Circuits in Cable Tray: Type THHN-THWN, single conductors in raceway and metal-clad cable, Type MC.
- J. Cord Drops and Portable Appliance Connections: Type SO, hard service cord with stainless-steel, wire-mesh, strain relief device at terminations to suit application.
- K. Class 1 Control Circuits: Type THHN-THWN, in raceway.
- L. Class 2 Control Circuits: Type THHN-THWN, in raceway Power-limited cable, concealed in building finishes, Power-limited tray cable, in cable tray.

3.3 INSTALLATION OF CONDUCTORS AND CABLES

- A. Conceal cables in finished walls, ceilings, and floors, unless otherwise indicated.
- B. Use manufacturer-approved pulling compound or lubricant where necessary; compound used must not deteriorate conductor or insulation. Do not exceed manufacturer's recommended maximum pulling tensions and sidewall pressure values.
- C. Use pulling means, including fish tape, cable, rope, and basket-weave wire/cable grips, that will not damage cables or raceway.
- D. Install exposed cables parallel and perpendicular to surfaces of exposed structural members, and follow surface contours where possible.
- E. Support cables according to Section 16073.
- F. Identify and color-code conductors and cables according to Section 16075.

3.4 CONNECTIONS

- A. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

- B. Make splices and taps that are compatible with conductor material and that possess equivalent or better mechanical strength and insulation ratings than unspliced conductors.
 - 1. Use oxide inhibitor in each splice and tap conductor for aluminum conductors.
- C. Wiring at Outlets: Install conductor at each outlet, with at least 12 inches of slack.

3.5 SLEEVE INSTALLATION FOR ELECTRICAL PENETRATIONS

- A. Concrete Slabs and Walls: Install sleeves for penetrations unless core-drilled holes or formed openings are used. Install sleeves during erection of slabs and walls.
- B. Use pipe sleeves unless penetration arrangement requires rectangular sleeved opening.
- C. Rectangular Sleeve Minimum Metal Thickness:
 - 1. For sleeve rectangle perimeter less than 50 inches and no side greater than 16 inches, thickness shall be 0.052 inch.
 - 2. For sleeve rectangle perimeter equal to, or greater than, 50 inches and 1 or more sides equal to, or greater than, 16 inches, thickness shall be 0.138 inch.
- D. Fire-Rated Assemblies: Install sleeves for penetrations of fire-rated floor and wall assemblies unless openings compatible with firestop system used are fabricated during construction of floor or wall.
- E. Cut sleeves to length for mounting flush with both wall surfaces.
- F. Extend sleeves installed in floors 2 inches above finished floor level.
- G. Size pipe sleeves to provide ¼-inch annular clear space between sleeve and cable unless sleeve seal is to be installed or unless seismic criteria require different clearance.
- H. Seal space outside of sleeves with grout for penetrations of concrete and masonry and with approved joint compound for gypsum board assemblies.
- I. Interior Penetrations of Non-Fire-Rated Walls and Floors: Seal annular space between sleeve and cable, using joint sealant appropriate for size, depth, and location of joint according to Section 07900.
- J. Fire-Rated-Assembly Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at cable penetrations.

LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

- K. **Roof-Penetration Sleeves:** Seal penetration of individual cables with flexible boot-type flashing units applied in coordination with roofing work.
- L. **Aboveground Exterior-Wall Penetrations:** Seal penetrations using sleeves and mechanical sleeve seals. Size sleeves to allow for 1-inch annular clear space between pipe and sleeve for installing mechanical sleeve seals.
- M. **Underground Exterior-Wall Penetrations:** Install cast-iron "wall pipes" for sleeves. Size sleeves to allow for 1-inch annular clear space between cable and sleeve for installing mechanical sleeve seals.

3.6 SLEEVE-SEAL INSTALLATION

- A. Install to seal underground exterior-wall penetrations.
- B. Use type and number of sealing elements recommended by manufacturer for cable material and size. Position cable in center of sleeve. Assemble mechanical sleeve seals and install in annular space between cable and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

3.7 FIRESTOPPING

- A. Apply firestopping to electrical penetrations of fire-rated floor and wall assemblies to restore original fire-resistance rating of assembly.

