

PROJECT MANUAL

**TOWN OF HEBRON
TOWN MANAGER'S OFFICE
TOWN OFFICE BUILDING
15 GILEAD STREET
HEBRON, CT 06248**

**HEBRON ELEMENTARY SCHOOL
CONTAMINATED WATER PIPING REPLACEMENT
92 CHURCH STREET
HEBRON, CT 06248**

**BID NO. 2020-03
STATE PROJECT NO.: 067-0042 CV
S/P+A Project No. 19.003**

**PCR Submission: August 16, 2019
Issued for Bid: October 1, 2019**



**Architects / Engineers / Interior Designers
Silver/Petrucci + Associates, Inc.
3190 Whitney Avenue, Hamden, Connecticut 06518
One Post Hill Place, New London, Connecticut 06320**

CONTAMINATED WATER PIPING REPLACEMENT

**HEBRON ELEMENTARY SCHOOL
92 CHURCH STREET
HEBRON, CT 06248
STATE PROJECT NO. 067-0042 CV**

S/P+A PROJECT NO. 19.003

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**Legal Notice:
Town Manager's Office
Town Office Building
15 Gilead Street
Hebron, CT 06248**

State Project No. 067-0042 CV

INVITATION TO BID - BID NO. 2020-03

Sealed bid proposals for **HEBRON ELEMENTARY SCHOOL CONTAMINATED WATER PIPING REPLACEMENT** will be received until **10:00 AM on Friday, November 1, 2019** at the **Town Manager's Office, Town Office Building, 15 Gilead Street, Hebron, CT 06248**. At that time, the bids will be publicly opened and read aloud.

The **Issuing Office** is: **The Town Manager's Office**, as noted above. Each bid should be submitted in a single sealed envelope; the outside clearly marked with "Bid 2020-03 – Hebron Elementary School Contaminated Water Piping Replacement" and Bid Opening Date. It is the responsibility of the vendor to be certain that all sealed bids are stamped in at the Issuing Office by the designated date and time.

There will be a **NON-MANDATORY** pre-bid conference at the site on **Wednesday, October 9, 2019** at **4:00 PM** at the Hebron Elementary School Main Lobby, 92 Church Street, Hebron, CT 06248. Pre-bid conference attendance is non-mandatory, but ***strongly encouraged*** to all prospective bidders due to the nature of the scope of work and varying existing conditions.

Electronic (PDF) copies of the Bidding Documents will be available for download from the Town's website and through the State of Connecticut BizNet State Contracting Portal. Each bidder is responsible for regularly checking the Town's website and BizNet State Contracting Portal to determine if the Town has issued any addenda and, if so, to complete its bid in accordance with the Invitation to Bid as modified by the addenda.

Each bid shall be signed by the bidder and accompanied by a bid bond in an amount equal to ten percent (10%) of the bid, payable to the Town of Hebron. The successful bidder will be required to provide Performance and Payment Bonds, each in the amount of one hundred percent (100%) of the Contract Price. No Bid may be withdrawn until sixty (60) days after the Bid Opening.

The successful bidder shall comply with the requirements of Prevailing Wage Rate Laws on accordance with Section 31-51 of the Connecticut General Statutes.

The contract documents require affirmative action of the contractor and subcontractors to ensure equal employment opportunity as noted in Governor's Executive Orders 3 and 17.

The Owner is exempt from payment of Sales Taxes and Use Taxes on all Material and Equipment to be incorporated in the Work. These Taxes shall not be included in the Bid.

The Town of Hebron reserves the right to reject any and all bids in whole or in part, make extensions to review Bids, or to waive any informality or defect in bidding, if it is determined by the Town of Hebron to be in the best interest of the Town of Hebron. The Town of Hebron is an equal opportunity employer and provider.

By the order of Mr. Andrew Tierney, Town Manager's Office, Town of Hebron

Dated: October 1, 2019



AIA[®] Document A701[™] – 2018

Instructions to Bidders

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

Contaminated Water Piping Replacement
Hebron Elementary School
92 Church Street
Hebron, Connecticut 06248

THE OWNER:
(Name, legal status, address, and other information)

Town of Hebron, Connecticut
15 Gilead Street
Hebron, Connecticut 06248

THE ARCHITECT:
(Name, legal status, address, and other information)

Silver, Petrucelli & Associates, Inc.
3190 Whitney Avenue, Bldg 2
Hamden, CT 06518

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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.

FEDERAL, STATE, AND LOCAL LAWS MAY IMPOSE REQUIREMENTS ON PUBLIC PROCUREMENT CONTRACTS. CONSULT LOCAL AUTHORITIES OR AN ATTORNEY TO VERIFY REQUIREMENTS APPLICABLE TO THIS PROCUREMENT BEFORE COMPLETING THIS FORM.

It is intended that AIA Document G612[™]-2017, Owner's Instructions to the Architect, Parts A and B will be completed prior to using this document.

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 any other bidding forms. The Proposed Contract Documents consist of the unexecuted form of Agreement between the Owner and Contractor and that Agreement's Exhibits, Conditions of the Contract (General, Supplementary and other Conditions), Drawings, Specifications, all Addenda, and all other documents enumerated in Article 8 of these Instructions.

§ 1.2 Definitions set forth in the General Conditions of the Contract for Construction, or in other Proposed Contract Documents apply to the Bidding Documents.

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

§ 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, to which Work may be added or deleted by 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, or that does not change, 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 By submitting a Bid, the Bidder represents that:

- .1 the Bidder has read and understands the Bidding Documents;
- .2 the Bidder understands how the Bidding Documents relate to other portions of the Project, if any, being bid concurrently or presently under construction;
- .3 the Bid complies with the Bidding Documents;
- .4 the Bidder has visited the site, become familiar with local conditions under which the Work is to be performed and to understand the facilities, difficulties and restrictions attending to the execution of the Work under the Contract Documents, and has correlated the Bidder's observations with the requirements of the Contract Documents;
- .5 the Bid is based upon the materials, equipment, and systems required by the Bidding Documents without exception; and
- .6 the Bidder has read and understands the provisions for liquidated damages, if any, set forth in the form of Agreement between the Owner and Contractor.

§ 2.2 The failure or omission of any Bidder to receive or examine all of the Bidding Document, and to visit the site to become familiar with local conditions under which the Work is to be performed and to understand the facilities, difficulties and restrictions attending to the execution of the Work under the Contract Documents, shall in no way relieve any Bidder from any obligation with respect to its Bid or the Contract Documents.

ARTICLE 3 BIDDING DOCUMENTS

§ 3.1 Distribution

§ 3.1.1 Bidders shall obtain complete Bidding Documents, as indicated below, from the issuing office designated in the advertisement or invitation to bid, for the deposit sum, if any, stated therein.

(Indicate how, such as by email, website, host site/platform, paper copy, or other method Bidders shall obtain Bidding Documents.)

§ 3.1.2 Any required deposit shall be refunded to Bidders who submit a bona fide Bid and return the paper Bidding Documents in good condition within ten days after receipt of Bids. The cost to replace missing or damaged paper documents will be deducted from the deposit. A Bidder receiving a Contract award may retain the paper Bidding Documents, and the Bidder's deposit will be refunded.

§ 3.1.3 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.

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

§ 3.1.5 The Bidding Documents will be available for the sole purpose of obtaining Bids on the Work. No license or grant of use is conferred by distribution of the Bidding Documents.

§ 3.2 Modification or Interpretation of Bidding Documents

§ 3.2.1 The Bidder shall carefully study the Bidding Documents, shall examine the site and local conditions, and shall notify the Architect of errors, inconsistencies, or ambiguities discovered and request clarification or interpretation pursuant to Section 3.2.2.

§ 3.2.2 Requests for clarification or interpretation of the Bidding Documents shall be submitted by the Bidder in writing and shall be received by the Architect at least seven days prior to the date for receipt of Bids.

(Indicate how, such as by email, website, host site/platform, paper copy, or other method Bidders shall submit requests for clarification and interpretation.)

§ 3.2.3 Modifications and interpretations of the Bidding Documents shall be made by Addendum. Modifications and interpretations of the Bidding Documents made in any other manner shall 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 Substitution Process

§ 3.3.2.1 Written requests for substitutions shall be received by the Architect at least ten days prior to the date for receipt of Bids. Requests shall be submitted in the same manner as that established for submitting clarifications and interpretations in Section 3.2.2.

§ 3.3.2.2 Bidders shall submit substitution requests on a Substitution Request Form if one is provided in the Bidding Documents.

§ 3.3.2.3 If a Substitution Request Form is not provided, requests shall include (1) the name of the material or equipment specified in the Bidding Documents; (2) the reason for the requested substitution; (3) a complete description of the proposed substitution including the name of the material or equipment proposed as the substitute, performance and test data, and relevant drawings; and (4) any other information necessary for an evaluation. The request shall include a statement setting forth changes in other materials, equipment, or other portions of the Work, including changes in the work of other contracts or the impact on any Project Certifications (such as LEED), that will result from incorporation of the proposed substitution.

§ 3.3.3 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.

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

§ 3.3.5 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 Bidders known by the issuing office to have received complete Bidding Documents.

(Indicate how, such as by email, website, host site/platform, paper copy, or other method Addenda will be transmitted.)

§ 3.4.2 Addenda will be available where Bidding Documents are on file.

§ 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 Prior to submitting a Bid, each Bidder shall ascertain 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 or identified in the Bidding Documents.

§ 4.1.2 All blanks on the bid form shall be legibly executed. Paper bid forms shall be executed in a non-erasable medium. Bids containing any conditions, omissions, erasures, alterations, or items not called for in the Bids, or irregularities of any kind may be rejected by the Owner as being incomplete. All prices and notations must be printed in ink or typewritten. No erasures permitted.

§ 4.1.3 Sums shall be expressed in both words and numbers, unless noted otherwise on the bid form. In case of discrepancy, the amount entered in words shall govern.

§ 4.1.4 Edits to entries made on paper bid forms 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" or as required by the bid form.

§ 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 neither make 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 and legal status of the Bidder. As part of the documentation submitted with the Bid, the Bidder shall provide evidence of its legal authority to perform the Work in the jurisdiction where the Project is located. Each copy of the Bid shall be signed by the person or persons legally authorized to bind the Bidder to a contract. A Bid by a corporation shall further name 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.

§ 4.1.8 A Bidder shall incur all costs associated with the preparation of its Bid.

§ 4.2 Bid Security

§ 4.2.1 Each Bid shall be accompanied by the following bid security:

(Insert the form and amount of bid security.)

§ 4.2.2 The Bidder pledges to enter into a Contract with the Owner on the terms stated in the Bid and shall, 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. In the event the Owner fails to comply with Section 6.2, the amount of the bid security shall not be forfeited to the Owner.

§ 4.2.3 If a surety bond is required as bid security, it shall be written on AIA Document A310™, Bid Bond, unless otherwise provided in the Bidding Documents. The attorney-in-fact who executes the bond on behalf of the surety shall affix to the bond a certified and current copy of an acceptable power of attorney. The Bidder shall provide surety bonds from a company or companies lawfully authorized to issue surety bonds in the jurisdiction where the Project is located.

§ 4.2.4 The Owner will have the right to retain the bid security of Bidders to whom an award is being considered until (a) the Contract has been executed and bonds, if required, have been furnished; (b) the specified time has elapsed so that Bids may be withdrawn; or (c) all Bids have been rejected. However, if no Contract has been awarded or a Bidder has not been notified of the acceptance of its Bid, a Bidder may, beginning days after the opening of Bids, withdraw its Bid and request the return of its bid security.

§ 4.3 Submission of Bids

§ 4.3.1 A Bidder shall submit its Bid as indicated below:

(Indicate how, such as by website, host site/platform, paper copy, or other method Bidders shall submit their Bid.)

§ 4.3.2 Paper copies of the Bid, the bid security, 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.

§ 4.3.3 Bids shall be submitted by the date and time and at the place indicated in the invitation to bid. Bids submitted after the date and time for receipt of Bids, or at an incorrect place, will not be accepted.

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

§ 4.3.5 A Bid submitted by any method other than as provided in this Section 4.3 will not be accepted.

§ 4.4 Modification or Withdrawal of Bid

§ 4.4.1 Prior to the date and time designated for receipt of Bids, a Bidder may submit a new Bid to replace a Bid previously submitted, or withdraw its Bid entirely, by notice to the party designated to receive the Bids. Such notice shall be received and duly recorded by the receiving party on or before the date and time set for receipt of Bids. The receiving party shall verify that replaced or withdrawn Bids are removed from the other submitted Bids and not considered. Notice of submission of a replacement Bid or withdrawal of a Bid shall be worded so as not to reveal the amount of the original Bid.

§ 4.4.2 Withdrawn Bids may be resubmitted up to the date and time designated for the receipt of Bids in the same format as that established in Section 4.3, provided they fully conform with these Instructions to Bidders. Bid security shall be in an amount sufficient for the Bid as resubmitted.

§ 4.4.3 After the date and time designated for receipt of Bids, a Bidder who discovers that it made a clerical error in its Bid shall notify the Architect of such error within two days, or pursuant to a timeframe specified by the law of the jurisdiction where the Project is located, requesting withdrawal of its Bid. Upon providing evidence of such error to the reasonable satisfaction of the Architect, the Bid shall be withdrawn and not resubmitted. If a Bid is withdrawn pursuant to this Section 4.4.3, the bid security will be attended to as follows:

(State the terms and conditions, such as Bid rank, for returning or retaining the bid security.)

ARTICLE 5 CONSIDERATION OF BIDS

§ 5.1 Opening of Bids

If stipulated in an advertisement or invitation to bid, or when otherwise required by law, Bids properly identified and received within the specified time limits will be publicly opened and read aloud. A summary of the Bids may be made available to Bidders.

§ 5.2 Rejection of Bids

Unless otherwise prohibited by law, the Owner shall have the right to reject any or all Bids.

§ 5.3 Acceptance of Bid (Award)

§ 5.3.1 It is the intent of the Owner to award a Contract to the lowest responsive and responsible Bidder, provided the Bid has been submitted in accordance with the requirements of the Bidding Documents. Unless otherwise prohibited by law, 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 best interests.

§ 5.3.2 Unless otherwise prohibited by law, 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 lowest responsive and responsible Bidder on the basis of the sum of the Base Bid and Alternates accepted.

§ 5.4 Failure of Bidder to Execute Contract

When notification of award of the Contract is made to the successful Bidder and the Bidder does not, within two weeks thereafter, execute a Contract in the form aforementioned and furnish satisfactory Bond, its failure to do so shall cause the Bidder to forfeit Bid Security as liquidated damages.

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 and within the timeframe specified by the Architect, a properly executed AIA Document A305™, Contractor's Qualification Statement, unless such a Statement has been previously required and submitted for this Bid.

§ 6.2 Owner's Financial Capability

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

§ 6.3 Submittals

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

- .1 a designation of the Work to be performed with the Bidder's own forces;
- .2 names of the principal products and systems proposed for the Work and the manufacturers and suppliers of each; 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 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, withdraw the Bid or submit an acceptable substitute person or entity. The Bidder may also submit any required adjustment in the Base Bid or Alternate Bid to account for 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.

§ 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 The Bidder shall provide surety bonds from a company or companies lawfully authorized to issue surety bonds in the jurisdiction where the Project is located.

§ 7.1.4 Unless otherwise indicated below, the Penal Sum of the Payment and Performance Bonds shall be the amount of the Contract Sum.

(If Payment or Performance Bonds are to be in an amount other than 100% of the Contract Sum, indicate the dollar amount or percentage of the Contract Sum.)

§ 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 commence sooner 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.

§ 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 to the bond a certified and current copy of the power of attorney.

ARTICLE 8 ENUMERATION OF THE PROPOSED CONTRACT DOCUMENTS

§ 8.1 Copies of the proposed Contract Documents have been made available to the Bidder and consist of the following documents:

- .1 AIA Document A101™–2017, Standard Form of Agreement Between Owner and Contractor, as modified.
(Insert the complete AIA Document number, including year, and Document title.)
- .2 AIA Document A101™–2017, Exhibit A, Insurance and Bonds, as modified.
(Insert the complete AIA Document number, including year, and Document title.)
- .3 AIA Document A201™–2017, General Conditions of the Contract for Construction, as modified.
(Insert the complete AIA Document number, including year, and Document title.)
- .4 AIA Document E203™–2013, Building Information Modeling and Digital Data Exhibit, dated as indicated below:

(Insert the date of the E203-2013.)

.5 Drawings

Number	Title	Date
See Project Manual, Division 00-Bidding and Contract Documents, Drawing List, incorporated herein.	Drawing List (1 page)	8/16/19

.6 Specifications

Section	Title	Date	Pages
See Project Manual, incorporated herein.	Project Manual	8/16/19	3 (Table of Contents)

.7 Addenda:

Number	Date	Pages
---------------	-------------	--------------

.8 Other Exhibits:

(Check all boxes that apply and include appropriate information identifying the exhibit where required.)

AIA Document E204™–2017, Sustainable Projects Exhibit, dated as indicated below:
(Insert the date of the E204-2017.)

The Sustainability Plan:

Title	Date	Pages
--------------	-------------	--------------

Supplementary and other Conditions of the Contract:

Document	Title	Date	Pages
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.9 Other documents listed below:

(List here any additional documents that are intended to form part of the Proposed Contract Documents.)

Project Manual, dated August 16, 2019

PART 1 - GENERAL

1.1 COMPLETION DATE

- A. All work as required by these specifications and drawings shall be substantially completed no later than August 15, 2020. The student and staff spaces shall be finished and cleaned and specified coats of finish are installed on the hard or resilient products. There is no exception to this contract requirement, unless approved otherwise by contract change order.

1.2 QUESTIONS

- A. Questions (RFIs) regarding this bid can be directed, in writing only, to:

Administrative

Mr. Andrew Tierney
Town Manager's Office
Town Office Building
15 Gilead Street
Hebron, CT 06248
Email: atierney@hebronct.com

Technical

Mr. Ken Eldridge, PE
Silver/Petrucci + Associates
3190 Whitney Avenue
Hamden, CT 06518
Email: keldridge@silverpetrucci.com
Phone: (203) 230-9007 x260

1.3 RESPONSIBILITY FOR MEASUREMENT OF QUANTITIES

- A. The Contractors shall have sole responsibility for the accuracy of all measurements and for estimating the material quantities required to satisfy these specifications.

1.4 DISCREPANCIES AND ADDENDA

- A. Should a Bidder find any discrepancies in the Drawings and Specifications, or should they be in doubt as to their meaning, they shall notify the Architect at once, who will send a written Addendum to all Bidders concerned. Oral instructions or decisions, unless confirmed by Addenda, will not be considered valid, legal or binding. No change order requests will be authorized or considered because of the failure of the Contractor to include work called for in the Addenda in their bid.

1.5 BIDDING REQUIREMENTS

- A. Bids from vendors that have previously failed to satisfactorily complete performance on a contract with the Town will not be considered.

1.6 MODIFICATIONS TO AIA DOCUMENT A701, Instructions to Bidders, 2018.

The following sections modify the provisions and procedures to the degree listed in the sections and articles listed in these supplementary instructions.

ARTICLE 3 Make the following changes:

- 3.1.1 **Delete** all but the first sentence and “, as indicated below,” from the first sentence.
- 3.1.2 **Delete** in its entirety.
- 3.2.2 **Delete** all but the first sentence.
 - 3.3.2.1 **Delete** all but the first sentence.
- 3.4.1 **Revise after the first sentence to read as follows:** "Addenda may be facsimile/electronically transmitted to all who are known to have received a complete set of bidding documents at the time of said facsimile/electronic transmission".
- 3.4.3 **Delete the phrase** "four days prior to the date for receipt" and insert "24 hours prior to the date and time for receipt".

ARTICLE 4 Make the following changes:

- 4.2.1 **Revise to read as follows:** “Each Bid shall be accompanied by the bid security as indicated on the Invitation to Bid.”
- 4.2.4 **Revise last sentence to read as follows:** “However, if no Contract has been awarded or a Bidder has not been notified of the acceptance of its Bid, a Bidder may withdraw its Bid and request the return of its bid security after the length of time on the Invitation to Bid.”
- 4.3.1 **Add to the end the following:** “Paper copy”.
- 4.4.3 **Add to the end the following:** “Owner will return bid security to the Bidder.”

ARTICLE 5 Add the following:

- 5.3.3 Contractors who have paid liquidated damages or penalties to an Owner for failing to comply with the schedule of any project in the last five (5) years are disqualified from this project, subject to an appeal to the Owner or Owner’s Representative(s) where the Contractor demonstrates that 1) subsequent to the project which resulted in penalties the Contractor completed two (2) similar projects or demonstrably similar projects in a timely fashion; and 2) that the factors which lead to delays and penalties in the first instance no longer exist. Payment of liquidated damages or penalties may also be defined as "having been found by the Owner to be in non-compliance with the project schedule and negotiating a financial settlement for the project in which value was returned to the Owner, either via change orders or 'work-in-kind' or other recognized manner". The Contractor under consideration shall respond to this clause in the Contractor's Qualification Statement, A305 as provided in Section 6.1 of the Instructions to Bidders, A701.

ARTICLE 6 Add the following:

- 6.1.1 The Owner will make investigations as he deems necessary to determine the ability of the Bidder to perform the Work, and the Bidder shall furnish the Owner all such information and data for this purpose as the Owner may request.

6.4 Contractor's Construction Schedule

Bidders to whom award of the Contract is under consideration shall submit to the Architect within fifteen (15) days of the Contract date, a detailed work Phasing Schedule describing the bodies of work to be undertaken and areas of the project to be addressed in per week periods between the Award of the Contract and the Bidder's proposed date of Substantial Completion.

ARTICLE 7 Add the following:

- 7.3 The Contractor and the Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors and assigns to the Owner for the performance of the Construction Contract, which is incorporated herein by reference. All Bonds (Performance, Labor and Material) must be issued by a Surety Company satisfactory to the Town of Hebron, licensed and qualified to underwrite bonds in the State of Connecticut, listed in the latest issue of U.S. Treasury Circular 570 and having a AM Best Rating of A- or better.
- 7.4 If the Contractor performs the Construction Contract, the Surety and the Contractor shall have no obligation under this Bond, except to participate in conferences as provided in Subparagraph 7.5.1.
- 7.5 If there is no Owner Default, the Surety's obligation under this Bond shall arise after:
 - 7.5.1 The Owner has notified the Contractor and the Surety at its address described in Paragraph 7.12 below that the Owner is considering declaring a Contractor Default and has requested and attempted to arrange a conference with the Contractor and the Surety to be held not later than fifteen (15) days after receipt of such notice to discuss methods of performing the Construction Contract. If the Owner, the Contractor and the Surety agree, the Contractor shall be allowed a reasonable time to perform the Construction Contract, but such an agreement shall not waive the Owner's right, if any, subsequently to declare a Contractor Default and
 - 7.5.2 The Owner has declared a Contractor Default and formally terminated the Contractor's right to complete the contract. Such Contractor Default shall not be declared earlier than twenty (20) days after the Contractor and the Surety have received notice as provided in Subparagraph 7.5.1; and
 - 7.5.3 The Owner has agreed to pay the Balance of the Contract Price to the Surety in accordance with the terms of the Construction Contract or to a contractor selected to perform the Construction Contract in accordance with the terms of the contract with the Owner.
- 7.6 When the Owner has satisfied the conditions of Paragraph 7.5.3, the Surety shall promptly and at the Surety's expense take one of the following actions:

SUPPLEMENTARY INSTRUCTIONS TO BIDDERS

- 7.6.1 Arrange for the Contractor, with consent of the Owner, to perform and complete the Construction Contract; or
- 7.6.2 Undertake to perform and complete the Construction Contract itself, through its agents or through independent contractors; or
- 7.6.3 Obtain bids or negotiated proposals from qualified contractors acceptable to the Owner for a contract for performance and completion of the Construction Contract, arrange for a contract to be prepared for execution by the Owner and the contractor selected with the Owner's concurrence, to be secured with performance and payment bonds executed by a qualified surety equivalent to the bonds issued on the Construction Contract, and pay to the Owner the amount of damages (as described in Paragraph 7.8) in excess of the Balance of the Contract Price incurred by the Owner resulting from the Contractor's default: or
- 7.6.4 Waive its right to perform and complete, arrange for completion, or obtain a new contractor and with reasonable promptness under the circumstances:
 - .1 After investigation, determine the amount for which it may be liable to the Owner and, as soon as practicable after the amount is determined, tender payment therefore to the Owner; or
 - .2 Deny liability in whole or in part and notify the Owner citing reasons therefore.
- 7.7 If the Surety does not proceed as provided in Paragraph 7.6 with reasonable promptness, the Surety shall be deemed to be in default on this Bond fifteen (15) days after receipt of an additional written notice from the Owner to the Surety demanding that the Surety perform its obligations under this Bond, and the Owner shall be entitled to enforce any remedy available to the Owner. If the Surety proceeds as provided in Subparagraph 7.6.4, and the Owner refuses the payment rendered or the Surety has denied liability, in whole or in part, without further notice the Owner shall be entitled to enforce any remedy available to the Owner.
- 7.8 After the Owner has terminated the Contractor's right to complete the Construction Contract, and if the Surety elects to act under Subparagraph 7.6.1, 7.6.2, or 7.6.3 above, then the responsibilities of the Surety to the Owner shall not be greater than those of the Contractor under the Construction Contract, and the responsibilities of the Owner to the Surety shall not be greater than those of the Owner under the Construction Contract. To the limit of the amount of this Bond, but subject to commitment by the Owner of the Balance of the Contract Price to mitigation of costs and damages on the Construction Contract, the Surety is obligated without duplication for:
 - 7.8.1 The responsibilities of the Contractor for correction of defective work and completion of the Construction Contract;
 - 7.8.2 Additional legal, design professional and delay costs resulting from the Contractor's Default, and resulting from the actions or failure to act of the Surety under Paragraph 7.6; and
 - 7.8.3 Late delivery penalties or if penalties are not specified in the Construction Contract, actual damages caused by delayed performance or non-performance of the Contractor.

SUPPLEMENTARY INSTRUCTIONS TO BIDDERS

- 7.9 The Surety shall not be liable to the Owner or others for obligations of the Contractor that are unrelated to the Construction Contract, and the Balance of the Contract Price shall not be reduced or set off on account of any such unrelated obligations. No right of action shall accrue on this Bond to any person or entity other than the Owner or its heirs, executors, administrators, or successors.
- 7.10 The Surety hereby waives notice of any change, including changes of time, to the Construction Contract or to related subcontracts, purchase orders, and other obligations.
- 7.11 Any proceeding, legal or equitable, under this Bond may be instituted in any court of competent jurisdiction in the location in which the work or part of the work is located and shall be instituted within two (2) years after Contractor Default or within two (2) years after the Contractor ceased working or within two (2) years after the Surety refuses or fails to perform its obligations under this Bond, whichever occurs first. If the provisions of this Paragraph are void or prohibited by law, the minimum period of limitation available to sureties as a defense in the jurisdiction of the suit shall be applicable.
- 7.12 Notice to the Surety, the Owner or the Contractor shall be mailed or delivered to the address shown on the signature page.
- 7.13 When this Bond has been furnished to comply with a statutory or other legal requirement in the location where the construction was to be performed, any provision in this Bond conflicting with said statutory or legal requirement shall be deemed deleted herefrom and provisions conforming to such statutory or other legal requirement shall be deemed incorporated herein. The intent is that this Bond shall be construed as a statutory bond and not as a common-law bond.
- 7.14 Definitions.
- 7.14.1 Balance of the Contract Price: The total amount payable by the Owner to the Contractor under the Construction Contract after all proper adjustments have been made, including allowance to the Contractor of any amounts received or to be received by the Owner in settlement of insurance or other claims for damages to which the Contractor is entitled, reduced by all valid and proper payments made to or on behalf of the Contractor under the Construction Contract.
- 7.14.2 Construction Contract: The agreement between the Owner and the Contractor identified on the signature page, including all Contract Documents and changes thereto.
- 7.14.3 Contractor Default: Failure of the Contractor, which has neither been remedied nor waived, to perform or otherwise to comply with the terms of the Construction Contract.
- 7.14.4 Owner Default: Failure of the Owner, which has neither been remedied nor waived, to pay the Contractor as required by the Construction Contract or to perform and complete or comply with the other terms thereof.

Add the following Articles:

ARTICLE 9 MISCELLANEOUS REQUIREMENTS

9.1 Watchman

The employment of continuous watchman service to guard the property during any and all hours shall be at the discretion of the Contractor. However, the Contractor shall remove and restore all work or temporary structures damaged by fire, vandalism or similar acts at no extra cost to the Owner.

9.2 Cleaning Up During Contracted Construction Period: The Contractor shall provide, on a regular basis throughout the contracted construction period, all project cleaning and removal of rubbish, waste material, litter, and other foreign substances. This shall include regular dumpster pickup, including pickup of dumpsters when they are full, and return of empty dumpsters. On a regular basis, store tools, construction equipment, machinery, and surplus material in a safe, hazard free manner. Remove snow and ice to provide safe access to site and building. The Contractor shall provide protection of the work and existing conditions, including existing landscape areas and landscape development areas.

9.3 Overtime

The Contractor must include within their base price all overtime, nights, holidays and weekends as required to meet the Project Completion date.

9.4 Permits

The Contractor must obtain their own town and building permits at no additional charge to the Owner. Town of Hebron permits can be obtained from the Town of Hebron at NO cost to the Contractor, excluding the State Education permit cost of \$0.26/\$1,000 value. However, Federal and State Permits (except the State Education permit cost of \$0.26/\$1,000 value) must be obtained at an additional cost to the Contractor.

9.5 Supervision

The Contractor must provide full-time, properly qualified on-site supervision for the entire duration of the project, while workpersons are on site.

9.6 Department of Administrative Services (DAS)

In accordance with Connecticut General Statute Secs. 4a-100 and 4b-91, a responsible bid that exceeds \$500,000 for this vertical building project must contain two (2) documents: The Contractor Prequalification Certificate and the Update (Bid) Statement. These two (2) documents must be submitted with the bid form. Contact the DAS Contractor Prequalification Unit at 860-713-5280 for more information. The classification GENERAL BUILDING CONSTRUCTION (GROUP B) is required as a minimum.

9.7 Commission on Human Rights and Opportunities (CHRO)

The Contractor who is selected to perform this State project must comply with CT General Statutes 4a-60, 4a-60a, 4a-60g, and 46a-68b through 46a-68f, inclusive, as amended by June 2015 Special Session Public Act 15-5. An Affirmative Action Plan must be filed with and approved by the Commission on Human Rights and Opportunities prior to the commencement of construction.

State law requires a minimum of twenty-five (25%) percent of the state-funded portion of the contract be set aside for award to subcontractors holding current certification from the Connecticut Department of Administrative Services (DAS) under the provisions of CT General Statute 4a-60g, as amended.

(25% of the work with DAS certified Small and Minority owned businesses and 25% of that work with DAS certified Minority, Women and/or Disabled owned businesses.) The Contractor must demonstrate good faith effort to meet the twenty-five percent (25%) set-aside goals.

For municipal public works contracts and quasi-public agency projects, the contractor must file a written or electronic non-discrimination certification with the Commission on Human Rights and Opportunities. Forms can be found at

http://www.ct.gov/opm/cwp/view.asp?a=2982&q=390928&opmNav_GID=1806.

ARTICLE 10 BIDDERS REPRESENTATION

Each bidder shall fully acquaint himself with conditions as they exist, so that he fully understands the complexities and restrictions attending the execution of the Work included in the Bid Documents. The failure to receive or examine any form, instrument, or document, or to visit the site to become acquainted with field conditions, shall in no way relieve the Bidder from any obligation with respect to the Bidder's proposal.

END OF SECTION

TOWN OF HEBRON
Department of Finance
NON COLLUSIVE AFFIDAVIT OF PROPOSER

The undersigned proposer, having fully informed themselves regarding the accuracy of the statements made herein certifies that;

- (1) the proposer developed the bid independently and submitted it without collusion with, and without any agreement, understanding, or planned common course of action with any other entity designed to limit independent bidding or competition;
- (2) the proposer, its employees and agents have not communicated the contents of the bid to any person not an employee or agent of the proposer and will not communicate the proposal to any such person prior to the official opening of the proposal, and
- (3) acknowledges that the Town of Hebron’s Code of Ethics Policy has been received and understood.

The undersigned proposer further certifies that this statement is executed for the purpose of inducing the Town of Hebron to consider the proposal and make an award in accordance therewith.

Legal Name of Proposer/Firm

Business Address

Signature and Title

Date

Printed Name of Title Person

Subscribed and Sworn to me this ____ day of _____, 20__.

Notary Public
My Commission Expires

Hebron Code of Ethics

Effective August 1, 2010

I. Persons Governed by this Code: This code shall apply to all Town officials, Officers and employees, whether elected and/or appointed, including members of boards, commissions, and committees, full time or part time, paid or unpaid and shall hereinafter be referred to collectively as “persons governed by this code.”

II. Purpose:

Public Office is a public trust. The trust of the public is essential for government to function effectively. Policy developed by government officials and employees affects every citizen of the town, and it must be based upon honest and fair deliberations and decisions. This process must be free from threats, favoritism, undue influence and all forms of impropriety so that the confidence of the public is not eroded. By enacting this Code, the Town of Hebron seeks to avoid any loss of trust and to maintain and increase the confidence of our citizens in the integrity, fairness and transparency of their government.

Persons governed by this Code should strive to conduct themselves in a professional, courteous, honest manner and otherwise according to the highest moral and personal standards of integrity, such that their behavior reflects favorably upon themselves and the Town of Hebron.

III. Definitions:

As used in this document, the following listed words and phrases shall have these specific meanings:

Code: This “Code of Ethics” as adopted by the Town of Hebron on August 1, 2010, and as amended from time to time.

Conflict of Interest: A conflict between one’s obligation to the public good and one’s self-interest.

Financial Interest: Any monetary benefit accruing to persons governed by this code that is not equally available to the general public.

Gift: Anything having value whether in the form of service, loan, tangible property, promise or any other form. However a gift shall not include political contributions made in accordance with campaign financing regulations; nor tokens of appreciation, recognition or other incidental gratuities not exceeding \$100 per year.

Immediate Family: Includes spouse/domestic partner, siblings of either, child(ren), parents, and any individual residing in the same household.

Independent Contractor: Any general contractor, subcontractor, consultant, person, firm, corporation, vendor or organization currently providing or formerly providing, goods or services to

the Town of Hebron in exchange for compensation.

Gender: Masculine shall include the feminine and the feminine shall include the masculine.

Personal Interest: Any non-monetary benefit, special consideration, treatment or advantage accruing to persons governed by this Code which is not equally available to the general public.

Singular and Plural: Singular shall include the plural and the plural shall include the singular unless the context otherwise requires.

IV. Conflicts of Interest:

No person governed by this code shall use his position or Office for the financial or personal interest of himself, a business with which he is associated, an individual with which he is associated or a member of his immediate family.

No person governed by this code shall engage in or participate in any business or transaction, including outside employment with a private business, or have an interest, direct or indirect, that is incompatible with the proper discharge of his official responsibilities in the public interest or that would tend to impair his independent judgment or action in the performance of his official responsibilities.

No person governed by this code or a business with which he is associated or member of his immediate family shall enter into a contract with the Town of Hebron unless it is awarded through a process of public notice and/or competitive bidding.

No person governed by this code or independent contractor shall knowingly counsel, authorize or otherwise sanction action that violates any provision of this code.

V. Disclosure and Recusal:

A person governed by this code shall refrain from participating on behalf of the Town of Hebron in any matter pending before any agency of the town if he, a business with which he is associated, an individual with whom he is associated or a member of his immediate family has a financial or personal interest in that matter and such interest is not shared by a substantial segment of the town's population.