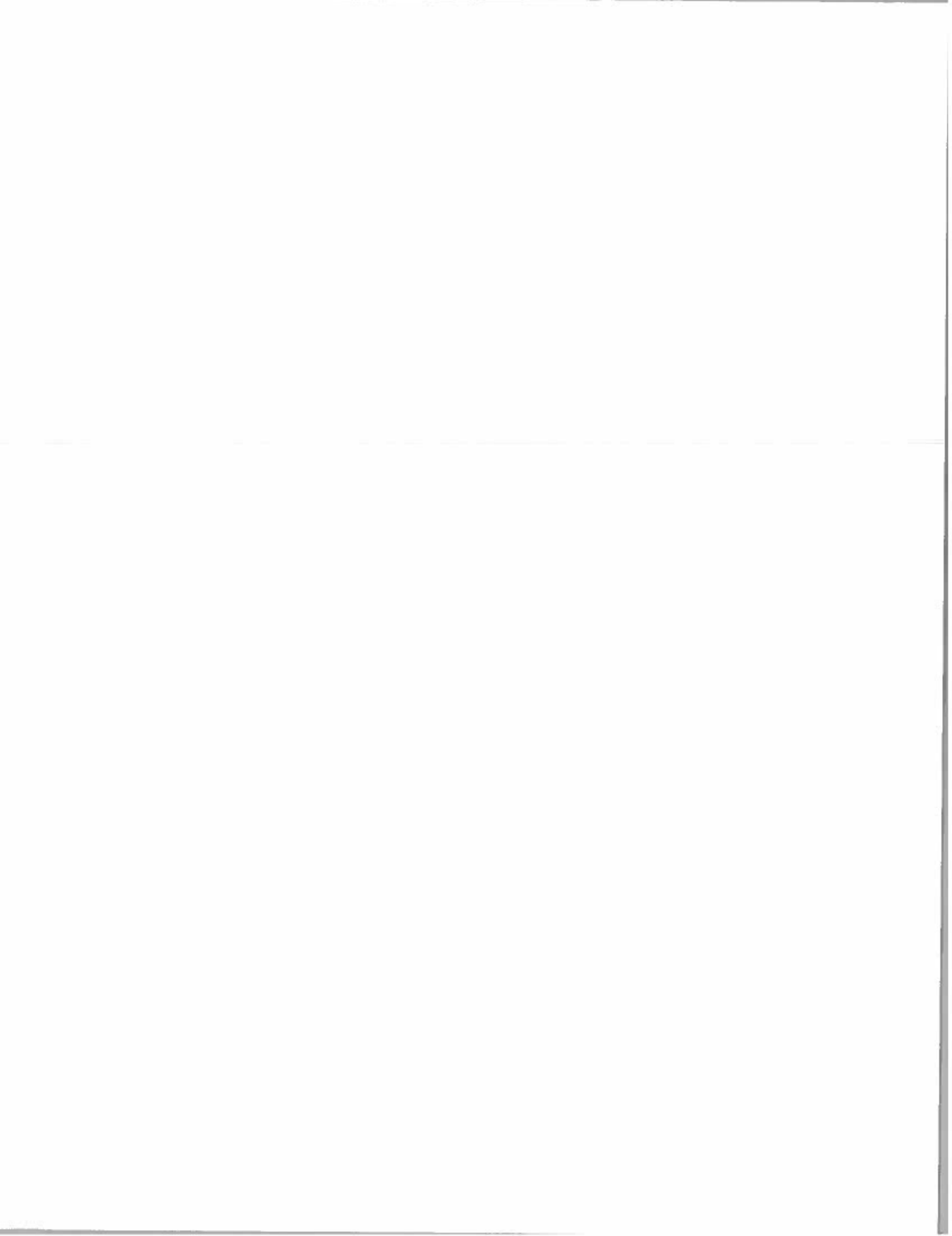
3.8 FIELD QUALITY CONTROL

- A. **Tests and Inspections:**
 - 1. After installing conductors and cables and before electrical circuitry has been energized, test service entrance and feeder conductors, and conductors feeding the following critical equipment and services for compliance with requirements.
 - 2. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.
 - 3. **Infrared Scanning:** After Substantial Completion, but not more than sixty (60) days after Final Acceptance, perform an infrared scan of each splice in cables and conductors No. 3 AWG and larger. Remove box and equipment covers so splices are accessible to portable scanner.
 - a. **Follow-up Infrared Scanning:** Perform an additional follow-up infrared scan of each splice eleven (11) months after date of Substantial Completion.
 - b. **Instrument:** Use an infrared scanning device designed to measure temperature or to detect significant deviations from normal values. Provide calibration record for device.

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- c. Record of Infrared Scanning: Prepare a certified report that identifies splices checked and that describes scanning results. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.
- B. Test Reports: Prepare a written report to record the following:
- 1. Test procedures used.
 - 2. Test results that comply with requirements.
 - 3. Test results that do not comply with requirements and corrective action taken to achieve compliance with requirements.
- C. Remove and replace malfunctioning units and retest as specified above.

END OF SECTION



RACEWAY 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. This Section includes raceways, fittings, boxes, enclosures, and cabinets for electrical wiring.

1.3 DEFINITIONS

- A. EMT: Electrical metallic tubing.
- B. ENT: Electrical nonmetallic tubing.
- C. EPDM: Ethylene-propylene-diene terpolymer rubber.
- D. FMC: Flexible metal conduit.
- E. IMC: Intermediate metal conduit.
- F. LFMC: Liquidtight flexible metal conduit.
- G. LFNC: Liquidtight flexible nonmetallic conduit.
- H. NBR: Acrylonitrile-butadiene rubber.
- I. RNC: Rigid nonmetallic conduit.

1.4 SUBMITTALS

- A. Product Data: For surface raceways, wireways and fittings, floor boxes, hinged-cover enclosures, and cabinets.
- B. Shop Drawings: For the following raceway components. Include plans, elevations, sections, details, and attachments to other work.
 - 1. Custom enclosures and cabinets.
- C. Coordination Drawings: Conduit routing plans, drawn to scale, on which the following items are shown and coordinated with each other, based on input from installers of the items involved:
 - 1. Structural members in the paths of conduit groups with common supports.
 - 2. HVAC and plumbing items and architectural features in the paths of conduit groups with common supports.
- D. Qualification Data: For professional engineer and testing agency.
- E. Source quality-control test reports.

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1.5 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- B. Comply with NFPA 70.

PART 2 - PRODUCTS

2.1 METAL CONDUIT AND TUBING

- A. Manufacturers: Subject to compliance with requirements, provide products by one (1) of the following:
 - 1. AFC Cable Systems, Inc.
 - 2. Alflex Inc.
 - 3. Allied Tube & Conduit; a Tyco International Ltd. Co.
 - 4. Anamet Electrical, Inc.; Anaconda Metal Hose
 - 5. Electri-Flex Co.
 - 6. Manhattan/CDT/Cole-Flex
 - 7. Maverick Tube Corporation
 - 8. O-Z Gedney; a unit of General Signal
 - 9. Wheatland Tube Company
- B. Rigid Steel Conduit: ANSI C80.1.
- C. IMC: ANSI C80.6.
- D. PVC-Coated Steel Conduit: PVC-coated rigid steel conduit and IMC.
 - 1. Comply with NEMA RN 1.
 - 2. Coating Thickness: 0.040 inch, minimum.
- E. EMT: ANSI C80.3.
- F. FMC: Zinc-coated steel or aluminum.
- G. LFMC: Flexible steel conduit with PVC jacket.
- H. Fittings for Conduit (Including all Types and Flexible and Liquidtight), EMT, and Cable: NEMA FB 1; listed for type and size raceway with which used, and for application and environment in which installed.
 - 1. Conduit Fittings for Hazardous (Classified) Locations: Comply with UL 886.
 - 2. Fittings for EMT: Steel or die-cast and set-screw or compression type.

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3. Coating for Fittings for PVC-Coated Conduit: Minimum thickness, 0.040 inch, with overlapping sleeves protecting threaded joints.
- I. Joint Compound for Rigid Steel Conduit or IMC: Listed for use in cable connector assemblies, and compounded for use to lubricate and protect threaded raceway joints from corrosion and enhance their conductivity.

2.2 NONMETALLIC CONDUIT AND TUBING

- A. Manufacturers: Subject to compliance with requirements, provide products by one (1) of the following:
 1. AFC Cable Systems, Inc.
 2. Anamet Electrical, Inc.; Anaconda Metal Hose
 3. Arco Corporation
 4. CANTEX Inc.
 5. CertainTeed Corp.; Pipe & Plastics Group
 6. Condux International, Inc.
 7. ElecSYS, Inc.
 8. Electri-Flex Co.
 9. Lamson & Sessions; Carlon Electrical Products
 10. Manhattan/CDT/Cole-Flex
 11. RACO; a Hubbell Company
 12. Thomas & Betts Corporation
- B. ENT: NEMA TC 13.
- C. RNC: NEMA TC 2, Type EPC-40-PVC, unless otherwise indicated.
- D. LFNC: UL 1660.
- E. Fittings for ENT and RNC: NEMA TC 3; match to conduit or tubing type and material.
- F. Fittings for LFNC: UL 514B.