If such participation is within the scope of said person's official responsibility, he shall be required to provide written disclosure, that sets forth the nature and extent of such interest to the town clerk, and this disclosure shall be included in the official record of all proceedings on this matter.

Notwithstanding the prohibition outlined above, a person governed by this code may vote or otherwise participate in a matter that involves a determination of general policy if said person's

interest in the matter is shared with a substantial segment of the population of the Town of Hebron.

No person governed by this code shall appear on behalf of private interests before any agency of the town, nor shall he represent private interests in any action, proceeding or litigation against the town.

Nothing contained in this code shall prohibit or restrict a person governed by this code from appearing before any agency of the Town of Hebron on his own behalf, or from being a party in any action, proceeding or litigation brought by or against such person to which the Town is also a party.

For a period of one (1) year after termination of service to the Town of Hebron, no former public employee or public official who participated in the negotiation or award of a town contract valued in excess of \$25,000 shall accept employment with, appear on behalf of, or represent any private interest concerning matters related to this same contract.

VI. Gifts:

No person governed by this code or member of such individual's immediate family or business with which he is associated shall solicit or accept any gift that could reasonably be expected to influence or create an appearance of influencing the actions or judgment of such person.

If a prohibited gift is offered to a person governed by this code, he shall refuse it, return it, pay the donor the market value of the gift or donate it to a nonprofit organization provided he does not take the corresponding tax write-off. Alternatively, such prohibited gift may be considered a gift to the Town of Hebron provided it remains in the Town's possession.

VII. Use of Town Assets:

No person governed by this code or independent contractor shall request or permit the use of town funds or services, Town owned or leased vehicles, equipment, facilities, materials or property for personal convenience or profit, except when such assets and services are available to the public generally or are provided as Town policy for the use of persons governed by this code in the conduct of official business.

VIII. Use of Confidential Information:

No person governed by this code, former employee or independent contractor shall disclose confidential information concerning Town affairs, nor shall such persons governed by this code use this information for the personal or financial interests of themselves or others.

IX. Severability:

If a specific section of this Code is found to be invalid by a state or federal court or agency having

jurisdiction only that specific section of the Code shall be deemed invalid. The rest of the Code shall remain in effect.

X. Distribution of Code of Ethics:

The Town Clerk shall provide a copy of this Code of Ethics to every town official, employee, board and commission member, persons serving the town or persons doing business with the town. Each public Officer or employee elected, appointed or engaged thereafter shall be furnished a copy before entering upon the duties of his Office or employment or contract.

APPENDIX II
ORDINANCE PROVIDING FOR LOCAL PREFERENCE
CHAPTER 11, ARTICLE 1

§11-1 TOWN BASED BUSINESS

The term “town based business” shall mean a business with a principal business located within the Town of Hebron. A business shall not be considered a town based business, unless evidence submitted with each bid submitted by said business to establish that said business has a bona fide principal place of business in Hebron. Such evidence may include evidence of ownership of or a long term lease of the real estate from which the principal place of business is operated, or payment of property taxes on the personal property of the business to be used in performance of the bid.

§11-2 LOWEST RESPONSIBLE BIDDERS

On any project the lowest responsible bidder shall be determined in the following order:

Provided that such town based resident bidder shall have met all other requirements set forth in this article, any town based resident bidder which has submitted a bid not more than five (5) percent higher than the lowest most responsible bid may be awarded the bid provided such town based bidder agrees to accept the award of the bid at the amount of the lowest most responsible bid.

If more than one town based resident bidder has submitted a bid not more than five (5) percent higher than the lowest responsible bid, the lowest responsible bidder shall be that one of the town based resident bidders which had submitted the lowest bid.

§11-3 IMPLEMENTATION OF LOCAL BIDDER PREFERENCE

Any local vendor meeting the requirements of a local vendor as defined in the above ordinance responding to the solicitation shall be required to submit a signed Local Bidder Affidavit form with their bid submittal. Failure to submit an affidavit form, approved by the Town of Hebron, may result in your disqualification as a local vendor and ineligibility for contract award.

§11-4 RESTRICTION OF USE OF LOCAL BIDDER PREFERENCE

This section shall not apply in those instances where the bid requested involves a cooperation purchasing arrangement between the town and other municipalities or the State of Connecticut.

APPENDIX III

AFFIDAVIT PURSUANT
TO THE ORDINANCE PROVIDING FOR LOCAL PREFERENCE

(It is not necessary to submit this form unless you are a Hebron Town-based Business)

The undersigned, being duly sworn, disposes and says as follows:

1. That he/she is over the age of eighteen (18) years of age;
2. That he/she believes in and understands the obligations of an oath;
3. That he/she is submitting a bid as a “town-based business”, pursuant to those conditions delineated in the Town of Hebron’s Ordinance Providing for Local Preference.

Name of Local Bidder
(Please Print)

Date

Signature of Local Bidder

BIDDER: _____
Name

Address

To: **Andrew Tierney
Town Manager Office
Town Office Building
15 Gilead Street
Hebron, CT 06248**

Project: **Hebron Elementary School
Contaminated Water Piping Replacement
92 Church Street
Hebron, CT 06248
State Project No. 067-0042 CV
Bid No. 2020-03**

We hereby submit our bid on the above referenced project. We are enclosing our bid surety in the amount of 10% of our base bid which will be returned to us after the award is made. Following award, we will be able to provide the required 100% Performance Bond and 100% Labor and Materials Bond from the following insurance company: _____.

We will provide the requested Certificate of Insurance from the following insurance Company: _____.

We have read the General Information and Conditions to bidders and are submitting our bid in full compliance with all your General Terms and Conditions except as noted below under exceptions.

We propose to provide all materials, labor, equipment and services necessary to properly and fully complete the specified contaminated water piping replacement project to the satisfaction of the Owner and Architect pursuant to the terms of the Contract Documents for the costs as detailed below:

Base Bid:

Hebron Elementary School Contaminated Water Piping Replacement, the entire project for a Total Cost of

\$ _____ Dollars (\$ _____ .00).
written figure

We will commence work _____ calendar days after receipt of "Notice to Proceed" or signing of Contract. We will be able to substantially complete the project within _____ calendar days thereafter (see SIB-1, 1.1.B), **but no later than August 15, 2020**.

Alternates

ADD ALTERNATE NO. 1: Fully Copper Water Distribution System: For the work, methods, procedures and materials (See Section 012300 and the Construction Documents), we propose to Add to the Base Bid a total of _____ Dollars (\$ _____ .00)

written figure

The project schedule will be increased by _____ calendar days to complete the work indicated under Alternate 1.

Unit Prices:

As required by the Base Bid, should deteriorated or damaged materials be required to be removed as determined by the Architect or Owner, the cost to remove and replace the referenced material, (or credit for specified material not provided or installed) including all labor, material, equipment and related furnishings is as follows:

- 1. Add: Acoustical panel ceiling assembly \$ _____/sf
- 2. Deduct: Acoustical panel ceiling assembly \$ _____/sf

Bidders are required to hold their Bid Price for a period of sixty (60) days after submission of Bids to the Town of Hebron Manager's Office.

If written notice of the acceptance of this Bid is mailed, transmitted by facsimile, or delivered to the undersigned at the Address designated above, within ninety (90) days after the date of Bid Opening, or any time thereafter before this Bid is withdrawn, the undersigned will, within ten (10) days after the date of mailing, faxing or delivering of the notice, execute and deliver a contract in the Standard Form of Agreement Between the Owner and Contractor, AIA Document A101, or similar contract modified as may be mutually agreed upon.

The undersigned acknowledges that he has examined the documents, visited and examined the site as required under "Instructions to Bidders", examined the availability of labor and materials and further agrees to comply with all the requirements as to the conditions of employment and wage rates set forth in the Contract Documents.

Addenda:

The Undersigned acknowledges receipt of the following addenda to the Contract Documents, listed by number and date:

- Number _____ Dated: _____
- Number _____ Dated: _____
- Number _____ Dated: _____
- Number _____ Dated: _____

NON-COLLUSIVE BID STATEMENT

The undersigned bidder certifies that this bid is made independently and without collusion, agreement, understanding or planned course of action with any other bidder and that the contents of the bid shall not be disclosed to anyone other than employees, agents or sureties prior to the official bid opening.

Date: _____

Name of Firm: _____

Address: _____

Signature: _____

Printed Name and
Title of Agent submitting bid: _____

Telephone Number: _____

Fax Number: _____



AIA® Document A310™ – 2010

Bid Bond

CONTRACTOR:

(Name, legal status and address)

SURETY:

(Name, legal status and principal place of business)

OWNER:

(Name, legal status and address)

Town of Hebron, Connecticut
15 Gilead Street
Hebron, Connecticut 06248

BOND AMOUNT: \$**PROJECT:**

(Name, location or address, and Project number, if any)

Contaminated Water Piping Replacement
Hebron Elementary School
92 Church Street
Hebron, Connecticut 06248

The Contractor and Surety are bound to the Owner in the amount set forth above, for the payment of which the Contractor and Surety bind themselves, their heirs, executors, administrators, successors and assigns, jointly and severally, as provided herein. The conditions of this Bond are such that if the Owner accepts the bid of the Contractor within the time specified in the bid documents, or within such time period as may be agreed to by the Owner and Contractor, and the Contractor either (1) enters into a contract with the Owner in accordance with the terms of such bid, and gives such bond or bonds as may be specified in the bidding or Contract Documents, with a surety admitted in the jurisdiction of the Project and otherwise acceptable to the Owner, for the faithful performance of such Contract and for the prompt payment of labor and material furnished in the prosecution thereof; or (2) pays to the Owner the difference, not to exceed the amount of this Bond, between the amount specified in said bid and such larger amount for which the Owner may in good faith contract with another party to perform the work covered by said bid, then this obligation shall be null and void, otherwise to remain in full force and effect. The Surety hereby waives any notice of an agreement between the Owner and Contractor to extend the time in which the Owner may accept the bid. Waiver of notice by the Surety shall not apply to any extension exceeding sixty (60) days in the aggregate beyond the time for acceptance of bids specified in the bid documents, and the Owner and Contractor shall obtain the Surety's consent for an extension beyond sixty (60) days.

If this Bond is issued in connection with a subcontractor's bid to a Contractor, the term Contractor in this Bond shall be deemed to be Subcontractor and the term Owner shall be deemed to be Contractor.

When this Bond has been furnished to comply with a statutory or other legal requirement in the location of the Project, any provision in this Bond conflicting with said statutory or legal requirement shall be deemed deleted herefrom and provisions conforming to such statutory or other legal requirement shall be deemed incorporated herein. When so

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.

Any singular reference to Contractor, Surety, Owner or other party shall be considered plural where applicable.

Init.

DRAFT AIA® Document A305™ - 1986

Contractor's Qualification Statement

The Undersigned certifies under oath that the information provided herein is true and sufficiently complete so as not to be misleading.

SUBMITTED TO: « »

ADDRESS: « »

SUBMITTED BY: « »

NAME: « »

ADDRESS: « »

PRINCIPAL OFFICE: « »

- [« »] Corporation
- [« »] Partnership
- [« »] Individual
- [« »] Joint Venture
- [« »] Other « »

NAME OF PROJECT: (if applicable) « »

TYPE OF WORK: (file separate form for each Classification of Work)

- [« »] General Construction
- [« »] HVAC
- [« »] Electrical
- [« »] Plumbing
- [« »] Other: (Specify) « »

§ 1 ORGANIZATION

§ 1.1 How many years has your organization been in business as a Contractor? « »

§ 1.2 How many years has your organization been in business under its present business name? « »

§ 1.2.1 Under what other or former names has your organization operated?

« »

§ 1.3 If your organization is a corporation, answer the following:

§ 1.3.1 Date of incorporation: « »

§ 1.3.2 State of incorporation: « »

§ 1.3.3 President's name: « »

§ 1.3.4 Vice-president's name(s)

« »

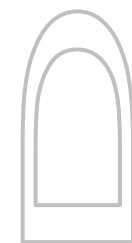
§ 1.3.5 Secretary's name: « »

§ 1.3.6 Treasurer's name: « »

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

This form is approved and recommended by the American Institute of Architects (AIA) and The Associated General Contractors of America (AGC) for use in evaluating the qualifications of contractors. No endorsement of the submitting party or verification of the information is made by AIA or AGC.



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§ 1.4 If your organization is a partnership, answer the following:

§ 1.4.1 Date of organization: « »

§ 1.4.2 Type of partnership (if applicable): « »

§ 1.4.3 Name(s) of general partner(s)

« »

§ 1.5 If your organization is individually owned, answer the following:

§ 1.5.1 Date of organization: « »

§ 1.5.2 Name of owner:

« »

§ 1.6 If the form of your organization is other than those listed above, describe it and name the principals:

« »

§ 2 LICENSING

§ 2.1 List jurisdictions and trade categories in which your organization is legally qualified to do business, and indicate registration or license numbers, if applicable.

« »

§ 2.2 List jurisdictions in which your organization's partnership or trade name is filed.

« »

§ 3 EXPERIENCE

§ 3.1 List the categories of work that your organization normally performs with its own forces.

« »

§ 3.2 Claims and Suits. (If the answer to any of the questions below is yes, please attach details.)

§ 3.2.1 Has your organization ever failed to complete any work awarded to it?

« »

§ 3.2.2 Are there any judgments, claims, arbitration proceedings or suits pending or outstanding against your organization or its officers?

« »

§ 3.2.3 Has your organization filed any law suits or requested arbitration with regard to construction contracts within the last five years?

« »

§ 3.3 Within the last five years, has any officer or principal of your organization ever been an officer or principal of another organization when it failed to complete a construction contract? (If the answer is yes, please attach details.)

« »

§ 3.4 On a separate sheet, list major construction projects your organization has in progress, giving the name of project, owner, architect, contract amount, percent complete and scheduled completion date.

« »

§ 3.4.1 State total worth of work in progress and under contract:

« »

§ 3.5 On a separate sheet, list the major projects your organization has completed in the past five years, giving the name of project, owner, architect, contract amount, date of completion and percentage of the cost of the work performed with your own forces.

« »

§ 3.5.1 State average annual amount of construction work performed during the past five years:

« »

§ 3.6 On a separate sheet, list the construction experience and present commitments of the key individuals of your organization.

« »

§ 4 REFERENCES

§ 4.1 Trade References:

« »

§ 4.2 Bank References:

« »

§ 4.3 Surety:

§ 4.3.1 Name of bonding company:

« »

§ 4.3.2 Name and address of agent:

« »

§ 5 FINANCING

§ 5.1 Financial Statement.

§ 5.1.1 Attach a financial statement, preferably audited, including your organization's latest balance sheet and income statement showing the following items:

Current Assets (e.g., cash, joint venture accounts, accounts receivable, notes receivable, accrued income, deposits, materials inventory and prepaid expenses);

Net Fixed Assets;

Other Assets;

Current Liabilities (e.g., accounts payable, notes payable, accrued expenses, provision for income taxes, advances, accrued salaries and accrued payroll taxes);

Other Liabilities (e.g., capital, capital stock, authorized and outstanding shares par values, earned surplus and retained earnings).

§ 5.1.2 Name and address of firm preparing attached financial statement, and date thereof:

<< >>

§ 5.1.3 Is the attached financial statement for the identical organization named on page one?

<< >>

§ 5.1.4 If not, explain the relationship and financial responsibility of the organization whose financial statement is provided (e.g., parent-subsidiary).

<< >>

§ 5.2 Will the organization whose financial statement is attached act as guarantor of the contract for construction?

<< >>

§ 6 SIGNATURE

§ 6.1 Dated at this <> day of <>

Name of Organization: <>

By: <>

Title: <>

§ 6.2

<< >>

M <> being duly sworn deposes and says that the information provided herein is true and sufficiently complete so as not to be misleading.

Subscribed and sworn before me this <> day of <>

Notary Public: <>

My Commission Expires: <>

COMMISSION ON HUMAN RIGHTS AND OPPORTUNITIES
CONTRACT COMPLIANCE REGULATIONS
NOTIFICATION TO BIDDERS

(Revised 09/3/15)

The contract to be awarded is subject to contract compliance requirements mandated by Sections 4a-60 and 4a-60a of the Connecticut General Statutes; and, when the awarding agency is the State, Sections 46a-71(d) and 46a-81i(d) of the Connecticut General Statutes. There are Contract Compliance Regulations codified at Section 46a-68j-21 through 43 of the Regulations of Connecticut State Agencies, which establish a procedure for awarding all contracts covered by Sections 4a-60 and 46a-71(d) of the Connecticut General Statutes.

According to Section 46a-68j-30(9) of the Contract Compliance Regulations, every agency awarding a contract subject to the contract compliance requirements has an obligation to “aggressively solicit the participation of legitimate minority business enterprises as bidders, contractors, subcontractors and suppliers of materials.” “Minority business enterprise” is defined in Section 4a-60 of the Connecticut General Statutes as a business wherein fifty-one percent or more of the capital stock, or assets belong to a person or persons: “(1) Who are active in daily affairs of the enterprise; (2) who have the power to direct the management and policies of the enterprise; and (3) who are members of a minority, as such term is defined in subsection (a) of Section 32-9n.” “Minority” groups are defined in Section 32-9n of the Connecticut General Statutes as “(1) Black Americans . . . (2) Hispanic Americans . . . (3) persons who have origins in the Iberian Peninsula . . . (4) Women . . . (5) Asian Pacific Americans and Pacific Islanders; (6) American Indians . . .” An individual with a disability is also a minority business enterprise as provided by Section 4a-60g of the Connecticut General Statutes. The above definitions apply to the contract compliance requirements by virtue of Section 46a-68j-21(11) of the Contract Compliance Regulations.

The awarding agency will consider the following factors when reviewing the bidder’s qualifications under the contract compliance requirements:

- (a) the bidder’s success in implementing an affirmative action plan;
- (b) the bidder’s success in developing an apprenticeship program complying with Sections 46a-68-1 to 46a-68-17 of the Administrative Regulations of Connecticut State Agencies, inclusive;
- (c) the bidder’s promise to develop and implement a successful affirmative action plan;
- (d) the bidder’s submission of employment statistics contained in the “Employment Information Form”, indicating that the composition of its workforce is at or near parity when compared to the racial and sexual composition of the workforce in the relevant labor market area; and
- (e) the bidder’s promise to set aside a portion of the contract for legitimate minority business enterprises. See Section 46a-68j-30(10)(E) of the Contract Compliance Regulations.

INSTRUCTIONS AND OTHER INFORMATION

The following BIDDER CONTRACT COMPLIANCE MONITORING REPORT must be completed in full, signed, and submitted with the bid for this contract. The contract awarding agency and the Commission on Human Rights and Opportunities will use the information contained thereon to determine the bidders compliance to Sections 4a-60 and 4a-60a CONN. GEN. STAT., and Sections 46a-68j-23 of the Regulations of Connecticut State Agencies regarding equal employment opportunity, and the bidder’s good faith efforts to include minority business enterprises as subcontractors and suppliers for the work of the contract.

1) **Definition of Small Contractor**

Section 4a-60g CONN. GEN. STAT. defines a small contractor as a company that has been doing business under the same management and control and has maintained its principal place of business in Connecticut for a one year period immediately prior to its application for certification under this section, had gross revenues not exceeding fifteen million dollars in the most recently completed fiscal year, and at least fifty-one percent of the ownership of which is held by a person or persons who are active in the daily affairs of the company, and have the power to direct the management and policies of the company, except that a nonprofit corporation shall be construed to be a small contractor if such nonprofit corporation meets the requirements of subparagraphs (A) and (B) of subdivision 4a-60g CONN. GEN. STAT.

MANAGEMENT: Managers plan, organize, direct, and control the major functions of an organization through subordinates who are at the managerial or supervisory level. They make policy decisions and set objectives for the company or departments. They are not usually directly involved in production or providing services. Examples include top executives, public relations managers, managers of operations specialties (such as financial, human resources, or purchasing managers), and construction and engineering managers.

BUSINESS AND FINANCIAL OPERATIONS: These occupations include managers and professionals who work with the financial aspects of the business. These occupations include accountants and auditors, purchasing agents, management analysts, labor relations specialists, and budget, credit, and financial analysts.

MARKETING AND SALES: Occupations related to the act or process of buying and selling products and/or services such as sales engineer, retail sales workers and sales representatives including wholesale.

LEGAL OCCUPATIONS: In-House Counsel who is charged with providing legal advice and services in regards to legal issues that may arise during the course of standard business practices. This category also includes assistive legal occupations such as paralegals, legal assistants.

COMPUTER SPECIALISTS: Professionals responsible for the computer operations within a company are grouped in this category. Examples of job titles in this category include computer programmers, software engineers, database administrators, computer scientists, systems analysts, and computer support specialists

ARCHITECTURE AND ENGINEERING: Occupations related to architecture, surveying, engineering, and drafting are included in this category. Some of the job titles in this category include electrical and electronic engineers, surveyors, architects, drafters, mechanical engineers, materials engineers, mapping technicians, and civil engineers.

OFFICE AND ADMINISTRATIVE SUPPORT: All clerical-type work is included in this category. These jobs involve the preparing, transcribing, and preserving of written communications and records; collecting accounts; gathering and distributing information; operating office machines and electronic data processing equipment; and distributing mail. Job titles listed in this category include telephone operators, bill and account collectors, customer service representatives, dispatchers, secretaries and administrative assistants, computer operators and clerks (such as payroll, shipping, stock, mail and file).

BUILDING AND GROUNDS CLEANING AND MAINTENANCE: This category includes occupations involving landscaping, housekeeping, and janitorial services. Job titles found in this category include supervisors of landscaping or housekeeping, janitors, maids, grounds maintenance workers, and pest control workers.

CONSTRUCTION AND EXTRACTION: This category includes construction trades and related occupations. Job titles found in this category include boilermakers, masons (all types), carpenters, construction laborers, electricians, plumbers (and related trades), roofers, sheet metal workers, elevator installers, hazardous materials removal workers, paperhangers, and painters. Paving, surfacing, and tamping equipment operators; drywall and ceiling tile installers; and carpet, floor and tile installers and finishers are also included in this category. First line supervisors, foremen, and helpers in these trades are also grouped in this category..

INSTALLATION, MAINTENANCE AND REPAIR: Occupations involving the installation, maintenance, and repair of equipment are included in this group. Examples of job titles found here are heating, ac, and refrigeration mechanics and installers; telecommunication line installers and repairers; heavy vehicle and mobile equipment service technicians and mechanics; small engine mechanics; security and fire alarm systems installers; electric/electronic repair, industrial, utility and transportation equipment; millwrights; riggers; and manufactured building and mobile home installers. First line supervisors, foremen, and helpers for these jobs are also included in the category.

MATERIAL MOVING WORKERS: The job titles included in this group are Crane and tower operators; dredge, excavating, and lading machine operators; hoist and winch operators; industrial truck and tractor operators; cleaners of vehicles and equipment; laborers and freight, stock, and material movers, hand; machine feeders and offbearers; packers and packagers, hand; pumping station operators; refuse and recyclable material collectors; and miscellaneous material moving workers.

PRODUCTION WORKERS: The job titles included in this category are chemical production machine setters, operators and tenders; crushing/grinding workers; cutting workers; inspectors, testers sorters, samplers, weighers; precious stone/metal workers; painting workers; cementing/gluing machine operators and tenders; etchers/engravers; molders, shapers and casters except for metal and plastic; and production workers.

<p><u>White</u> (not of Hispanic Origin)- All persons having origins in any of the original peoples of Europe, North Africa, or the Middle East.</p> <p><u>Black</u>(not of Hispanic Origin)- All persons having origins in any of the Black racial groups of Africa.</p> <p><u>Hispanic</u>- All persons of Mexican, Puerto Rican, Cuban, Central or South American, or other Spanish culture or origin, regardless of race.</p>	<p><u>Asian or Pacific Islander</u>- All persons having origins in any of the original peoples of the Far East, Southeast Asia, the Indian subcontinent, or the Pacific Islands. This area includes China, India, Japan, Korea, the Philippine Islands, and Samoa.</p> <p><u>American Indian or Alaskan Native</u>- All persons having origins in any of the original peoples of North America, and who maintain cultural identification through tribal affiliation or community recognition.</p>
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BIDDER CONTRACT COMPLIANCE MONITORING REPORT

PART I - Bidder Information

Company Name Street Address City & State Chief Executive	Bidder Federal Employer Identification Number _____ Or Social Security Number _____
Major Business Activity (brief description)	Bidder Identification (response optional/definitions on page 1) -Bidder is a small contractor. Yes ___ No ___ -Bidder is a minority business enterprise Yes ___ No ___ (If yes, check ownership category) Black ___ Hispanic ___ Asian American ___ American Indian/Alaskan Native ___ Iberian Peninsula ___ Individual(s) with a Physical Disability ___ Female ___
Bidder Parent Company (If any)	- Bidder is certified as above by State of CT Yes ___ No ___
Other Locations in Ct. (If any)	

PART II - Bidder Nondiscrimination Policies and Procedures

1. Does your company have a written Affirmative Action/Equal Employment Opportunity statement posted on company bulletin boards? Yes ___ No ___	7. Do all of your company contracts and purchase orders contain non-discrimination statements as required by Sections 4a-60 & 4a-60a Conn. Gen. Stat.? Yes ___ No ___
2. Does your company have the state-mandated sexual harassment prevention in the workplace policy posted on company bulletin boards? Yes ___ No ___	8. Do you, upon request, provide reasonable accommodation to employees, or applicants for employment, who have physical or mental disability? Yes ___ No ___
3. Do you notify all recruitment sources in writing of your company's Affirmative Action/Equal Employment Opportunity employment policy? Yes ___ No ___	9. Does your company have a mandatory retirement age for all employees? Yes ___ No ___
4. Do your company advertisements contain a written statement that you are an Affirmative Action/Equal Opportunity Employer? Yes ___ No ___	10. If your company has 50 or more employees, have you provided at least two (2) hours of sexual harassment training to all of your supervisors? Yes ___ No ___ NA ___
5. Do you notify the Ct. State Employment Service of all employment openings with your company? Yes ___ No ___	11. If your company has apprenticeship programs, do they meet the Affirmative Action/Equal Employment Opportunity requirements of the apprenticeship standards of the Ct. Dept. of Labor? Yes ___ No ___ NA ___
6. Does your company have a collective bargaining agreement with workers? Yes ___ No ___ 6a. If yes, do the collective bargaining agreements contain non-discrimination clauses covering all workers? Yes ___ No ___ 6b. Have you notified each union in writing of your commitments under the nondiscrimination requirements of contracts with the state of Ct? Yes ___ No ___	12. Does your company have a written affirmative action Plan? Yes ___ No ___ If no, please explain. 13. Is there a person in your company who is responsible for equal employment opportunity? Yes ___ No ___ If yes, give name and phone number. _____

1. Will the work of this contract include subcontractors or suppliers? Yes__ No__

1a. If yes, please list all subcontractors and suppliers and report if they are a small contractor and/or a minority business enterprise. (defined on page 1 / use additional sheet if necessary)

1b. Will the work of this contract require additional subcontractors or suppliers other than those identified in 1a. above?

Yes__ No__

PART IV - Bidder Employment Information

Date:

JOB CATEGORY *	OVERALL TOTALS	WHITE (not of Hispanic origin)		BLACK (not of Hispanic origin)		HISPANIC		ASIAN or PACIFIC ISLANDER		AMERICAN INDIAN or ALASKAN NATIVE	
		Male	Female	Male	Female	Male	Female	Male	Female	male	female
Management											
Business & Financial Ops											
Marketing & Sales											
Legal Occupations											
Computer Specialists											
Architecture/Engineering											
Office & Admin Support											
Bldg/ Grounds Cleaning/Maintenance											
Construction & Extraction											
Installation , Maintenance & Repair											
Material Moving Workers											
Production Occupations											
TOTALS ABOVE											
Total One Year Ago											
FORMAL ON THE JOB TRAINEES (ENTER FIGURES FOR THE SAME CATEGORIES AS ARE SHOWN ABOVE)											
Apprentices											
Trainees											

*NOTE: JOB CATEGORIES CAN BE CHANGED OR ADDED TO (EX. SALES CAN BE ADDED OR REPLACE A CATEGORY NOT USED IN YOUR COMPANY)

1. Which of the following recruitment sources are used by you? (Check yes or no, and report percent used)				2. Check (X) any of the below listed requirements that you use as a hiring qualification (X)	3. Describe below any other practices or actions that you take which show that you hire, train, and promote employees without discrimination
SOURCE	YES	NO	% of applicants provided by source		
State Employment Service				Work Experience	
Private Employment Agencies				Ability to Speak or Write English	
Schools and Colleges				Written Tests	
Newspaper Advertisement				High School Diploma	
Walk Ins				College Degree	
Present Employees				Union Membership	
Labor Organizations				Personal Recommendation	
Minority/Community Organizations				Height or Weight	
Others (please identify)				Car Ownership	
				Arrest Record	
				Wage Garnishments	

Certification (Read this form and check your statements on it CAREFULLY before signing). I certify that the statements made by me on this BIDDER CONTRACT COMPLIANCE MONITORING REPORT are complete and true to the best of my knowledge and belief, and are made in good faith. I understand that if I knowingly make any misstatements of facts, I am subject to be declared in non-compliance with Section 4a-60, 4a-60a, and related sections of the CONN. GEN. STAT.

(Signature)	(Title)	(Date Signed)	(Telephone)
-------------	---------	---------------	-------------

 **AIA** Document A101™ – 2017**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 2019
(In words, indicate day, month and year.)

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

Town of Hebron, Connecticut
15 Gilead Street
Hebron, Connecticut 06248

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

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

Contaminated Water Piping Replacement
Hebron Elementary School
92 Church Street
Hebron, Connecticut 06248

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

Silver, Petrucelli & Associates, Inc.
3190 Whitney Avenue, Bldg 2
Hamden, CT 06518

The Owner and Contractor agree as follows.

ADDITIONS AND DELETIONS:

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

The parties should complete A101™–2017, Exhibit A, Insurance and Bonds, contemporaneously with this Agreement. AIA Document A201™–2017, 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.

Init.

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User Notes:

(3B9ADA57)

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

EXHIBIT A 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.

The Work includes all work shown and/or reasonably inferable from the Contract Documents for the proper completion of the Work. It is understood and agreed that the intent of the Contract Documents is to provide for the proper completion of the Work and, under this Agreement, the Contractor agrees to provide all labor, materials, and/or equipment necessary to complete the Work in accordance with that intent regardless of whether any specific item is expressly shown provided it is of a nature that would ordinarily be required for the type of work being performed.

ARTICLE 3 DATE OF COMMENCEMENT AND SUBSTANTIAL COMPLETION

§ 3.1 The date of commencement of the Work shall be:

(Check one of the following boxes.)

- The date of this Agreement.
- A date set forth in a notice to proceed issued by the Owner.
- Established as follows:

(Insert a date or a means to determine the date of commencement of the Work.)

Init.

If a date of commencement of the Work is not selected, then the date of commencement shall be the date of this Agreement.

§ 3.2 The Contract Time shall be measured from the date of commencement of the Work to be performed under this Agreement.

§ 3.3 Substantial Completion

§ 3.3.1 Subject to adjustments of the Contract Time as provided in the Contract Documents, the Contractor shall achieve Substantial Completion of the entire Work:

(Check one of the following boxes and complete the necessary information.)

Not later than () calendar days from the date of commencement of the Work.

By not later than the following date: August 15, 2020, time being of the essence.

§ 3.3.2 Subject to adjustments of the Contract Time as provided in the Contract Documents, if portions of the Work are to be completed prior to Substantial Completion of the entire Work, the Contractor shall achieve Substantial Completion of such portions by the following dates:

Portion of Work	Substantial Completion Date
-----------------	-----------------------------

§ 3.3.3 If the Contractor fails to achieve Substantial Completion as provided in this Section 3.3, liquidated damages, if any, shall be assessed as set forth in Section 4.5.

§ 3.3.4 The Owner and Contractor hereby acknowledge and agree that time is of the essence with respect to Contractor's performance of the Work hereunder. Accordingly, upon Owner's issuance to Contractor of the Notice to Proceed, Contractor shall immediately commence performance of the Work and continue to perform the same during the term of this Agreement.

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 Alternates

§ 4.2.1 Alternates, if any, included in the Contract Sum:

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

§ 4.2.2 Subject to the conditions noted below, the following alternates may be accepted by the Owner following execution of this Agreement. Upon acceptance, the Owner shall issue a Modification to this Agreement.

(Insert below each alternate and the conditions that must be met for the Owner to accept the alternate.)

Item	Price	Conditions for Acceptance
------	-------	---------------------------

§ 4.3 Allowances, if any, included in the Contract Sum:

(Identify each allowance.)

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

§ 4.4 Unit prices, if any:

(Identify the item and state the unit price and quantity limitations, if any, to which the unit price will be applicable.)

Init.

Item

Units and Limitations

Price per Unit (\$0.00)

§ 4.5 Liquidated damages, if any:

(Insert terms and conditions for liquidated damages, if any.)

The Contractor agrees that if the date of Substantial Completion, as may be adjusted under the Contract Documents, is not achieved within the Contract Time, as may be adjusted, the Contractor shall pay to the Owner, as liquidated damages, and not as a penalty, Five Thousand and 00/100 Dollars (\$5,00.00), plus a per diem amount of Two Hundred Fifty and 00/100 Dollars (\$250.00) for every calendar day that the date of Substantial Completion is delayed after the expiration of ninety (90) days after the Contract Time, as may be adjusted hereunder.

§ 4.6 Other:

(Insert provisions for bonus or other incentives, if any, that might result in a change to the Contract Sum.)

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 last day of a month, the Owner shall make payment of the amount certified to the Contractor not later than the 30th day of the following month. If an Application for Payment is received by the Architect after the application date fixed above, payment of the amount certified shall be made by the Owner not later than thirty (30) 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 of values 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 In accordance with AIA Document A201™–2017, General Conditions of the Contract for Construction, as modified, and subject to other provisions of the Contract Documents, the amount of each progress payment shall be computed as follows:

§ 5.1.6.1 The amount of each progress payment shall first include:

- .1 That portion of the Contract Sum properly allocable to completed Work;
- .2 That portion of the Contract Sum properly allocable to materials and equipment delivered and securely stored at the site for subsequent incorporation in the completed construction, or, if approved in advance by the Owner, securely stored off the site at a location agreed upon in writing; and
- .3 That portion of Construction Change Directives that the Architect determines, in the Architect's professional judgment, to be reasonably justified.

§ 5.1.6.2 The amount of each progress payment shall then be reduced by:

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- .1 The aggregate of any amounts previously paid by the Owner;
- .2 The amount, if any, for Work that remains uncorrected and for which the Architect has previously withheld a Certificate for Payment as provided in Article 9 of AIA Document A201–2017, as modified;
- .3 Any amount for which the Contractor does not intend to pay a Subcontractor or material supplier, unless the Work has been performed by others the Contractor intends to pay;
- .4 For Work performed or defects discovered since the last payment application, any amount for which the Architect may withhold payment, or nullify a Certificate of Payment in whole or in part, as provided in Article 9 of AIA Document A201–2017, as modified; and
- .5 Retainage withheld pursuant to Section 5.1.7.

§ 5.1.7 Retainage

§ 5.1.7.1 For each progress payment made prior to Substantial Completion of the Work, the Owner may withhold the following amount, as retainage, from the payment otherwise due:

(Insert a percentage or amount to be withheld as retainage from each Application for Payment. The amount of retainage may be limited by governing law.)

Five percent (5%)

§ 5.1.7.1.1 The following items are not subject to retainage:

(Insert any items not subject to the withholding of retainage, such as general conditions, insurance, etc.)

None.