2.3 METAL WIREWAYS

- A. Manufacturers: Subject to compliance with requirements, provide products by one (1) of the following:
 1. Cooper B-Line, Inc.
 2. Hoffman
 3. Square D; Schneider Electric
- B. Description: Sheet metal sized and shaped as indicated, NEMA 250, Type 3R, unless otherwise indicated.

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- C. **Fittings and Accessories:** Include couplings, offsets, elbows, expansion joints, adapters, hold-down straps, end caps, and other fittings to match and mate with wireways as required for complete system.
- D. **Wireway Covers:** Hinged type, Screw-cover type, Flanged-and-gasketed type, or as indicated.
- E. **Finish:** Manufacturer's standard enamel finish.

2.4 SURFACE RACEWAYS

- A. **Surface Metal Raceways:** Galvanized steel with snap-on covers. Manufacturer's standard enamel finish in color selected by Architect and Owner from manufacturer's full range.
 - 1. **Manufacturers:** Subject to compliance with requirements, provide products by one (1) of the following:
 - a. Thomas & Betts Corporation
 - b. Walker Systems, Inc.; Wiremold Company (The)
 - c. Wiremold Company (The); Electrical Sales Division
- B. **Surface Nonmetallic Raceways:** Two-piece construction, manufactured of rigid PVC with texture and color selected by Architect and Owner from manufacturer's full range.
 - 1. **Manufacturers:** Subject to compliance with requirements, provide products by one (1) of the following:
 - a. Butler Manufacturing Company; Walker Division
 - b. Enduro Systems, Inc.; Composite Products Division
 - c. Hubbell Incorporated; Wiring Device-Kellems Division
 - d. Lamson & Sessions; Carlon Electrical Products
 - e. Panduit Corp.
 - f. Walker Systems, Inc.; Wiremold Company (The)
 - g. Wiremold Company (The); Electrical Sales Division

2.5 BOXES, ENCLOSURES, AND CABINETS

- A. **Manufacturers:** Subject to compliance with requirements, provide products by one (1) of the following:
 - 1. Cooper Crouse-Hinds; Div. of Cooper Industries, Inc.
 - 2. EGS/Appleton Electric
 - 3. Erickson Electrical Equipment Company
 - 4. Hoffman
 - 5. Hubbell Incorporated; Killark Electric Manufacturing Co. Division
 - 6. O-Z/Gedney; a unit of General Signal

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7. RACO; a Hubbell Company
 8. Robroy Industries, Inc.; Enclosure Division
 9. Scott Fetzer Co.; Adalet Division
 10. Spring City Electrical Manufacturing Company
 11. Thomas & Betts Corporation
 12. Walker Systems, Inc.; Wiremold Company (The)
 13. Woodhead, Daniel Company; Woodhead Industries, Inc. Subsidiary
- B. Sheet Metal Outlet and Device Boxes: NEMA OS 1.
- C. Cast-Metal Outlet and Device Boxes: NEMA FB 1, cast ferrous alloy, Type FD, with gasketed cover.
- D. Nonmetallic Outlet and Device Boxes: NEMA OS 2.
- E. Small Sheet Metal Pull and Junction Boxes: NEMA OS 1.
- F. Cast-Metal Access, Pull, and Junction Boxes: NEMA FB 1, galvanized cast iron with gasketed cover.
- G. Hinged-Cover Enclosures: 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.
 2. Nonmetallic Enclosures: Plastic, finished inside with radio-frequency-resistant paint.
- H. Cabinets:
1. NEMA 250, Type 1, galvanized-steel box with removable interior panel and removable front, finished inside and out with manufacturer's standard enamel.
 2. Hinged door in front cover with flush latch and concealed hinge.
 3. Key latch to match panelboards.
 4. Metal barriers to separate wiring of different systems and voltage.
 5. Accessory feet where required for freestanding equipment.

2.6 SLEEVES FOR RACEWAYS

- A. Steel Pipe Sleeves: ASTM A 53, Type E, Grade B, Schedule 40, galvanized steel, plain ends.
- B. Cast-Iron Pipe Sleeves: Cast or fabricated "wall pipe," equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop, unless otherwise indicated.
- C. Sleeves for Rectangular Openings: Galvanized sheet steel with minimum 0.052- or 0.138-inch thickness as indicated and of length to suit application.

RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS

- D. Coordinate sleeve selection and application with selection and application of firestopping.

2.7 SLEEVE SEALS

- A. Basis-of-Design Product: Subject to compliance with requirements, provide the product indicated on Drawings or a comparable product by one (1) of the following:
1. Advance Products & Systems, Inc.
 2. Calpico, Inc.
 3. Metraflex Co.
 4. Pipeline Seal and Insulator, Inc.
- B. Description: Modular sealing device, designed for field assembly, to fill annular space between sleeve and cable.
1. Sealing Elements: EPDM interlocking links shaped to fit surface of cable or conduit. Include type and number required for material and size of raceway or cable.
 2. Pressure Plates: Stainless steel. Include two (2) for each sealing element.
 3. Connecting Bolts and Nuts: Stainless steel of length required to secure pressure plates to sealing elements. Include one (1) for each sealing element.

PART 3 - EXECUTION

3.1 RACEWAY APPLICATION

- A. Comply with the following indoor applications, unless otherwise indicated:
1. Exposed, Not Subject to Physical Damage: EMT, ENT, or RNC.
 2. Exposed, Not Subject to Severe Physical Damage: EMT, RNC identified for such use.
 3. Exposed and Subject to Severe Physical Damage: Rigid steel conduit. Includes raceways in the following locations:
 - a. Loading dock.
 - b. Corridors used for traffic of mechanized carts, forklifts, and pallet-handling units.
 - c. Mechanical rooms.
 4. Concealed in Ceilings and Interior Walls and Partitions: EMT, ENT, or RNC, Type EPC-40-PVC.
 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.

RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS

6. Damp or Wet Locations: Rigid steel conduit.
 7. Raceways for Optical Fiber or Communications Cable in Spaces Used for Environmental Air: Plenum-type, optical fiber/communications cable raceway, EMT.
 8. Raceways for Optical Fiber or Communications Cable Risers in Vertical Shafts: Riser-type, optical fiber/communications cable raceway, EMT.
 9. Raceways for Concealed General Purpose Distribution of Optical Fiber or Communications Cable: General-use, optical fiber/communications cable raceway, Riser-type, optical fiber/communications cable raceway, Plenum-type, optical fiber/communications cable raceway, EMT.
 10. Boxes and Enclosures: NEMA 250, Type 1, except use NEMA 250, Type 4, stainless steel nonmetallic in damp or wet locations.
- B. Comply with the following outdoor applications, unless otherwise indicated:
1. Buried: PVC, schedule 40.
 2. Exposed: Rigid Steel Conduit.
 3. Provide LFNC for connection to vibrating equipment in wet locations. Maximum length shall be 5'.
- C. Minimum Raceway Size: ¾-inch trade size.
- D. Raceway Fittings: Compatible with raceways and suitable for use and location.
1. Rigid and Intermediate Steel Conduit: Use threaded rigid steel conduit fittings, unless otherwise indicated.
 2. PVC Externally Coated, Rigid Steel Conduits: Use only fittings listed for use with that material. Patch and seal all joints, nicks, and scrapes in PVC coating after installing conduits and fittings. Use sealant recommended by fitting manufacturer.
- E. Do not install aluminum conduits in contact with concrete.