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

(If the retainage established in Section 5.1.7.1 is to be modified prior to Substantial Completion of the entire Work, including modifications for Substantial Completion of portions of the Work as provided in Section 3.3.2, insert provisions for such modifications.)

At the Owner's sole discretion.

§ 5.1.7.3 Except as set forth in this Section 5.1.7.3, upon Substantial Completion of the Work, the Contractor may submit an Application for Payment that includes the retainage withheld from prior Applications for Payment pursuant to this Section 5.1.7. The Application for Payment submitted at Substantial Completion shall not include retainage as follows:

(Insert any other conditions for release of retainage upon Substantial Completion.)

Provided the Contract has achieved Substantial Completion in accordance with Section 9.8 of AIA Document A201–2017, as modified, the amount of retainage shall be reduced to two and one half percent (2 ½ %).

§ 5.1.8 If final completion of the Work is materially delayed through no fault of the Contractor, the Owner shall pay the Contractor any additional amounts in accordance with Article 9 of AIA Document A201–2017, as modified.

§ 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.

§ 5.1.10 With each Application for Payment, the Contractor shall provide the Owner with a partial waiver and release of any claims of payment and any rights under any bonds provided pursuant to AIA Document A101-2017 Exhibit A, and elsewhere in the Contract Documents, to the extent of the payment pursuant to such Application for Payment, and, conditioned upon receipt of such payment from the Owner, as well as unconditional waivers and releases of any claims for payment and any rights under any bonds from subcontractors and suppliers to the extent of all payments received pursuant to previous Applications for Payment.

§ 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

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- .1 the Contractor has fully performed the Contract except for the Contractor's responsibility to correct Work as provided in Article 12 of AIA Document A201–2017, and to satisfy other requirements, if any, which extend beyond final payment;
- .2 a final Certificate for Payment has been issued by the Architect.
- .3 Contractor has delivered to Owner all final conditional waivers and releases of any claims of payment and any rights under any bonds from itself and all subcontractors, suppliers, and vendors of any description and a consent of surety to final payment if any. All waivers and releases shall be in a form acceptable to the Owner. For any Subcontractors or Suppliers who have not provided a final conditional waiver and release, Owner may, but is not required, to issue checks jointly payable to Contractor and Subcontractor in exchange for a final unconditional waiver and release. If any Subcontractor or Supplier has filed a payment bond claim because it remains unsatisfied after all sums required under the Contract Documents have been paid by Owner to Contractor and Contractor does not immediately obtain a release of such claim, Contractor shall reimburse Owner for all costs associated with its obtaining a release of any such claim, including all costs and attorneys' fees;

fees;

- .4 Contractor has completed all Work, including all Punch List Work items;
- .5 All governmental approvals, including a Final Certificate of Occupancy or local equivalent have been issued by the Town of Hebron for all Work under the Contract Documents;
- .6 All warranties, final certifications, guarantees, assignments of all applicable warranties and guarantees and similar documents as required by the Contract Documents have been delivered to the Owner;
- .7 All Project Closeout Documents required by the Contract Documents, including but not limited to, all operations and maintenance manuals, have been delivered to the Owner;
- .8 Contractor has delivered to Owner one reproducible copy of the As Built Drawings detailing all changes or deviations from the original Contract Documents and the other Submittals required by the Contract Documents to show the true locations, with accurate dimensions of the architectural and engineered systems of the component and/or the Work to the satisfaction of the Owner and the Architect; and,
- .9 Contractor has delivered to Owner a Contractor's Final Payment Affidavit in a form acceptable to the Owner and 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, provided the Contractor has satisfied the requirements of Section 5.2.1 above or as follows:

§ 5.3 Interest

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 % zero percent

ARTICLE 6 DISPUTE RESOLUTION

§ 6.1 Initial Decision Maker

The Architect will serve as the Initial Decision Maker pursuant to Article 15 of AIA Document A201–2017, unless the parties appoint below another individual, not a party to this Agreement, to serve as the 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.)

§ 6.2 Binding Dispute Resolution

For any Claim subject to, but not resolved by, mediation pursuant to Article 15 of AIA Document A201–2017, the method of binding dispute resolution shall be as follows:

(Check the appropriate box.)

Arbitration pursuant to Section 15.4 of AIA Document A201–2017

Litigation in a court of competent jurisdiction

Other *(Specify)*

If the Owner and Contractor do not select a method of binding dispute resolution, 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.

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 A201–2017, as modified.

§ 7.1.1 If the Contract is terminated for the Owner’s convenience in accordance with Article 14 of AIA Document A201–2017, as modified, then the Owner shall pay the Contractor a termination fee as follows:

(Insert the amount of, or method for determining, the fee, if any, payable to the Contractor following a termination for the Owner’s convenience.)

Zero Dollars (\$0.00)

§ 7.2 The Work may be suspended by the Owner as provided in Article 14 of AIA Document A201–2017, as modified.

ARTICLE 8 MISCELLANEOUS PROVISIONS

§ 8.1 Where reference is made in this Agreement to a provision of AIA Document A201–2017, as modified, or another Contract Document, the reference refers to that provision as amended or supplemented by other provisions of the Contract Documents.

§ 8.2 The Owner’s representative:
(Name, address, email address, and other information)

Malcolm Leichter
HES Drinking Water Remediation Commission
Public Building Committee
Hebron Town Office Building
15 Gilead Street
Hebron, CT 06248
Tel. (860) 228-0601
E-mail: mleichter@hebronct.com

§ 8.3 The Contractor’s representative:
(Name, address, email address, and other information)

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§ 8.4 Neither the Owner’s nor the Contractor’s representative shall be changed without ten days’ prior notice to the other party.

§ 8.5 Insurance and Bonds

§ 8.5.1 The Owner and the Contractor shall purchase and maintain insurance as set forth in AIA Document A101™–2017, Standard Form of Agreement Between Owner and Contractor where the basis of payment is a Stipulated Sum, Exhibit A, Insurance and Bonds, and elsewhere in the Contract Documents.

§ 8.5.2 The Contractor shall provide bonds as set forth in AIA Document A101™–2017 Exhibit A, and elsewhere in the Contract Documents.

§ 8.6 Notice in electronic format, pursuant to Article 1 of AIA Document A201–2017, may be given in accordance with AIA Document E203™–2013, Building Information Modeling and Digital Data Exhibit, if completed, or as otherwise set forth below:

(If other than in accordance with AIA Document E203–2013, insert requirements for delivering notice in electronic format such as name, title, and email address of the recipient and whether and how the system will be required to generate a read receipt for the transmission.)

§ 8.7 Other provisions:

ARTICLE 9 ENUMERATION OF CONTRACT DOCUMENTS

§ 9.1 This Agreement is comprised of the following documents:

- .1 AIA Document A101™–2017, Standard Form of Agreement Between Owner and Contractor, as modified.
- .2 AIA Document A101™–2017, Exhibit A, Insurance and Bonds, as modified.
- .3 AIA Document A201™–2017, General Conditions of the Contract for Construction, as modified.
- .4 AIA Document E203™–2013, Building Information Modeling and Digital Data Exhibit, dated as indicated below:
(Insert the date of the E203-2013 incorporated into this Agreement.)

.5 Drawings

Number	Title	Date
See Project Manual, Division 00-Bidding and Contract Documents, Drawing List, incorporated herein.	Drawing List (1 page)	8/16/19

.6 Specifications

Section	Title	Date	Pages
See Project Manual, incorporated herein.	Project Manual	8/16/19	3 (Table of Contents)

.7 Addenda, if any:

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

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.8 Other Exhibits:

(Check all boxes that apply and include appropriate information identifying the exhibit where required.)

AIA Document E204™-2017, Sustainable Projects Exhibit, dated as indicated below:
(Insert the date of the E204-2017 incorporated into this Agreement.)

The Sustainability Plan:

Title	Date	Pages
-------	------	-------

Supplementary and other Conditions of the Contract:

Document	Title	Date	Pages
----------	-------	------	-------

.9 Other documents, if any, listed below:

(List here any additional documents that are intended to form part of the Contract Documents. AIA Document A201™-2017 provides that the advertisement or invitation to bid, Instructions to Bidders, sample forms, the Contractor’s bid or proposal, portions of Addenda relating to bidding or proposal requirements, and other information furnished by the Owner in anticipation of receiving bids or proposals, are not part of the Contract Documents unless enumerated in this Agreement. Any such documents should be listed here only if intended to be part of the Contract Documents.)

- Contractor’s Executed Bid Form, submitted _____ (3 pages) (Exhibit A)
- AIA Document A305-1986 Contractor’s Qualification Statement, dated _____ (4 pages)(Exhibit B)
- State of Connecticut, Department of Administrative Services, Contractor Prequalification Update (Bid Statement) and Certificate (6 pages total) (Exhibit C)
- Contractor’s Non-Collusion Affidavit, dated _____ (1 page) (Exhibit D)
- Contractor’s Local Preference Ordinance Affidavit, dated _____ (1 page) (Exhibit E)
- Contractor’s Legal Status Disclosure (___ pages) (Exhibit F)
- Project Manual, dated August 16, 2019 (Exhibit G)

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

TOWN OF HEBRON, CONNECTICUT

OWNER *(Signature)*

Andrew TierneyTown Manager
(Printed name and title)

CONTRACTOR *(Signature)*

(Printed name and title)

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AIA® Document A101™ – 2017 Exhibit A

Insurance and Bonds

This Insurance and Bonds Exhibit is part of the Agreement, between the Owner and the Contractor, dated the day of in the year 2019
(In words, indicate day, month and year.)

for the following **PROJECT**:
(Name and location or address)

Contaminated Water Piping Replacement
Hebron Elementary School
92 Church Street
Hebron, Connecticut 06248

THE OWNER:
(Name, legal status and address)

Town of Hebron, Connecticut
15 Gilead Street
Hebron, Connecticut 06248

THE CONTRACTOR:
(Name, legal status and address)

TABLE OF ARTICLES

- A.1 GENERAL
- A.2 OWNER'S INSURANCE
- A.3 CONTRACTOR'S INSURANCE AND BONDS
- A.4 SPECIAL TERMS AND CONDITIONS

ARTICLE A.1 GENERAL

The Owner and Contractor shall purchase and maintain insurance throughout the life of the Contract, and provide bonds, as set forth in this Exhibit. As used in this Exhibit, the term General Conditions refers to AIA Document A201™–2017, General Conditions of the Contract for Construction.

ARTICLE A.2 OWNER'S INSURANCE

§ A.2.1 General

Prior to commencement of the Work, the Owner shall secure the insurance, and provide evidence of the coverage, required under this Article A.2 and, upon the Contractor's request, provide a copy of the property insurance policy or policies required by Section A.2.3. The copy of the policy or policies provided shall contain all applicable conditions, definitions, exclusions, and endorsements.

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.

This document is intended to be used in conjunction with AIA Document A201™–2017, General Conditions of the Contract for Construction. Article 11 of A201™–2017 contains additional insurance provisions.

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§ A.2.2 Liability Insurance

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

§ A.2.3 Required Property Insurance

§ A.2.3.1 Unless this obligation is placed on the Contractor pursuant to Section A.3.3.2.1, the Owner shall purchase and maintain, from an insurance company or insurance companies lawfully authorized to issue insurance in the jurisdiction where the Project is located, property insurance written on a builder's risk "all-risks" completed value or equivalent policy form and sufficient to cover the total value of the entire Project on a replacement cost basis. The Owner's property insurance coverage shall be no less than the amount of the initial Contract Sum, plus the value of subsequent Modifications and labor performed and materials or equipment supplied by others. The property insurance shall be maintained until Substantial Completion and thereafter as provided in Section A.2.3.1.3, unless otherwise provided in the Contract Documents or otherwise agreed in writing by the parties to this Agreement. This insurance shall include the interests of the Owner, Contractor, Subcontractors, and Sub-subcontractors in the Project as insureds. This insurance shall include the interests of mortgagees as loss payees.

§ A.2.3.1.1 **Causes of Loss.** The insurance required by this Section A.2.3.1 shall provide coverage for direct physical loss or damage, and shall not exclude the risks of fire, explosion, theft, vandalism, malicious mischief, collapse, earthquake, flood, or windstorm. The insurance shall also provide coverage for ensuing loss or resulting damage from error, omission, or deficiency in construction methods, design, specifications, workmanship, or materials. Sub-limits, if any, are as follows:

(Indicate below the cause of loss and any applicable sub-limit.)

Causes of Loss

Sub-Limit

§ A.2.3.1.2 **Specific Required Coverages.** The insurance required by this Section A.2.3.1 shall provide coverage for loss or damage to falsework and other temporary structures, and to building systems from testing and startup. The insurance shall also cover debris removal, including demolition occasioned by enforcement of any applicable legal requirements, and reasonable compensation for the Architect's and Contractor's services and expenses required as a result of such insured loss, including claim preparation expenses. Sub-limits, if any, are as follows:

(Indicate below type of coverage and any applicable sub-limit for specific required coverages.)

Coverage

Sub-Limit

§ A.2.3.1.3 Unless the parties agree otherwise, upon Substantial Completion, the Owner shall continue the insurance required by Section A.2.3.1 or, if necessary, replace the insurance policy required under Section A.2.3.1 with property insurance written for the total value of the Project that shall remain in effect until expiration of the period for correction of the Work set forth in Section 12.2.2 of the General Conditions.

§ A.2.3.1.4 **Deductibles and Self-Insured Retentions.** If the insurance required by this Section A.2.3 is subject to deductibles or self-insured retentions, the Owner shall be responsible for all loss not covered because of such deductibles or retentions.

§ A.2.3.2 **Occupancy or Use Prior to Substantial Completion.** The Owner's occupancy or use of any completed or partially completed portion of the Work prior to Substantial Completion shall not commence until the insurance company or companies providing the insurance under Section A.2.3.1 have consented in writing to the continuance of coverage. The Owner and the Contractor shall take no action with respect to partial occupancy or use that would cause cancellation, lapse, or reduction of insurance, unless they agree otherwise in writing.

§ A.2.3.3 Insurance for Existing Structures

If the Work involves remodeling an existing structure or constructing an addition to an existing structure, the Owner shall purchase and maintain, until the expiration of the period for correction of Work as set forth in Section 12.2.2 of the General Conditions, "all-risks" property insurance, on a replacement cost basis, protecting the existing structure against direct physical loss or damage from the causes of loss identified in Section A.2.3.1, notwithstanding the undertaking of the Work. The Owner shall be responsible for all co-insurance penalties.

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§ A.2.4 Optional Extended Property Insurance.

The Owner shall purchase and maintain the insurance selected and described below.

(Select the types of insurance the Owner is required to purchase and maintain by placing an X in the box(es) next to the description(s) of selected insurance. For each type of insurance selected, indicate applicable limits of coverage or other conditions in the fill point below the selected item.)

- § A.2.4.1 Loss of Use, Business Interruption, and Delay in Completion Insurance**, to reimburse the Owner for loss of use of the Owner's property, or the inability to conduct normal operations due to a covered cause of loss.
- § A.2.4.2 Ordinance or Law Insurance**, for the reasonable and necessary costs to satisfy the minimum requirements of the enforcement of any law or ordinance regulating the demolition, construction, repair, replacement or use of the Project.
- § A.2.4.3 Expediting Cost Insurance**, for the reasonable and necessary costs for the temporary repair of damage to insured property, and to expedite the permanent repair or replacement of the damaged property.
- § A.2.4.4 Extra Expense Insurance**, to provide reimbursement of the reasonable and necessary excess costs incurred during the period of restoration or repair of the damaged property that are over and above the total costs that would normally have been incurred during the same period of time had no loss or damage occurred.
- § A.2.4.5 Civil Authority Insurance**, for losses or costs arising from an order of a civil authority prohibiting access to the Project, provided such order is the direct result of physical damage covered under the required property insurance.
- § A.2.4.6 Ingress/Egress Insurance**, for loss due to the necessary interruption of the insured's business due to physical prevention of ingress to, or egress from, the Project as a direct result of physical damage.
- § A.2.4.7 Soft Costs Insurance**, to reimburse the Owner for costs due to the delay of completion of the Work, arising out of physical loss or damage covered by the required property insurance: including construction loan fees; leasing and marketing expenses; additional fees, including those of architects, engineers, consultants, attorneys and accountants, needed for the completion of the construction, repairs, or reconstruction; and carrying costs such as property taxes, building permits, additional interest on loans, realty taxes, and insurance premiums over and above normal expenses.

§ A.2.5 Other Optional Insurance.

The Owner shall purchase and maintain the insurance selected below.

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(Select the types of insurance the Owner is required to purchase and maintain by placing an X in the box(es) next to the description(s) of selected insurance.)

§ A.2.5.1 Cyber Security Insurance for loss to the Owner due to data security and privacy breach, including costs of investigating a potential or actual breach of confidential or private information. (Indicate applicable limits of coverage or other conditions in the fill point below.)

§ A.2.5.2 Other Insurance
(List below any other insurance coverage to be provided by the Owner and any applicable limits.)

Coverage

Limits

ARTICLE A.3 CONTRACTOR'S INSURANCE AND BONDS

§ A.3.1 General

§ A.3.1.1 Certificates of Insurance. The Contractor shall provide certificates of insurance acceptable to the Owner evidencing compliance with the requirements in this Article A.3 at the following times: (1) prior to commencement of the Work; (2) upon renewal or replacement of each required policy of insurance; and (3) upon the Owner's written request. An additional certificate evidencing continuation of commercial liability coverage, including coverage for completed operations, shall be submitted with the final Application for Payment and thereafter upon renewal or replacement of such coverage until the expiration of the periods required by Section A.3.2.1 and Section A.3.3.1. The certificates will show the Owner as an additional insured on the Contractor's Commercial General Liability and excess or umbrella liability policy or policies.

§ A.3.1.1.1 It shall be the responsibility of the Contractor to obtain Certificates of Insurance from each Subcontractor and to make certain that all coverage is maintained throughout the life of the Contract.

§ A.3.1.1.2 Each certificate shall state that the insurance evidenced by such certificate will not be canceled or reduced without thirty (30) days prior written notice to the Owner.

§ A.3.1.2 Deductibles and Self-Insured Retentions. The Contractor shall disclose to the Owner any deductible or self-insured retentions applicable to any insurance required to be provided by the Contractor.

§ A.3.1.3 Additional Insured Obligations. To the fullest extent permitted by law, the Contractor shall cause the commercial general liability coverage 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 insured for claims caused in whole or in part by the Contractor's negligent acts or omissions for which loss occurs during completed operations. The additional insured coverage shall be primary and non-contributory to any of the Owner's general liability insurance policies and shall apply to both ongoing and completed operations. To the extent commercially available, the additional insured coverage shall be no less than that provided by Insurance Services Office, Inc. (ISO) forms CG 20 10 07 04, CG 20 37 07 04, and, with respect to the Architect and the Architect's consultants, CG 20 32 07 04.

§ A.3.2 Contractor's Required Insurance Coverage

§ A.3.2.1 The Contractor shall purchase and maintain the following types and limits of insurance from an insurance company or insurance companies lawfully authorized to issue insurance in the jurisdiction where the Project is located. The Contractor shall maintain the required insurance until the expiration of the period for correction of Work as set forth in Section 12.2.2 of the General Conditions, unless a different duration is stated below:

(If the Contractor is required to maintain insurance for a duration other than the expiration of the period for correction of Work, state the duration.)

§ A.3.2.2 Commercial General Liability

§ A.3.2.2.1 Commercial General Liability insurance for the Project written on an occurrence form with policy limits of not less than One Million and 00/100 Dollars (\$ 1,000,000.00) each occurrence, Three Million and 00/100 Dollars (\$ 3,000,000.00) general aggregate, and Three Million and 00/100 Dollars (\$ 3,000,000.00) aggregate for products-completed operations hazard, providing coverage for claims including

- .1 damages because of bodily injury, sickness or disease, including occupational sickness or disease, and death of any person;
- .2 personal injury and advertising injury;
- .3 damages because of physical damage to or destruction of tangible property, including the loss of use of such property;
- .4 bodily injury or property damage arising out of completed operations; and
- .5 the Contractor's indemnity obligations under Section 3.18 of the General Conditions.

§ A.3.2.2.2 The Contractor's Commercial General Liability policy under this Section A.3.2.2 shall not contain an exclusion or restriction of coverage for the following:

- .1 Claims by one insured against another insured, if the exclusion or restriction is based solely on the fact that the claimant is an insured, and there would otherwise be coverage for the claim.
- .2 Claims for property damage to the Contractor's Work arising out of the products-completed operations hazard where the damaged Work or the Work out of which the damage arises was performed by a Subcontractor.
- .3 Claims for bodily injury other than to employees of the insured.
- .4 Claims for indemnity under Section 3.18 of the General Conditions arising out of injury to employees of the insured.
- .5 Claims or loss excluded under a prior work endorsement or other similar exclusionary language.
- .6 Claims or loss due to physical damage under a prior injury endorsement or similar exclusionary language.
- .7 Claims related to residential, multi-family, or other habitational projects, if the Work is to be performed on such a project.
- .8 Claims related to roofing, if the Work involves roofing.
- .9 Claims related to exterior insulation finish systems (EIFS), synthetic stucco or similar exterior coatings or surfaces, if the Work involves such coatings or surfaces.
- .10 Claims related to earth subsidence or movement, where the Work involves such hazards.
- .11 Claims related to explosion, collapse and underground hazards, where the Work involves such hazards.

§ A.3.2.3 Automobile Liability covering vehicles owned, and non-owned vehicles used, by the Contractor, with policy limits of not less than One Million and 00/100 Dollars (\$ 1,000,000.00) per accident, for bodily injury, death of any person, and property damage arising out of the ownership, maintenance and use of those motor vehicles along with any other statutorily required automobile coverage.

§ A.3.2.4 The Contractor may achieve the required limits and coverage for Commercial General Liability and Automobile Liability through a combination of primary and excess or umbrella liability insurance, provided such primary and excess or umbrella insurance policies result in the same or greater coverage as the coverages required under Section A.3.2.2 and A.3.2.3, and in no event shall any excess or umbrella liability insurance provide narrower coverage than the primary policy. The excess policy shall not require the exhaustion of the underlying limits only through the actual payment by the underlying insurers.

§ A.3.2.5 Workers' Compensation at statutory limits.

§ A.3.2.6 Employers' Liability with policy limits not less than One Hundred Thousand and 00/100 Dollar (\$ 100,000.00) each accident, (\$) each employee, and One Million and 00/100 Dollars (\$ 1,000,000.00) policy limit.

§ A.3.2.7 Jones Act, and the Longshore & Harbor Workers' Compensation Act, as required, if the Work involves hazards arising from work on or near navigable waterways, including vessels and docks

§ A.3.2.8 If the Contractor is required to furnish professional services as part of the Work, the Contractor shall procure Professional Liability insurance covering performance of the professional services, with policy limits of not less than (\$) per claim and (\$) in the aggregate.

§ A.3.2.9 If the Work involves the transport, dissemination, use, or release of pollutants, the Contractor shall procure Pollution Liability insurance, with policy limits of not less than (\$) per claim and (\$) in the aggregate.

§ A.3.2.10 Coverage under Sections A.3.2.8 and A.3.2.9 may be procured through a Combined Professional Liability and Pollution Liability insurance policy, with combined policy limits of not less than (\$) per claim and (\$) in the aggregate.

§ A.3.2.11 Insurance for maritime liability risks associated with the operation of a vessel, if the Work requires such activities, with policy limits of not less than (\$) per claim and (\$) in the aggregate.

§ A.3.2.12 Insurance for the use or operation of manned or unmanned aircraft, if the Work requires such activities, with policy limits of not less than (\$) per claim and (\$) in the aggregate.

§ A.3.3 Contractor's Other Insurance Coverage

§ A.3.3.1 Insurance selected and described in this Section A.3.3 shall be purchased from an insurance company or insurance companies lawfully authorized to issue insurance in the jurisdiction where the Project is located. The Contractor shall maintain the required insurance until the expiration of the period for correction of Work as set forth in Section 12.2.2 of the General Conditions, unless a different duration is stated below:

(If the Contractor is required to maintain any of the types of insurance selected below for a duration other than the expiration of the period for correction of Work, state the duration.)

§ A.3.3.2 The Contractor shall purchase and maintain the following types and limits of insurance in accordance with Section A.3.3.1.

(Select the types of insurance the Contractor is required to purchase and maintain by placing an X in the box(es) next to the description(s) of selected insurance. Where policy limits are provided, include the policy limit in the appropriate fill point.)

§ A.3.3.2.1 Property insurance of the same type and scope satisfying the requirements identified in Section A.2.3, which, if selected in this section A.3.3.2.1, relieves the Owner of the responsibility to purchase and maintain such insurance except insurance required by Section A.2.3.1.3 and Section A.2.3.3. The Contractor shall comply with all obligations of the Owner under Section A.2.3 except to the extent provided below. The Contractor shall disclose to the Owner the amount of any deductible, and the Owner shall be responsible for losses within the deductible. Upon request, the Contractor shall provide the Owner with a copy of the property insurance policy or policies required. The Owner shall adjust and settle the loss with the insurer and be the trustee of the proceeds of the property insurance in accordance with Article 11 of the General Conditions unless otherwise set forth below:
(Where the Contractor's obligation to provide property insurance differs from the Owner's obligations as described under Section A.2.3, indicate such differences in the space below. Additionally, if a party other than the Owner will be responsible for adjusting and settling a loss with the insurer and acting as the trustee of the proceeds of property insurance in accordance with Article 11 of the General Conditions, indicate the responsible party below.)

§ A.3.3.2.2 Railroad Protective Liability Insurance, with policy limits of not less than (\$) per claim and (\$) in the aggregate, for Work within fifty (50) feet of railroad property.

§ A.3.3.2.3 Asbestos Abatement Liability Insurance, with policy limits of not less than (\$) per claim and (\$) in the aggregate, for liability arising from the encapsulation, removal, handling, storage, transportation, and disposal of asbestos-containing materials.

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§ A.3.3.2.4 Insurance for physical damage to property while it is in storage and in transit to the construction site on an "all-risks" completed value form.

§ A.3.3.2.5 Property insurance on an "all-risks" completed value form, covering property owned by the Contractor and used on the Project, including scaffolding and other equipment.

§ A.3.3.2.6 Other Insurance
(List below any other insurance coverage to be provided by the Contractor and any applicable limits.)

Coverage

Limits

§ A.3.4 Performance Bond and Payment Bond

The Contractor shall provide surety bonds, from a company or companies lawfully authorized to issue surety bonds in the jurisdiction where the Project is located, as follows:

(Specify type and penal sum of bonds.)

Type

Payment Bond

Performance Bond

Penal Sum (\$0.00)

One Hundred Percent (100%) of Contract Price

One Hundred Percent (100%) of Contract Price

Payment and Performance Bonds shall be AIA Document A312™, Payment Bond and Performance Bond, or contain provisions identical to AIA Document A312™, current as of the date of this Agreement.

ARTICLE A.4 SPECIAL TERMS AND CONDITIONS

Special terms and conditions that modify this Insurance and Bonds Exhibit, if any, are as follows:



AIA[®] Document A201[™] – 2017

General Conditions of the Contract for Construction

for the following PROJECT:

(Name and location or address)

Contaminated Water Piping Replacement
Hebron Elementary School
92 Church Street
Hebron, Connecticut 06248

THE OWNER:

(Name, legal status and address)

Town of Hebron, Connecticut
15 Gilead Street
Hebron, Connecticut 06248

THE ARCHITECT:

(Name, legal status and address)

Silver, Petrucelli & Associates, Inc.
3190 Whitney Avenue, Bldg 2
Hamden, CT 06518

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- 2 OWNER
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- 5 SUBCONTRACTORS
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- 10 PROTECTION OF PERSONS AND PROPERTY
- 11 INSURANCE AND BONDS
- 12 UNCOVERING AND CORRECTION OF WORK

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.

For guidance in modifying this document to include supplementary conditions, see AIA Document A503[™], Guide for Supplementary Conditions.

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ARTICLE 1 GENERAL PROVISIONS

§ 1.1 Basic Definitions

§ 1.1.1 The Contract Documents

§ 1.1.1.1 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 or proposal requirements. The Contract Documents actually executed by both parties shall prevail in case of an inconsistency with subsequent versions made through manipulatable electronic operations involving computers.

§ 1.1.1.2 The Owner and Contractor intend that the Contract Documents complement one another. If, and to the extent of, any inconsistency, ambiguity, or discrepancy in the Contract Documents, such inconsistency, ambiguity or discrepancy shall be resolved based on the greater quantity, higher quality or level of performance, most expensive, more time consuming item as determined by the Architect.

§ 1.1.2 The Contract

§ 1.1.2.1 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. The parties acknowledge that the provisions of this Agreement are the subject of arm's length negotiations between parties and agree that no provision of this Agreement shall be constructed against the other party be reason of such party having drafted such provision of this Agreement.

§ 1.1.2.2 Except as expressly provided herein, nothing contained in this Agreement shall be constructed to confer upon any person other than the parties hereto, any rights, remedies, privileges, benefits or causes of action to any extent whatsoever. No provision of this Agreement shall in any way inure to the benefit of any third person so as to constitute such person a third-party beneficiary of this Agreement or of any one of the terms and conditions of the Contract Documents or otherwise give rise to a cause of action in any person not a party hereto.

§ 1.1.2.3 If any provision contained in the Contract Documents or the application thereof to any person or circumstance shall, for any reason or to any extent be held to be invalid, illegal or enforceable in any respect, all other provisions hereof, as well as the application of the affected provision to persons or circumstances other than those as to which it is held invalid, illegal or unenforceable, shall not be affected thereby and shall be constructed and enforced to the fullest extent permitted by law as if such invalid, illegal or unenforceable provision had never been included in the Contract Documents, it being intended that each of the provisions of the Contract Documents shall be severable.

§ 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. The Work shall be deemed to include, in the reasonable opinion of the Architect, all items reasonably inferable from the Contract Documents.

§ 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. The Initial Decision Maker shall not show partiality to the Owner or Contractor and shall not be liable for results of interpretations or decisions rendered in good faith.

§ 1.2 Correlation and Intent of the Contract Documents

§ 1.2.1.1 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.

§ 1.2.1.2 It shall be the Contractor's responsibility in subcontracting portions of the work to arrange or group items of work under particular trades to conform to then-prevailing customs of the trade, and in accordance with applicable requirements of law. The Owner shall have no liability arising out of jurisdictional issues raised or claims advanced by Subcontractors, trade organizations or other interested parties based on the arrangement or subdivision of Work in the contract documents. In the event of any claim arising out of any duplication, conflict, inconsistency or discrepancy within the Contract Documents as to the allocation of the Work among the Subcontractors and contractor's own forces, the Contractor shall be solely responsible for resolving the claim and shall be responsible for ensuring that all the Work is completed regardless of where it appears in the Contract Documents.

§ 1.2.1.3 The invalidity of any provision of the Contract Documents shall not invalidate the Contract or its remaining provisions. If it is determined that any provision of the Contract Documents violates any law, or is otherwise invalid or unenforceable, then that provision shall be revised to the extent necessary to make that provision legal and enforceable. In such case the Contract Documents shall be construed, to the fullest extent permitted by law, to give effect to the parties' intentions and purposes in executing the Contract.

§ 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.

§ 1.2.4 It is the intent of the Contract Documents that a functionally complete Project will be constructed in accordance with the Contract Documents. The Work includes all items set forth in, or reasonably implied or inferable from, the Contract Documents. Reference to standard specifications, manuals, or codes of any technical society, organization or association, or to the laws or regulations of any governmental authority, whether such

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reference be specific or by implication, shall mean the latest standard specification, manual or code or laws or regulations in effect at the date of this Agreement, unless otherwise specifically stated in the Contract Documents. However, no provision of any standard specification, manual or code shall be effective to change the duties and responsibilities of the Contractor or any of its consultants, agents or employees from those set forth in the Contract Documents.

§ 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 retain all common law, statutory, and other reserved rights in their Instruments of Service, including copyrights. The Contractor, Subcontractors, Sub-subcontractors, and 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 the 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 suppliers are authorized to use and reproduce the Instruments of Service provided to them, subject to any protocols established pursuant to Sections 1.7 and 1.8, 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 suppliers may not use the Instruments of Service on other projects or for additions to the Project outside the scope of the Work without the specific written consent of the Owner, Architect, and the Architect’s consultants.

§ 1.6 Notice

§ 1.6.1 Except as otherwise provided in Section 1.6.2, where the Contract Documents require one party to notify or give notice to the other party, such notice shall be provided in writing to the designated representative of the party to whom the notice is addressed and shall be deemed to have been duly served if delivered in person, by mail, by courier, or by electronic transmission.

§ 1.6.2 Notice of Claims as provided in Section 15.1.3 shall be provided in writing and shall be deemed to have been duly served only if delivered to the designated representative of the party to whom the notice is addressed by certified or registered mail, by courier providing proof of delivery or by electronic transmission.

§ 1.7 Digital Data Use and Transmission

If the parties intend to transmit Instruments of Service or any other information or documentation in digital form, the parties shall agree upon protocols governing the transmission and use of Instruments of Service or any other information or documentation in digital form, unless otherwise already provided for in the Agreement or Contract Documents. The parties may use AIA Document E203™–2013, Building Information Modeling and Digital Data Exhibit, to establish the protocols for the development, use, transmission, and exchange of digital data.

§ 1.8 Building Information Models Use and Reliance

Any use of, or reliance on, all or a portion of a building information model without agreement to protocols governing the use of, and reliance on, the information contained in the model shall be at the using or relying party’s sole risk and without liability to the other party and its contractors or consultants, the authors of, or contributors to, the building information model, and each of their agents and employees.

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

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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 Evidence of the Owner's Financial Arrangements

§ 2.2.1 Prior to commencement of the Work and upon written request by the Contractor, the Owner shall furnish to the Contractor reasonable evidence that the Owner has made financial arrangements to fulfill the Owner's obligations under the Contract. The Contractor shall have no obligation to commence the Work until the Owner provides such evidence. If commencement of the Work is delayed under this Section 2.2.1, the Contract Time shall be extended appropriately.

§ 2.2.2 Following commencement of the Work and upon written request by the Contractor, the Owner shall furnish to the Contractor reasonable evidence that the Owner has made financial arrangements to fulfill the Owner's obligations under the Contract only if (1) the Owner fails to make payments to the Contractor as the Contract Documents require; (2) the Contractor identifies in writing a reasonable concern regarding the Owner's ability to make payment when due; or (3) a change in the Work materially changes the Contract Sum. If the Owner fails to provide such evidence, as required, within fourteen days of the Contractor's request, the Contractor may immediately stop the Work and, in that event, shall notify the Owner that the Work has stopped. However, if the request is made because a change in the Work materially changes the Contract Sum under (3) above, the Contractor may immediately stop only that portion of the Work affected by the change until reasonable evidence is provided. If the Work is stopped under this Section 2.2.2, the Contract Time shall be extended appropriately and the Contract Sum shall be increased by the amount of the Contractor's reasonable costs of shutdown, delay and start-up, plus interest as provided in the Contract Documents.

§ 2.2.3 After the Owner furnishes evidence of financial arrangements under this Section 2.2, the Owner shall not materially vary such financial arrangements without prior notice to the Contractor.

§ 2.2.4 Where the Owner has designated information furnished under this Section 2.2 as "confidential," the Contractor shall keep the information confidential and shall not disclose it to any other person. However, the Contractor may disclose "confidential" information, after seven (7) days' notice to the Owner, where disclosure is required by law, including a subpoena or other form of compulsory legal process issued by a court or governmental entity, or by court or arbitrator(s) order. The Contractor may also disclose "confidential" information to its employees, consultants, sureties, Subcontractors and their employees, Sub-subcontractors, and others who need to know the content of such information solely and exclusively for the Project and who agree to maintain the confidentiality of such information under the same terms and conditions as set forth herein.