3.2 INSTALLATION

- A. Comply with NECA 1 for installation requirements applicable to products specified in Part 2 except where requirements on Drawings or in this Article are stricter.
- B. Keep raceways at least 6 inches away from parallel runs of flues and steam or hot-water pipes. Install horizontal raceway runs above water and steam piping.
- C. Complete raceway installation before starting conductor installation.
- D. Support raceways as specified in Section 16073.
- E. Arrange stub-ups so curved portions of bends are not visible above the finished slab.

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- F. Install no more than the equivalent of three (3) 90-degree bends in any conduit run except for communications conduits, for which fewer bends are allowed.
- G. Conceal conduit and EMT within finished walls, ceilings, and floors, unless otherwise indicated.
- H. Raceways Embedded in Slabs:
 - 1. Run conduit larger than 1-inch trade size, parallel or at right angles to main reinforcement. Where at right angles to reinforcement, place conduit close to slab support.
 - 2. Arrange raceways to cross building expansion joints at right angles with expansion fittings.
 - 3. Change from ENT to RNC, Type EPC-40-PVC, rigid steel conduit, or IMC before rising above the floor.
- I. 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.
- J. Raceway Terminations at Locations Subject to Moisture or Vibration: Use insulating bushings to protect conductors, including conductors smaller than No. 4 AWG.
- K. Install pull wires in empty raceways. Use polypropylene or monofilament plastic line with not less than 200-lb tensile strength. Leave at least 12 inches of slack at each end of pull wire.
- L. Raceways for Optical Fiber and Communications Cable: Install raceways, metallic and nonmetallic, rigid and flexible, as follows:
 - 1. ¼-Inch Trade Size and Smaller: Install raceways in maximum lengths of 50 feet.
 - 2. 1-Inch Trade Size and Larger: Install raceways in maximum lengths of 75 feet.
 - 3. Install with a maximum of two (2) 90-degree bends or equivalent for each length of raceway unless Drawings show stricter requirements. Separate lengths with pull or junction boxes or terminations at distribution frames or cabinets where necessary to comply with these requirements.
- M. Install raceway sealing fittings at suitable, approved, and accessible locations 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 at the following points:

RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS

1. Where conduits pass from warm to cold locations, such as boundaries of refrigerated spaces.
 2. Where otherwise required by NFPA 70.
- N. Expansion-Joint Fittings for RNC: Install in each run of aboveground conduit 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.
1. Install expansion-joint fittings for each of the following locations, and provide type and quantity of fittings that accommodate temperature change listed for location:
 - 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 the Outdoors without Physical Separation: 125 deg F (70 deg C) temperature change.
 - d. Attics: 135 deg F (75 deg C) temperature change.
 2. 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.
 3. Install each expansion-joint fitting with position, mounting, and piston setting selected according to manufacturer's written instructions for conditions at specific location at the time of installation.
- O. Flexible Conduit Connections: Use maximum of 72 inches of flexible conduit for recessed and semi-recessed lighting fixtures, 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.
- P. Recessed Boxes in Masonry Walls: Saw-cut opening for box in center of cell of masonry block, and install box flush with surface of wall.
- Q. Set metal floor boxes level and flush with finished floor surface.
- R. Set nonmetallic floor boxes level. Trim after installation to fit flush with finished floor surface.

3.3 SLEEVE INSTALLATION FOR ELECTRICAL PENETRATIONS

- A. Coordinate sleeve selection and application with selection and application of firestopping.

RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS

- B. **Concrete Slabs and Walls:** Install sleeves for penetrations unless core-drilled holes or formed openings are used. Install sleeves during erection of slabs and walls.
- C. Use pipe sleeves unless penetration arrangement requires rectangular sleeved opening.
- D. **Rectangular Sleeve Minimum Metal Thickness:**
 - 1. For sleeve cross-section rectangle perimeter less than 50 inches and no side greater than 16 inches, thickness shall be 0.052 inch.
 - 2. For sleeve cross-section rectangle perimeter equal to, or greater than, 50 inches and one (1) or more sides equal to, or greater than, 16 inches, thickness shall be 0.138 inch.
- E. **Fire-Rated Assemblies:** Install sleeves for penetrations of fire-rated floor and wall assemblies unless openings compatible with firestop system used are fabricated during construction of floor or wall.
- F. Cut sleeves to length for mounting flush with both surfaces of walls.
- G. Extend sleeves installed in floors 2 inches above finished floor level.
- H. Size pipe sleeves to provide $\frac{1}{4}$ -inch annular clear space between sleeve and raceway unless sleeve seal is to be installed or unless seismic criteria require different clearance.
- I. Seal space outside of sleeves with grout for penetrations of concrete and masonry and with approved joint compound for gypsum board assemblies.
- J. **Interior Penetrations of Non-Fire-Rated Walls and Floors:** Seal annular space between sleeve and raceway, using joint sealant appropriate for size, depth, and location of joint. Refer to Section 07900 for materials and installation.
- K. **Fire-Rated-Assembly Penetrations:** Maintain indicated fire rating of walls, partitions, ceilings, and floors at raceway penetrations. Install sleeves and seal with firestop materials.
- L. **Roof-Penetration Sleeves:** Seal penetration of individual raceways with flexible, boot-type flashing units applied in coordination with roofing work.
- M. **Aboveground, Exterior-Wall Penetrations:** Seal penetrations using sleeves and mechanical sleeve seals. Select sleeve size to allow for 1-inch annular clear space between pipe and sleeve for installing mechanical sleeve seals.
- N. **Underground, Exterior-Wall Penetrations:** Install cast-iron "wall pipes" for sleeves. Size sleeves to allow for 1-inch annular clear space between raceway and sleeve for installing mechanical sleeve seals.

RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS

3.4 SLEEVE-SEAL INSTALLATION

- A. Install to seal underground, exterior wall penetrations.
- B. Use type and number of sealing elements recommended by manufacturer for raceway material and size. Position raceway in center of sleeve. Assemble mechanical sleeve seals and install in annular space between raceway and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

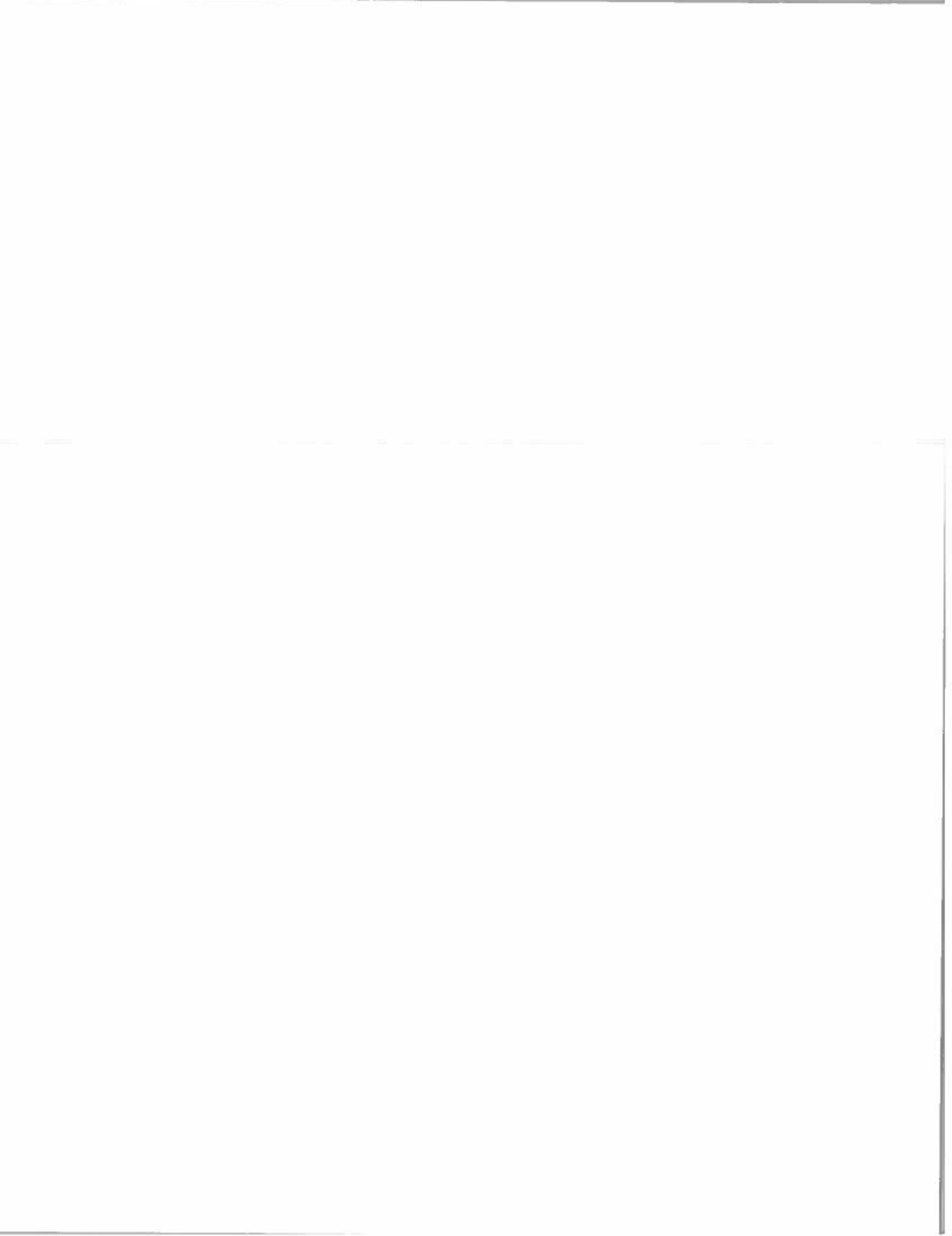
3.5 FIRESTOPPING

- A. Apply firestopping to electrical penetrations of fire-rated floor and wall assemblies to restore original fire-resistance rating of assembly.

3.6 PROTECTION

- A. Provide final protection and maintain conditions that ensure coatings, finishes, and cabinets are without damage or deterioration at time of Substantial Completion.
 - 1. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.
 - 2. Repair damage to PVC or paint finishes with matching touchup coating recommended by manufacturer.

END OF SECTION



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. This Section includes the following:
 - 1. Receptacles, receptacles with integral GFCI, and associated device plates.
 - 2. Snap switches.
 - 3. Wall-switch.

1.3 DEFINITIONS

- A. EMI: Electromagnetic interference.
- B. GFCI: Ground-fault circuit interrupter.
- C. Pigtail: Short lead used to connect a device to a branch-circuit conductor.
- D. RFI: Radio-frequency interference.
- E. TVSS: Transient voltage surge suppressor.
- F. UTP: Unshielded twisted pair.

1.4 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: List of legends and description of materials and process used for premarking wall plates.
- C. Samples: One for each type of device and wall plate specified, in each color specified.
- D. Field quality-control test reports.
- E. Operation and Maintenance Data: For wiring devices to include in all manufacturers' packing label warnings and instruction manuals that include labeling conditions.

1.5 QUALITY ASSURANCE

- A. Source Limitations: Obtain each type of wiring device and associated wall plate through one (1) source from a single manufacturer. Insofar as they are available, obtain all wiring devices and associated wall plates from a single manufacturer and one source.

- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- C. Comply with NFPA 70.

1.6 COORDINATION

- A. Receptacles for Owner-Furnished Equipment: Match plug configurations.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers' Names: Shortened versions (shown in parentheses) of the following manufacturers' names are used in other Part 2 articles:
 - 1. Cooper Wiring Devices; a division of Cooper Industries, Inc. (Cooper)
 - 2. Hubbell Incorporated; Wiring Device-Kellems (Hubbell)
 - 3. Leviton Mfg. Company Inc. (Leviton)
 - 4. Pass & Seymour/Legrand; Wiring Devices & Accessories (Pass & Seymour)

2.2 STRAIGHT BLADE RECEPTACLES

- A. Convenience Receptacles, 125 V, 20 A: Comply with NEMA WD 1, NEMA WD 6 configuration 5-20R, and UL 498.
 - 1. Products: Subject to compliance with requirements, provide one (1) of the following:
 - a. Cooper; **5351** (single), **5352** (duplex)
 - b. Hubbell; **HBL5351** (single), **CR5352** (duplex)
 - c. Leviton; **5891** (single), **5352** (duplex)
 - d. Pass & Seymour; **5381** (single), **5352** (duplex)

2.3 GFCI RECEPTACLES

- A. General Description: Straight blade, feed-through type. Comply with NEMA WD 1, NEMA WD 6, UL 498, and UL 943, Class A, and include indicator light that is lighted when device is tripped.
- B. Duplex GFCI Convenience Receptacles, 125 V, 20 A:
 - 1. Products: Subject to compliance with requirements, provide one (1) of the following:
 - a. Cooper; **GF20**