§ 2.3 Information and Services Required of the Owner

§ 2.3.1 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.

§ 2.3.2 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.

§ 2.3.3 If the employment of the Architect terminates, the Owner shall promptly employ a successor to whom the Contractor has no reasonable objection and whose status under the Contract Documents shall be that of the Architect. If the Work is stopped because the Architect has been terminated or it is not fulfilling its obligations set forth in this Agreement, the Contract Time shall be extended appropriately and the Contract Sum shall be increased by the amount of the Contractor's reasonable costs of shutdown, delay and start-up, plus interest as provided in the Contract Documents.

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§ 2.3.4 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 in relying on any such information and relating to the safe performance of the Work.

§ 2.3.5 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.

§ 2.3.6 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.

§ 2.4 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.

§ 2.5 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 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 default or neglect. Such action by the Owner and amounts charged to the Contractor are both subject to prior approval of the Architect and the Architect may, pursuant to Section 9.5.1, withhold or nullify a Certificate for Payment in whole or in part, to the extent reasonably necessary to reimburse the Owner for 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. In performing such corrective Work under this Section, the Owner shall mitigate its damages to carry out such corrective Work and shall take whatever steps the Architect deems necessary to carry out such corrective Work. If current and future payments are not sufficient to cover such amounts, the Contractor shall pay the difference to the Owner. If the Contractor disagrees with the actions of the Owner or the Architect, or the amounts claimed as costs to the Owner, the Contractor may file a Claim pursuant to Article 15.

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 its 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 2.3.4, 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. The Contractor's obligations herein are for the purpose of discovering errors and omissions or adverse field conditions. In the event the Contractor fails to promptly report any known error, omission or adverse field condition and commences the Work, the Contractor shall be responsible for all costs associated with any re-work or correction. 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 submit 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, subject to Section 15.1.7, 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, and in a manner consistent with the degree of care and skill usually exercised by qualified contractors experienced in projects of similar size, complexity and scope. 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 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 notice to the Owner and Architect, and shall propose alternative means, methods, techniques, sequences, or procedures. The Architect shall evaluate the proposed alternative solely for conformance with the design intent for the completed construction. Unless the Architect objects to the Contractor's proposed alternative, the Contractor shall perform the Work using its alternative means, methods, techniques, sequences, or procedures. If the Contractor is instructed to proceed with the required means, methods, techniques, sequences or procedures not 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.

§ 3.3.4 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.

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§ 3.3.5 The Contractor shall be responsible to the Owner for coordinating its Work with and overseeing the Work of any contractors, subcontractors or suppliers hired by the Owner to furnish labor, materials, services or equipment to the Project. The Contractor shall not be responsible for the quality or scope of the work done by such contractors, subcontractors or suppliers hired by the Owner, except as expressly stated herein.

§ 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.

§ 3.4.2 Except in the case of minor changes in the Work approved by the Architect in accordance with Section 3.12.8 or ordered by the Architect in accordance with Section 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. The Contractor shall be responsible for determining that all material and equipment furnished for the Work meet all requirements of the Contract Documents. Any additional cost, or any loss or damage arising from the substitution or proposed substitution of any material equipment or method for those originally specified shall be borne by the Contractor, including costs of any civil, landscaping, structural, mechanical, electrical, architectural or other changes necessary to accommodate substitute materials or equipment, and costs of modifying documents and other additional fees of the Architect or other consultants notwithstanding approval or acceptance of such substitution by the Owner or Architect's role such substitution was made at the written request or direction of the Owner or Architect.

§ 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.

§ 3.4.4 Wherever the terms "or equal" "equal" "approved equal" or the like are used in the Contract Documents it shall be understood that other products other than those specified shall be considered for use in the Work. It is also understood that such products or materials proposed by the Contractor shall, in all respects, be equal to the look, feel, performance, warranty, utility requirements, physical characteristics, maintenance, and service life to the specified products or materials, as determined by the Architect.

§ 3.5 Warranty

§ 3.5.1 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.

§ 3.5.2 All material, equipment, or other special warranties required by the Contract Documents shall be issued in the name of the Owner, or shall be transferable to the Owner, and shall commence in accordance with Section 9.8.4.

§ 3.5.3 The Contractor shall provide copies of all fully executed warranties and guarantees, operating and maintenance manuals, and manufacturer's instructions to the Owner within fourteen (14) days of the date of Substantial Completion or as otherwise provided for Work accepted before or after such date.

§ 3.5.4 All warranties shall commence as of the date of Substantial Completion of the Work, and shall continue for a period of one (1) year or longer as required by the Contract Documents. In no event shall the commencement of the use of building systems be deemed to commence the term of any warranty unless the Owner has, at that time, actually commenced beneficial use of the Project.

§ 3.5.5 Substitutions not properly approved and authorized by the Architect shall be considered defective.

§ 3.5.6 Work, materials or equipment which fails to perform under the proper use and normal wear for intended purposes for a period of one year after the date of Substantial Completion, except where warranties for longer durations are called for by the Contract Documents, shall be considered defective.

§ 3.5.7 Longer term or extended warranties required by the Contract Documents shall be provided by the relevant Subcontractor, vendor or manufacturer directly to the Owner, and the Contractor shall obtain documentation of such warranties and transmit such documentation to the Owner for review and approval.

§ 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 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 that it knew or reasonably should have known was 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 that an equitable adjustment be made 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 submit a Claim 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 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. Alternatively, the Owner may terminate the Agreement for convenience in accordance with Section 14.4.

§ 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 notify the Owner and Architect of the name and qualifications of a proposed superintendent. Within 14 days of receipt of the information, the Architect may notify the Contractor, stating whether the Owner or the Architect (1) has reasonable objection to the proposed superintendent or (2) requires additional time for review. Failure of the Architect to provide notice 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 and Submittal Schedules

§ 3.10.1 The Contractor, promptly after being awarded the Contract, shall submit for the Owner's and Architect's information a Contractor's construction schedule for the Work. The schedule shall contain detail appropriate for the Project, including (1) the date of commencement of the Work, interim schedule milestone dates, and the date of Substantial Completion; (2) an apportionment of the Work by construction activity; and (3) the time required for completion of each portion of the Work. The schedule shall provide for the orderly progression of the Work to completion and shall not exceed time limits current under the Contract Documents. The schedule shall be revised at appropriate intervals as required by the conditions of the Work and Project.

§ 3.10.2 The Contractor, promptly after being awarded the Contract and thereafter as necessary to maintain a current submittal schedule, shall submit a submittal schedule for the Architect's approval. The Architect's approval shall not be unreasonably 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, or fails to provide submittals in accordance with the approved 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 make available, at the Project site, the Contract Documents, including Change Orders, Construction Change Directives, and other Modifications, in good order and marked currently to indicate field changes and selections made during construction, and the approved Shop Drawings, Product Data, Samples, and similar required submittals. These shall be in electronic form or paper copy, available to the Architect and Owner, and 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 how 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 the requirements of the Contract Documents by the Architect's approval of Shop Drawings, Product Data, Samples, or similar submittals, unless the Contractor has specifically notified the Architect 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 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.

§ 3.12.10.1 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 be entitled to rely upon the adequacy and accuracy of the performance and design criteria provided in the Contract Documents. The Contractor shall cause such services or certifications to be provided by an appropriately licensed design

professional, whose signature and seal shall appear on all drawings, calculations, specifications, certifications, Shop 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 and accuracy of the services, certifications, and approvals performed or provided by such design professionals, provided the Owner and Architect have specified to the Contractor the performance and design criteria that such services must satisfy. Pursuant to this Section 3.12.10, the Architect will review and 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.

§ 3.12.10.2 If the Contract Documents require the Contractor's design professional to certify that the Work has been performed in accordance with the design criteria, the Contractor shall furnish such certifications to the Architect at the time and in the form specified by the Architect.

§ 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, 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, or patching shall be restored to the condition existing prior to the cutting, fitting, or 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 the Separate Contractor. Consent shall not be unreasonably withheld. The Contractor shall not unreasonably withhold, from the Owner or a Separate Contractor, its 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 and 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. If the Contractor fails to clean up as provided in the Contract Documents, the Owner may do so and the cost thereof shall be charged to the Contractor and withheld from any payment then due or that may become due.

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

§ 3.16 Access to Work

The Contractor shall provide the Owner and Architect with 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 it is discovered by, or made known to, the Contractor that the required design, process or product is an infringement of a copyright or patent, the Contractor shall be responsible for the 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 defend, indemnify and hold harmless the Owner, Architect, the Architect's consultants, the Owner's consultants, and their 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, its Subcontractors, 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 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.

§ 3.18.3 The defense and indemnification provisions of this Agreement shall survive termination or full or partial performance of this Agreement.

ARTICLE 4 ARCHITECT

§ 4.1 General

§ 4.1.1 The Architect is the person or entity retained by the Owner pursuant to Section 2.3.2 and identified as such in the Agreement.

§ 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.

§ 4.2 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 for the duties as Architect specified herein 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.

§ 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 promptly report to the Owner (1) known deviations from the Contract Documents, (2) known deviations from the most recent construction schedule submitted by the Contractor, and (3) 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

The Owner and Contractor shall include the Architect in all communications that relate to or affect the Architect's services or professional responsibilities under this Agreement. The Owner shall promptly notify the Architect of the

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substance of any direct communications between the Owner and the Contractor otherwise relating to the Project. Communications by and with the Architect's consultants shall be through the Architect. Communications by and with Subcontractors and suppliers shall be through the Contractor. Communications by and with Separate Contractors shall be through the Owner. The Contract Documents may specify other communication protocols.

§ 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 13.4.2 and 13.4.3, whether or not the Work is fabricated, installed or completed. 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, 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 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 order 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 Owner shall notify the Contractor of any change in the duties, responsibilities and limitations of authority of the Project representatives.

§ 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 three (3) business days. 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 the 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, the Contractor, as soon as practicable after award of the Contract, shall notify the Owner and Architect of the persons or entities proposed for each principal portion of the Work, including those who are to furnish materials or equipment fabricated to a special design, if applicable. Within 14 days of receipt of the information, the Architect may notify the Contractor whether the Owner or the Architect (1) has reasonable objection to any such proposed person or entity or (2) requires additional time for review. Failure of the Architect to provide notice 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 for one previously selected if the Owner or Architect makes reasonable objection to such substitution.

§ 5.3 Subcontractual Relations

By appropriate written agreement, 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 that the Contractor, by these Contract 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; 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.

§ 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 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 term "Separate Contractor(s)" shall mean other contractors retained by the Owner under separate agreements. The Owner reserves the right to perform construction or operations related to the Project with the Owner's own forces, and with Separate Contractors retained under Conditions of the Contract substantially similar to those of this Contract, including those provisions of the Conditions of the Contract related to insurance and waiver of subrogation, provided the Owner gives the Contractor at least fourteen (14) days written notice identifying the specific Work to be performed by Owner's own forces and/or Separate Contractors retained by the Owner under this provision.

§ 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 any Separate Contractors and the Owner in reviewing their construction schedules. The Contractor shall make any revisions to its 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 or with Separate Contractors, the Owner or its Separate Contractors shall have the same obligations and rights that the Contractor has 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 notify the Architect of apparent discrepancies or defects in the construction or operations by the Owner or Separate Contractor that would render it unsuitable for proper execution and results of the Contractor's Work. Failure of the Contractor to notify the Architect of such discrepancies or defects prior to proceeding with the Work shall constitute an acknowledgment that the Owner's or Separate Contractor's completed or partially completed

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construction is fit and proper to receive the Contractor's Work. The Contractor shall not be responsible for discrepancies or defects in the construction or operations by the Owner or Separate Contractor that are neither apparent nor reasonably discoverable by the Contractor.

§ 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 that the Contractor wrongfully causes to completed or partially completed construction or to property of the Owner or Separate Contractor 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.

§ 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. The Contractor shall proceed promptly with changes in the Work, unless otherwise provided in the Change Order, Construction Change Directive, or order for a minor change in the Work.

§ 7.1.4 The Owner reserves the sole and exclusive right to reduce or remove certain portions of the Work after the execution of this Agreement by Change Order or Construction Change Directive, provided it gives the Contractor at least fourteen (14) days written notice.

§ 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:

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- .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 7.3.4.

§ 7.3.4 If the Contractor does not respond promptly or disagrees with the method for adjustment in the Contract Sum, the Architect shall determine 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 7.3.4 shall be limited to the following:

- .1 Costs of labor, including indirect overhead, applicable payroll taxes, social security, old age and unemployment insurance, fringe benefits required by agreement or custom, workers' compensation insurance, and other employee costs approved by the Architect;
- .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, directly related to the change; and
- .5 Costs of supervision and field office personnel directly attributable to the change.

§ 7.3.5 If the Contractor disagrees with the adjustment in the Contract Time, the Contractor may make a Claim in accordance with applicable provisions of Article 15.

§ 7.3.6 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.

§ 7.3.7 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.

§ 7.3.8 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 may order minor changes in the Work that are consistent with the intent of the Contract Documents and do not involve an adjustment in the Contract Sum or an extension of the Contract Time. The Architect's order

for minor changes shall be in writing. If the Contractor believes that the proposed minor change in the Work will affect the Contract Sum or Contract Time, the Contractor shall notify the Architect and shall not proceed or be obligated to implement the change in the Work, unless the Owner and the Contractor agree in writing to adjustments to Contract Sum or Contract Time, as applicable.

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, commence the Work prior to the effective date of insurance required to be furnished by the Contractor and Owner.

§ 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 (1) an act or neglect of the Owner or Architect or their consultants, of an employee of either, or of a Separate Contractor; (2) by changes ordered in the Work; (3) by labor disputes, fire, unusual delay in deliveries, unavoidable casualties, adverse weather conditions documented in accordance with Section 15.1.6.2, or other causes beyond the Contractor’s control; (4) by delay authorized by the Owner pending mediation and binding dispute resolution; (5) by changes ordered in the Work pursuant to Article 10; (6) by delays associated with the delivery of materials ordered by the Owner for which the Contractor is not responsible and which impact the critical path of the construction schedule; (7) by acts of God (such as tornado, hurricane, flood, etc.); (8) by unusual delays by relevant governmental authorities in performing inspections and/or issuing governmental approvals which are a condition precedent to the issuance of a certificate of occupancy (temporary or permanent); (9) by the failure or unusual delay by any local utility (i.e., electricity, water, sewer) providing services to the Project that impact the critical path of the construction schedule or is necessary to obtain a certificate of occupancy (temporary or permanent); or (10) by other causes that the Contractor asserts, and the Architect determines, justify delay, then the Contract Time shall be extended for such reasonable time as the Architect may determine by Change Order or Constructive Change Directive, and the construction schedule shall be revised accordingly. In order for the Contractor to obtain an extension of time, the Contractor must prove to the Owner that the cause of the delay will extend the critical path of the construction schedule leading to the occupancy or use of the Project. Such extensions of Contract Time shall apply only to delays for which the Contractor has no responsibility. If a delay is attributable to both the Contractor and the Owner (including parties for which each is responsible), then entitlement to an extension of Contract Time shall apply proportionately.

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

§ 8.3.3 Intentionally omitted.

§ 8.3.4 Notwithstanding anything to the contrary in the Contract Documents, an extension of Contract Time, to the extent permitted herein, shall be the sole remedy of the Contractor for any (1) delay in the start, prosecution, or completion of the Work, (2) hindrance or obstruction in the performance of the Work, (3) loss of productivity, or (4) other similar claims, whether or not such claims are foreseeable, contemplated, or unanticipated. In no event is the Contractor entitled to any compensation or recovery of any damages, in connection with any claim, including

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without limitation, consequential damages, lost opportunity costs, impact damages or other similar remuneration.

The Owner's exercise of any of its rights or remedies under the Contract Documents, including without limitation, ordering changes in the Work, or directing the suspension, rescheduling or correction of the Work, regardless of the extent or frequency of the Owner's exercise of such rights or remedies, are not to be construed as active interference with the Contractor's performance of the Work.

§ 8.4 Waiver of Impact Claims

In all events, the Contractor shall waive all kinds of impact claims, including but not limited to, efficiency, loss of productivity, trade stacking, disruption, re-sequencing of the Work, and the like, regardless of whether all or part of such impact may be in any way attributable to the acts, the failure to act, or the omissions of the Owner, the Owner's consultants, if any, the Owner's own forces, if any, the Architect, and, the Architect's consultants, if any.

§ 8.5 The Contractor shall include similar provisions as Section 8.3 above regarding No Damages for Delay and Section 8.4 above regarding Waiver of Impact Claims in any agreements that it enters into with its Subcontractors, its Consultants, or any persons or entities it employs to perform the Work under this Agreement.

ARTICLE 9 PAYMENTS AND COMPLETION

§ 9.1 Contract Sum

§ 9.1.1 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.

§ 9.1.2 Intentionally omitted.

§ 9.2 Schedule of Values

Where the Contract is based on a stipulated sum or Guaranteed Maximum Price, the Contractor shall submit a schedule of values to the Architect before the first Application for Payment after the execution of this Agreement, allocating the entire Contract Sum to the various portions of the Work. The schedule of values shall be prepared in the form, and supported by the data to substantiate its accuracy, required by the Architect. This schedule, unless objected to by the Architect, shall be used as a basis for reviewing the Contractor's Applications for Payment. Any changes to the schedule of values shall be submitted to the Architect and supported by such data to substantiate its accuracy as the Architect may require, and unless objected to by the Architect, shall be used as a basis for reviewing the Contractor's subsequent 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. The application shall be notarized, if required, and supported by all data substantiating the Contractor's right to payment that the Owner or Architect require, such as copies of requisitions, and releases and waivers of liens from Subcontractors and suppliers, as required, 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 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 compliance by the Contractor with procedures satisfactory to the Owner to establish the Owner's title to such

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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, suppliers, or other persons or entities that 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 (1) issue to the Owner a Certificate for Payment in the full amount of the Application for Payment, with a copy to the Contractor; or (2) issue to the Owner a Certificate for Payment for such amount as the Architect determines is properly due, and notify the Contractor and Owner in writing of the Architect's reasons for withholding certification in part as provided in Section 9.5.1; or (3) withhold certification of the entire Application for Payment, and notify the Contractor and Owner in writing of the Architect's reason for withholding certification in whole 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 in the Application for Payment, that, to the best of the Architect's knowledge, information, and belief, the Work has progressed to the point indicated, the quality of the Work is in accordance with the Contract Documents, and that the Contractor is entitled to payment in the amount certified. 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. 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 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 suppliers 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 either party disputes the Architect's decision regarding a Certificate for Payment under Section 9.5.1, in whole or in part, that party may submit a Claim in accordance with Article 15.