- b. Pass & Seymour; 2084

2.4 SNAP SWITCHES

- A. Comply with NEMA WD 1 and UL 20.
- B. Switches, 120/277 V, 20 A:
 - 1. Products: Subject to compliance with requirements, provide one (1) of the following:
 - a. Cooper; 2221 (single-pole), 2222 (two-pole), 2223 (three-way), 2224 (four-way)
 - b. Hubbell; CS1221 (single-pole), CS1222 (two-pole), CS1223 (three-way), CS1224 (four-way)
 - c. Leviton; 1221-2 (single-pole), 1222-2 (two-pole), 1223-2 (three-way), 1224-2 (four-way)
 - d. Pass & Seymour; 20AC1 (single-pole), 20AC2 (two-pole), 20AC3 (three-way), 20AC4 (four-way)
- C. Key-Operated Switches, 120/277 V, 20 A:
 - 1. Products: Subject to compliance with requirements, provide one (1) of the following:
 - a. Cooper; 2221L
 - b. Hubbell; HBL1221L
 - c. Leviton; 1221-2L
 - d. Pass & Seymour; PS20AC1-L
 - 2. Description: Single pole, with factory-supplied key in lieu of switch handle.
- D. Single-Pole, Double-Throw, Momentary Contact, Center-Off Switches, 120/277 V, 20 A; for use with mechanically held lighting contactors.
 - 1. Products: Subject to compliance with requirements, provide one (1) of the following:
 - a. Cooper; 1995
 - b. Hubbell; HBL1557
 - c. Leviton; 1257
 - d. Pass & Seymour; 1251
- E. Key-Operated, Single-Pole, Double-Throw, Momentary Contact, Center-Off Switches, 120/277 V, 20 A; for use with mechanically held lighting contactors, with factory-supplied key in lieu of switch handle.

1. Products: Subject to compliance with requirements, provide one (1) of the following:
 - a. Cooper; **1995L**
 - b. Hubbell; **HBL1557L**
 - c. Leviton; **1257L**
 - d. Pass & Seymour; **1251L**

2.5 FINISHES

- A. Color: Wiring device catalog numbers in Section Text do not designate device color.
 1. Wiring Devices Connected to Normal Power System: Ivory and/or as selected by Architect, unless otherwise indicated or required by NFPA 70 or device listing.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Comply with NECA 1, including the mounting heights listed in that standard, unless otherwise noted.
- B. Coordination with Other Trades:
 1. Take steps to insure that devices and their boxes are protected. Do not place wall finish materials over device boxes and do not cut holes for boxes with routers that are guided by riding against outside of the boxes.
 2. Keep outlet boxes free of plaster, drywall joint compound, mortar, cement, concrete, dust, paint, and other material that may contaminate the raceway system, conductors, and cables.
 3. Install device boxes in brick or block walls so that the cover plate does not cross a joint unless the joint is troweled flush with the face of the wall.
 4. Install wiring devices after all wall preparation, including painting, is complete.
- C. Conductors:
 1. Do not strip insulation from conductors until just before they are spliced or terminated on devices.
 2. Strip insulation evenly around the conductor using tools designed for the purpose. Avoid scoring or nicking of solid wire or cutting strands from stranded wire.
 3. The length of free conductors at outlets for devices shall meet provisions of NFPA 70, Article 300, without pigtails.
 4. Existing Conductors:

- a. Cut back and pigtail, or replace all damaged conductors.
- b. Straighten conductors that remain and remove corrosion and foreign matter.
- c. Pigtailling existing conductors is permitted provided the outlet box is large enough.

D. Device Installation:

1. Replace all devices that have been in temporary use during construction or that show signs that they were installed before building finishing operations were complete.
2. Keep each wiring device in its package or otherwise protected until it is time to connect conductors.
3. Do not remove surface protection, such as plastic film and smudge covers, until the last possible moment.
4. Connect devices to branch circuits using pigtails that are not less than 6 inches in length.
5. When there is a choice, use side wiring with binding-head screw terminals. Wrap solid conductor tightly clockwise, $\frac{2}{3}$ to $\frac{3}{4}$ of the way around terminal screw.
6. Use a torque screwdriver when a torque is recommended or required by the manufacturer.
7. When conductors larger than No. 12 AWG are installed on 15- or 20-A circuits, splice No. 12 AWG pigtails for device connections.
8. Tighten unused terminal screws on the device.
9. When mounting into metal boxes, remove the fiber or plastic washers used to hold device mounting screws in yokes, allowing metal-to-metal contact.
10. Install GFCI devices in all wet locations.

E. Receptacle Orientation:

1. Install ground pin of vertically mounted receptacles up, and on horizontally mounted receptacles to the right.

F. Device Plates: Do not use oversized or extra-deep plates. Repair wall finishes and remount outlet boxes when standard device plates do not fit flush or do not cover rough wall opening.

G. Arrangement of Devices: Unless otherwise indicated, mount flush, with long dimension vertical and with grounding terminal of receptacles on top. Group adjacent switches under single, multi-gang wall plates.

3.2 IDENTIFICATION

A. Comply with Section 16075.

1. Receptacles and Switches: Identify panelboard and circuit number from which served. Use self-adhesive labels with black lettering on white field

mounted on face of plate, and durable wire markers or tags inside outlet boxes.

3.3 FIELD QUALITY CONTROL

- A. Perform tests and inspections and prepare test reports.
 - 1. Test Instruments: Use instruments that comply with UL 1436.
 - 2. Test Instrument for Convenience Receptacles: Digital wiring analyzer with digital readout or illuminated LED indicators of measurement.

- B. Tests for Convenience Receptacles:
 - 1. Line Voltage: Acceptable range is 105 to 132 V.
 - 2. Percent Voltage Drop under 15-A Load: A value of six percent (6%) or higher is not acceptable.
 - 3. Ground Impedance: Values of up to 2 ohms are acceptable.
 - 4. GFCI Trip: Test for tripping values specified in UL 1436 and UL 943.
 - 5. Using the test plug, verify that the device and its outlet box are securely mounted.
 - 6. The tests shall be diagnostic, indicating damaged conductors, high resistance at the circuit breaker, poor connections, inadequate fault current path, defective devices, or similar problems. Correct circuit conditions, remove malfunctioning units and replace with new ones, and retest as specified above.

END OF SECTION

ENCLOSED SWITCHES AND CIRCUIT BREAKERS

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. Fusible switches.
 - 2. Non-fusible switches.
 - 3. Molded-case circuit breakers (MCCBs).
 - 4. Molded-case switches.
 - 5. Enclosures.

1.3 DEFINITIONS

- A. NC: Normally closed.
- B. NO: Normally open.
- C. SPDT: Single pole, double throw.

1.4 PERFORMANCE REQUIREMENTS

- A. Seismic Performance: Enclosed switches and circuit breakers shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.
 - 1. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified and the unit will be fully operational after the seismic event."

1.5 SUBMITTALS

- A. Product Data: For each type of enclosed switch, circuit breaker, accessory, and component indicated. Include dimensioned elevations, sections, weights, and manufacturers' technical data on features, performance, electrical characteristics, ratings, accessories, and finishes.
 - 1. Enclosure types and details for types other than NEMA 250, Type 1.
 - 2. Current and voltage ratings.
 - 3. Short-circuit current ratings (interrupting and withstand, as appropriate).
 - 4. Include evidence of NRTL listing for series rating of installed devices.
 - 5. Detail features, characteristics, ratings, and factory settings of individual overcurrent protective devices, accessories, and auxiliary components.
 - 6. Include time-current coordination curves (average melt) for each type and rating of overcurrent protective device; include selectable ranges for each

ENCLOSED SWITCHES AND CIRCUIT BREAKERS

type of overcurrent protective device.

- B. **Shop Drawings:** For enclosed switches and circuit breakers. Include plans, elevations, sections, details, and attachments to other work.
- C. **Seismic Qualification Certificates:** For enclosed switches and circuit breakers, accessories, and 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.**
- D. **Field quality-control reports.**
 - 1. **Test procedures used.**
 - 2. **Test results that comply with requirements.**
 - 3. **Results of failed tests and corrective action taken to achieve test results that comply with requirements.**
- E. **Operation and Maintenance Data:** For enclosed switches and circuit breakers to include in emergency, operation, and maintenance manuals. In addition to items specified in Section 01730, include the following:
 - 1. **Manufacturer's written instructions for testing and adjusting enclosed switches and circuit breakers.**

1.6 QUALITY ASSURANCE

- A. **Source Limitations:** Obtain enclosed switches and circuit breakers, overcurrent protective devices, components, and accessories, within same product category, from single source from single manufacturer.
- B. **Product Selection for Restricted Space:** Drawings indicate maximum dimensions for enclosed switches and circuit breakers, including clearances between enclosures, and adjacent surfaces and other items. Comply with indicated maximum dimensions.
- C. **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.
- D. **Comply with NFPA 70.**

ENCLOSED SWITCHES AND CIRCUIT BREAKERS

1.7 PROJECT CONDITIONS

- A. Environmental Limitations: Rate equipment for continuous operation under the following conditions unless otherwise indicated:
 - 1. Ambient Temperature: Not less than minus 22 deg F and not exceeding 104 deg F.
 - 2. Altitude: Not exceeding 6600 feet.
- B. Interruption of Existing Electric Service: Do not interrupt electric service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary electric service according to requirements indicated:
 - 1. Notify Architect and Owner no fewer than seven (7) days in advance of proposed interruption of electric service.
 - 2. Indicate method of providing temporary electric service.
 - 3. Do not proceed with interruption of electric service without Architect's written permission.
 - 4. Comply with NFPA 70E.

1.8 COORDINATION

- A. Coordinate layout and installation of switches, circuit breakers, and components with equipment served and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.

1.9 EXTRA MATERIALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Fuses: Equal to ten percent (10%) of quantity installed for each size and type, but no fewer than three (3) of each size and type.
 - 2. Fuse Pullers: Two (2) for each size and type.

PART 2 - PRODUCTS

2.1 FUSIBLE SWITCHES

- A. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one (1) of the following:
 - 1. Eaton Electrical Inc.; Cutler-Hammer Business Unit
 - 2. General Electric Company; GE Consumer & Industrial - Electrical Distribution
 - 3. Siemens Energy & Automation, Inc.

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4. Square D; a brand of Schneider Electric
- B. Type HD, Heavy Duty, Single Throw, 240-V ac, 1200 A and Smaller: UL 98 and NEMA KS 1, horsepower rated, with clips or bolt pads to accommodate specified fuses, lockable handle with capability to accept three (3) padlocks, and interlocked with cover in closed position.
- C. Accessories:
1. Equipment Ground Kit: Internally mounted and labeled for copper and aluminum ground conductors.
 2. Neutral Kit: Internally mounted; insulated, capable of being grounded and bonded; labeled for copper and aluminum neutral conductors.
 3. Isolated Ground Kit: Internally mounted; insulated, capable of being grounded and bonded; labeled for copper and aluminum neutral conductors.
 4. Class R Fuse Kit: Provides rejection of other fuse types when Class R fuses are specified.
 5. Lugs: Mechanical and/or Compression type, suitable for number, size, and conductor material.
 6. Service-Rated Switches: Labeled for use as service equipment.

2.2 NONFUSIBLE SWITCHES

- A. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one (1) of the following:
1. Eaton Electrical Inc.; Cutler-Hammer Business Unit
 2. General Electric Company; GE Consumer & Industrial - Electrical Distribution
 3. Siemens Energy & Automation, Inc.
 4. Square D; a brand of Schneider Electric
- B. Type HD, Heavy Duty, Single Throw, 240-V ac, 1200 A and Smaller: UL 98 and NEMA KS 1, horsepower rated, lockable handle with capability to accept three (3) padlocks, and interlocked with cover in closed position.
- C. Accessories:
1. Equipment Ground Kit: Internally mounted and labeled for copper and aluminum ground conductors.
 2. Neutral Kit: Internally mounted; insulated, capable of being grounded and bonded; labeled for copper and aluminum neutral conductors.
 3. Isolated Ground Kit: Internally mounted; insulated, capable of being grounded and bonded; labeled for copper and aluminum neutral conductors.
 4. Lugs: Mechanical and/or Compression type, suitable for number, size, and conductor material.

ENCLOSED SWITCHES AND CIRCUIT BREAKERS

2.3 MOLDED-CASE CIRCUIT BREAKERS

- A. **Basis-of-Design Product:** Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one (1) of the following:
 - 1. Eaton Electrical Inc.; Cutler-Hammer Business Unit
 - 2. General Electric Company; GE Consumer & Industrial - Electrical Distribution
 - 3. Siemens Energy & Automation, Inc.
 - 4. Square D; a brand of Schneider Electric
- B. **General Requirements:** Comply with UL 489, NEMA AB 1, and NEMA AB 3, with interrupting capacity to comply with available fault currents.
- C. **Thermal-Magnetic Circuit Breakers:** Inverse time-current element for low-level overloads and instantaneous magnetic trip element for short circuits. Adjustable magnetic trip setting for circuit-breaker frame sizes 250 A and larger.
- D. **Ground-Fault, Circuit-Interrupter (GFCI) Circuit Breakers:** Single- and two-pole configurations with Class A ground-fault protection (6-mA trip).
- E. **Ground-Fault, Equipment-Protection (GFEP) Circuit Breakers:** With Class B ground-fault protection (30-mA trip).
- F. **Features and Accessories:**
 - 1. Standard frame sizes, trip ratings, and number of poles.
 - 2. Lugs: Mechanical and/or Compression type, suitable for number, size, trip ratings, and conductor material.
 - 3. Application Listing: Appropriate for application; Type SWD for switching fluorescent lighting loads; Type HID for feeding fluorescent and high-intensity discharge lighting circuits.
 - 4. Ground-Fault Protection: Comply with UL 1053; remote-mounted and powered type with mechanical ground-fault indicator; relay with adjustable pickup and time-delay settings, push-to-test feature, internal memory, and shunt trip unit; and three-phase, zero-sequence current transformer/sensor.
 - 5. Shunt Trip: Trip coil energized from separate circuit, with coil-clearing contact.

2.4 MOLDED-CASE SWITCHES

- A. **Basis-of-Design Product:** Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one (1) of the following:
 - 1. Eaton Electrical Inc.; Cutler-Hammer Business Unit
 - 2. General Electric Company; GE Consumer & Industrial - Electrical Distribution
 - 3. Siemens Energy & Automation, Inc.

ENCLOSED SWITCHES AND CIRCUIT BREAKERS

4. Square D; a brand of Schneider Electric
- B. General Requirements: MCCB with fixed, high-set instantaneous trip only, and short-circuit withstand rating equal to equivalent breaker frame size interrupting rating.
- C. Features and Accessories:
1. Standard frame sizes and number of poles.
 2. Lugs: Mechanical and/or Compression type, suitable for number, size, trip ratings, and conductor material.
 3. Ground-Fault Protection: Comply with UL 1053; remote-mounted and powered type with mechanical ground-fault indicator; relay with adjustable pickup and time-delay settings, push-to-test feature, internal memory, and shunt trip unit; and three-phase, zero-sequence current transformer/sensor.
 4. Shunt Trip: Trip coil energized from separate circuit, with coil-clearing contact.

2.5 ENCLOSURES

- A. Enclosed Switches and Circuit Breakers: NEMA AB 1, NEMA KS 1, NEMA 250, and UL 50, to comply with environmental conditions at installed location.
1. Indoor, Dry and Clean Locations: NEMA 250, Type 1.
 2. Outdoor Locations: NEMA 250, Type 3R.
 3. Kitchen and/or Wash-Down Areas: NEMA 250, Type 4X.
 4. Other Wet or Damp, Indoor Locations: NEMA 250, Type 4.
 5. Indoor Locations Subject to Dust, Falling Dirt, and Dripping Noncorrosive Liquids: NEMA 250, Type 12.
 6. Hazardous Areas Indicated on Drawings: NEMA 250, Type 9.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine elements and surfaces to receive enclosed switches and circuit breakers for compliance with 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. Install individual wall-mounted switches and circuit breakers with tops at uniform height unless otherwise indicated.

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- B. Temporary Lifting Provisions: Remove temporary lifting eyes, channels, and brackets and temporary blocking of moving parts from enclosures and components.
- C. Install fuses in fusible devices.
- D. Comply with NECA 1.

3.3 IDENTIFICATION

- A. Comply with requirements in Section 16075.
 - 1. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs.
 - 2. When switch is not mounted to equipment served, label enclosure with engraved metal or laminated-plastic nameplate listed equipment served.

3.4 FIELD QUALITY CONTROL

- A. Acceptance Testing Preparation:
 - 1. Test insulation resistance for each enclosed switch and circuit breaker, component, connecting supply, feeder, and control circuit.
 - 2. Test continuity of each circuit.
- B. Tests and Inspections:
 - 1. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.
 - 2. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.
 - 3. Test and adjust controls, remote monitoring, and safeties. Replace damaged and malfunctioning controls and equipment.
- C. Enclosed switches and circuit breakers will be considered defective if they do not pass tests and inspections.
- D. Prepare test and inspection reports, including a certified report that identifies enclosed switches and circuit breakers and that describes scanning results. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.

3.5 ADJUSTING

- A. Adjust moving parts and operable components to function smoothly, and lubricate as recommended by manufacturer.

ENCLOSED SWITCHES AND CIRCUIT BREAKERS

END OF SECTION

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. Cartridge fuses rated 600-V ac and less for use in control circuits and enclosed switches.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated. Include construction details, material, dimensions, and descriptions of individual components. Include the following for each fuse type indicated:
 - 1. Dimensions and manufacturer's technical data on features, performance, electrical characteristics, and ratings.
 - 2. Current-limitation curves for fuses with current-limiting characteristics.
 - 3. Time-current coordination curves (average melt) and current-limitation curves (instantaneous peak let-through current) for each type and rating of fuse.
 - 4. Coordination charts and tables and related data.
 - 5. Fuse sizes for elevator feeders and elevator disconnect switches.

1.4 QUALITY ASSURANCE

- A. Source Limitations: Obtain fuses, for use within a specific product or circuit, from single source from single manufacturer.
- B. 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.
- C. Comply with NEMA FU 1 for cartridge fuses.
- D. Comply with NFPA 70.

1.5 PROJECT CONDITIONS

- A. Where ambient temperature to which fuses are directly exposed is less than 40 deg F or more than 100 deg F, apply manufacturer's ambient temperature adjustment factors to fuse ratings.

1.6 COORDINATION

- A. Coordinate fuse ratings with utilization equipment nameplate limitations of maximum fuse size and with system short-circuit current levels.

1.7 EXTRA MATERIALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Fuses: Equal to ten percent (10%) of quantity installed for each size and type, but no fewer than two (2) of each size and type.

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. Cooper Bussmann, Inc.
 - 2. Edison Fuse, Inc.
 - 3. Ferraz Shawmut, Inc.
 - 4. Littelfuse, Inc.

2.2 CARTRIDGE FUSES

- A. Characteristics: NEMA FU 1, nonrenewable cartridge fuses with voltage ratings consistent with circuit voltages.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine fuses before installation. Reject fuses that are moisture damaged or physically damaged.
- B. Examine holders to receive fuses for compliance with installation tolerances and other conditions affecting performance, such as rejection features.
- C. Examine utilization equipment nameplates and installation instructions. Install fuses of sizes and with characteristics appropriate for each piece of equipment.
- D. Evaluate ambient temperatures to determine if fuse rating adjustment factors must be applied to fuse ratings.

- E. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 FUSE APPLICATIONS

A. Cartridge Fuses:

1. Motor Branch Circuits: Class RK1, time delay.
2. Other Branch Circuits: Class J, fast acting.
3. Control Circuits: Class CC, fast acting.

3.3 INSTALLATION

- A. Install fuses in fusible devices. Arrange fuses so rating information is readable without removing fuse.

3.4 IDENTIFICATION

- A. Install labels complying with requirements for identification specified in Section 16075 and indicating fuse replacement information on inside door of each fused switch and adjacent to each fuse block, socket, and holder.

END OF SECTION