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

§ 9.5.4 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 supplier to whom the 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 Contractor shall reflect such payment on its next Application 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 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 and suppliers 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 or supplier, except as may otherwise be required by law.

§ 9.6.5 The Contractor's payments to 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 or provided by 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.

§ 9.6.8 Provided the Owner has fulfilled its payment obligations to the Contractor under the Contract Documents, including but not limited to, paying the Contractor for all Work arising out of any lien claim or other claim for payment, the Contractor shall defend and indemnify the Owner from all loss, liability, damage or expense, including reasonable attorney's fees and litigation expenses, arising out of any lien claim or other claim for payment by any Subcontractor or supplier of any tier. Upon receipt of notice of a lien claim or other claim for payment, the Owner shall promptly notify the Contractor in writing and transmit such claim to the Contractor. If approved by the applicable court, when required, the Contractor may substitute a surety bond for the property against which the lien or other claim for payment has been asserted.

§ 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

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dispute resolution, then the Contractor may, upon seven additional days' 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 shutdown, 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. The Town of Hebron's issuance of a temporary or final certificate of occupancy, or equivalent approval that the Owner can occupy or utilize the Work for its intended use, shall constitute Substantial Completion, even if minor punch list items are to be completed.

§ 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 shall 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 the Certificate. Upon such acceptance, and consent of surety if any, the Owner shall make payment of retainage applying to the 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 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 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. 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 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, (3) a written statement that the Contractor knows of no 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) documentation of any special warranties, such as manufacturers' warranties or specific Subcontractor warranties, and (6) if required by the Owner, other data establishing payment or satisfaction of obligations, such as receipts and 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, claim, security interest, or encumbrance. If a lien, claim, security interest, or encumbrance 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 the lien, claim, security interest, or encumbrance, including all costs and reasonable attorneys' fees. All waivers and releases of claims of payment and any rights under the labor and material payment bond provided pursuant to AIA Document A101-2017 Exhibit A, and elsewhere in the Contract Documents, shall be for amounts actually paid and for Work actually performed as of the date that such waivers and releases are executed. All waivers and releases shall become effective upon the Contractor's receipt and sufficiency of payment.

§ 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, corrected, 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 the 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;
- .3 terms of special warranties required by the Contract Documents; or
- .4 audits performed by the Owner, if permitted by the Contract Documents, after final payment.

§ 9.10.5 Acceptance of final payment by the Contractor, a Subcontractor, or a 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, a Subcontractor, or a Sub-subcontractor; 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 implement, 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 the owners and users of adjacent sites and utilities of the safeguards.

§ 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 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. The Contractor may make a Claim for the cost to remedy the damage or loss to the extent such damage or loss is 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 the injury or damage, whether or not insured, shall be given to the other party within a reasonable time not exceeding 21 days after discovery. Such notice shall provide sufficient detail to enable the other party to investigate the matter.

§ 10.3 Hazardous Materials and Substances

§ 10.3.1 The Contractor is responsible for compliance with any requirements included in the Contract Documents regarding hazardous materials or substances. 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 notify the Owner and Architect of the condition.

§ 10.3.2 Upon receipt of the Contractor's 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 the material or substance or who are to perform the task of removal or safe containment of the 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 by the amount of the Contractor's reasonable additional costs of shutdown, 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. Notwithstanding the foregoing, the Owner shall only be required to indemnify any such party seeking indemnity to the extent of such negligence attributable to the acts or omissions of the Owner.

§ 10.3.4 The Owner shall not be responsible under this Section 10.3 for hazardous 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 hazardous 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 hazardous materials or substances 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 Insurance and Bonds

§ 11.1.1 The Contractor shall purchase and maintain insurance of the types and limits of liability, containing the endorsements, and subject to the terms and conditions, as described in the Agreement or elsewhere in the Contract Documents. The Contractor shall purchase and maintain the required insurance from an insurance company or insurance companies lawfully authorized to issue insurance in the jurisdiction where the Project is located. The Owner, Architect, and Architect's consultants shall be named as additional insureds under the Contractor's commercial general liability policy or as otherwise described in the Contract Documents.

§ 11.1.2 The Contractor shall provide surety bonds of the types, for such penal sums, and subject to such terms and conditions as required by the Contract Documents. The Contractor shall purchase and maintain the required bonds from a company or companies lawfully authorized to issue surety bonds in the jurisdiction where the Project is located.

§ 11.1.3 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.

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§ 11.1.4 Notice of Cancellation or Expiration of Contractor's Required Insurance. Within five (5) business days of the date the Contractor becomes aware of an impending or actual cancellation or expiration of any insurance required by the Contract Documents, the Contractor shall provide written notice to the Owner of such impending or actual cancellation or expiration. Upon receipt of such notice from the Contractor, the Owner shall, unless the lapse in coverage arises from an act or omission of the Owner, have the right to stop the Work until the lapse in coverage has been cured by the procurement of replacement coverage by the Contractor. The furnishing of such notice by the Contractor shall not relieve the Contractor of any contractual obligation to provide any required coverage.

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

§ 11.1.6 The Contractor shall include a provision in its agreements with its Subcontractors requiring that the Additional Insureds be named as additional insureds on the Subcontractor's insurance policies. The insurance of the Contractor and the insurance of the Contractor's Subcontractors shall be primary to any insurance available to the Additional Insureds, which insurance shall be secondary and non-contributory.

§ 11.1.7 The Contractor shall, before commencement of its Work, and prior to the commencement of the Work of any of its Subcontractors, submit to the Owner evidence of the aforementioned insurance requirements from itself and its Subcontractors in the form of a certificate of insurance and additional insured endorsements or actual insurance policies containing a blanket additional insured clause acceptable to the Owner. Failure by the Contractor to provide the endorsements required in this section shall entitle the Owner to withhold payment from any Application for Payment then due or to become due until such time as the endorsements are provided.

§ 11.1.8 All certificates of insurance shall contain the name and address of the Project as follows: Hebron Elementary School, Contaminated Water Piping Replacement, 92 Church Street, Hebron, CT 06268.

§ 11.2 Owner's Insurance

§ 11.2.1 The Owner shall purchase and maintain insurance of the types and limits of liability, containing the endorsements, and subject to the terms and conditions, as described in the Agreement or elsewhere in the Contract Documents. The Owner shall purchase and maintain the required insurance from an insurance company or insurance companies lawfully authorized to issue insurance in the jurisdiction where the Project is located.

§ 11.2.2 Failure to Purchase Required Property Insurance. If the Owner fails to purchase and maintain the required property insurance, with all of the coverages and in the amounts described in the Agreement or elsewhere in the Contract Documents, the Owner shall inform the Contractor in writing prior to commencement of the Work. Upon receipt of written notice from the Owner, the Contractor may delay commencement of the Work and may obtain insurance that will protect the interests of the Contractor, Subcontractors, and Sub-Subcontractors in the Work. When the failure to provide coverage has been cured or resolved, the Contract Sum and Contract Time shall be equitably adjusted to compensate the Contractor for any costs it incurred by reason of the Owner's failure to provide coverage. In the event the Owner fails to procure coverage, the Owner waives all rights against the Contractor, Subcontractors, and Sub-subcontractors to the extent the loss to the Owner would have been covered by the insurance to have been procured by the Owner. The cost of the insurance shall be charged to the Owner by a Change Order. If the Owner does not provide written notice, and the Contractor is damaged by the failure or neglect of the Owner to purchase or maintain the required insurance, the Owner shall reimburse the Contractor for all reasonable costs and damages attributable thereto.

§ 11.2.3 Notice of Cancellation or Expiration of Owner's Required Property Insurance. Within five (5) business days of the date the Owner becomes aware of an impending or actual cancellation or expiration of any property insurance required by the Contract Documents, the Owner shall provide written notice to the Contractor of such impending or actual cancellation or expiration. Unless the lapse in coverage arises from an act or omission of the Contractor: (1) the Contractor, upon receipt of such notice from the Owner, shall have the right to stop the Work until the lapse in coverage has been cured by the procurement of replacement coverage by either the Owner or the Contractor; (2) the Contract Time and Contract Sum shall be equitably adjusted; and (3) the Owner waives all rights against the

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Contractor, Subcontractors, and Sub-subcontractors to the extent any loss to the Owner would have been covered by the insurance had it not expired or been cancelled. If the Contractor purchases replacement coverage, the cost of the insurance shall be charged to the Owner by an appropriate Change Order. The furnishing of such notice by the Owner shall not relieve the Owner of any contractual obligation to provide required insurance.

§ 11.3 Waivers of Subrogation

§ 11.3.1 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; (2) the Architect and Architect's consultants; and (3) Separate Contractors, 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 those losses are covered by property insurance required by the Agreement or other property insurance applicable to the Project, except such rights as they have to proceeds of such insurance. The Owner or Contractor, as appropriate, shall require similar written waivers in favor of the individuals and entities identified above from the Architect, Architect's consultants, Separate Contractors, subcontractors, and sub-subcontractors. The policies of insurance purchased and maintained by each person or entity agreeing to waive claims pursuant to this section 11.3.1 shall not prohibit this waiver of subrogation. This waiver of subrogation shall be effective as to a person or entity (1) even though that person or entity would otherwise have a duty of indemnification, contractual or otherwise, (2) even though that person or entity did not pay the insurance premium directly or indirectly, or (3) whether or not the person or entity had an insurable interest in the damaged property.

§ 11.3.2 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 11.3.1 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.

§ 11.4 Loss of Use, Business Interruption, and Delay in Completion Insurance

The Owner, at the Owner's option, may purchase and maintain insurance that will protect the Owner against loss of use of the Owner's property, or the inability to conduct normal operations, due to fire or other causes of loss. The Owner waives all rights of action against the Contractor and Architect for loss of use of the Owner's property, due to fire or other hazards however caused.

§ 11.5 Adjustment and Settlement of Insured Loss

§ 11.5.1 A loss insured under the property insurance required by the Agreement 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 11.5.2. The Owner shall pay the Architect and Contractor their just shares of insurance proceeds received by the Owner, and by appropriate agreements the Architect and Contractor shall make payments to their consultants and Subcontractors in similar manner.

§ 11.5.2 Prior to settlement of an insured loss, the Owner shall notify the Contractor in writing of the terms of the proposed settlement as well as the proposed allocation of the insurance proceeds. The Contractor shall have 14 days from receipt of notice to object to the proposed settlement or allocation of the proceeds. If the Contractor does not object, the Owner shall settle the loss and the Contractor shall be bound by the settlement and allocation. Upon receipt, the Owner shall deposit the insurance proceeds in a separate account and make the appropriate distributions. Thereafter, if no other agreement is made or the Owner does not terminate the Contract for convenience, the Owner and Contractor shall execute a Change Order for reconstruction of the damaged or destroyed Work in the amount allocated for that purpose. If the Contractor timely objects to either the terms of the proposed settlement or the allocation of the proceeds, the Owner may proceed to settle the insured loss, and any dispute between the Owner and Contractor arising out of the settlement or allocation of the proceeds shall be resolved pursuant to Article 15. Pending resolution of any dispute, the Owner may issue a Construction Change Directive for the reconstruction of the damaged or destroyed Work.

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, the Contractor shall be entitled to an equitable adjustment to the Contract Sum and Contract Time as may be appropriate. If such Work is not in accordance with the Contract Documents, the costs of uncovering the Work, and the cost of correction, shall be at the Contractor's expense unless the condition was caused by the Owner, the Owner's own forces or by a Separate Contractor employed by the Owner in which event the Owner shall be responsible for payment of such costs.

§ 12.2 Correction of Work

§ 12.2.1 Before Substantial Completion

The Contractor shall promptly correct Work rejected by the Architect or failing to conform to the requirements of the Contract Documents, discovered before 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 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 after receipt of 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 2.5.

§ 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 of the Owner or Separate Contractors, whether completed or partially completed, 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 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 as determined by the Architect. 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, excluding that jurisdiction's choice of law rules.

§ 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 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 the assignment.

§ 13.3 Rights and Remedies

§ 13.3.1 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.

§ 13.3.2 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 thereunder, except as may be specifically agreed upon in writing.

§ 13.4 Tests and Inspections

§ 13.4.1 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 tests, inspections, or approvals that do not become requirements until after bids are received or negotiations concluded. The Owner shall directly arrange and pay for tests, inspections, or approvals where building codes or applicable laws or regulations so require.

§ 13.4.2 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 13.4.1, 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 13.4.3, shall be at the Owner's expense.

§ 13.4.3 If procedures for testing, inspection, or approval under Sections 13.4.1 and 13.4.2 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.

§ 13.4.4 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.

§ 13.4.5 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.

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

§ 13.5 Interest

(Paragraph Deleted)

Intentionally omitted

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, a Subcontractor, a Sub-subcontractor, their agents or employees, or any other persons or entities performing portions of the Work, 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 in writing 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.

§ 14.1.2 The Contractor may terminate the Contract if, through no act or fault of the Contractor, a Subcontractor, a Sub-subcontractor, their agents or employees, or any other persons or entities performing portions of the Work, 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, , and costs incurred by reason of such termination.

§ 14.1.4 If the Work is stopped for a period of 60 consecutive days through no act or fault of the Contractor, a Subcontractor, a Sub-subcontractor, or their agents or employees or any other persons or entities performing portions of the Work, including but not limited to, the Owner's own forces or Separate Contractors employed by the Owner 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.

§ 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 not subject to a good faith dispute to Subcontractors or suppliers in accordance with the respective agreements between the Contractor and the Subcontractors or suppliers;
- .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 reasons described in Section 14.2.1 exist, and upon certification by the Architect that sufficient cause exists to justify such action, the Owner may, without prejudice to any other rights or remedies of the

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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 under 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 Owner shall pay the Contractor for Work properly executed; costs incurred by reason of the termination, including costs attributable to termination of Subcontracts.

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, a change in the Contract Time, 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. This Section 15.1.1 does not require the Owner to file a Claim in order to impose liquidated damages in accordance with the Contract Documents.

§ 15.1.2 Time Limits on Claims

The Owner and Contractor shall commence all Claims and causes of action against the other and arising out of or related to the Contract, whether in contract, tort, breach of warranty or otherwise, in accordance with the requirements of the binding dispute resolution method selected in the Agreement and within the 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 15.1.2.

§ 15.1.3 Notice of Claims

§ 15.1.3.1 Claims by either the Owner or Contractor, where the condition giving rise to the Claim is first discovered prior to expiration of the period for correction of the Work set forth in Section 12.2.2, shall be initiated by written notice to the other party and to the Initial Decision Maker. Claims by either party under this Section 15.1.3.1 shall 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.

§ 15.1.3.2 Claims by either the Owner or Contractor, where the condition giving rise to the Claim is first discovered after expiration of the period for correction of the Work set forth in Section 12.2.2, shall be initiated by written notice to the other party. In such event, no decision by the Initial Decision Maker is required.

§ 15.1.4 Continuing Contract Performance

§ 15.1.4.1 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.

§ 15.1.4.2 The Contract Sum and Contract Time shall be adjusted in accordance with the Initial Decision Maker's decision, subject to the right of either party to proceed in accordance with this Article 15. The Architect will issue Certificates for Payment in accordance with the decision of the Initial Decision Maker.

§ 15.1.5 Claims for Additional Cost

If the Contractor wishes to make a Claim for an increase in the Contract Sum, notice as provided in Section 15.1.3 shall be given before proceeding to execute the portion of the Work that is the subject of the Claim. Prior notice is not required for Claims relating to an emergency endangering life or property arising under Section 10.4.

§ 15.1.6 Claims for Additional Time

§ 15.1.6.1 If the Contractor wishes to make a Claim for an increase in the Contract Time, written notice as provided in Section 15.1.3 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.

§ 15.1.6.2 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.

§ 15.1.7 Waiver of 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 15.1.7 shall be deemed to preclude assessment of liquidated damages, when applicable, in accordance with the requirements of the Contract Documents.

§ 15.2 Initial Decision

§ 15.2.1 Claims, excluding those where the condition giving rise to the Claim is first discovered after expiration of the period for correction of the Work set forth in Section 12.2.2 or arising under Sections 10.3, 10.4, and 11.5, shall be referred to the Initial Decision Maker for initial decision. The Architect will serve as the Initial Decision Maker. 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.

§ 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 the 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.

§ 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 receipt of an initial decision, demand in writing that the other party file for mediation within 60 days of 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 Intentionally omitted.

§ 15.3.2 The parties may endeavor to resolve their Claims by mediation which, unless the parties mutually agree otherwise, shall be administered by the American Dispute Resolution Center in New Britain, CT 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.

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§ 15.3.3 Either party may, within 30 days from the date that mediation has been concluded without resolution of the dispute or 60 days after mediation has been demanded without resolution of the dispute, demand in writing that the other party file for binding dispute resolution. If such a demand is made and the party receiving the demand fails to file for binding dispute resolution within 60 days after receipt thereof, then both parties waive their rights to binding dispute resolution proceedings with respect to the initial decision.

§ 15.3.4 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 Intentionally omitted.

§ 15.4.1.1 Intentionally omitted.

§ 15.4.2 Intentionally omitted.

§ 15.4.3 Intentionally omitted.

§ 15.4.4 Consolidation or Joinder

§ 15.4.4.1 Intentionally omitted.

§ 15.4.4.2 Intentionally omitted.

§ 15.4.4.3 Intentionally omitted.

§ 15.5 RESOLUTION OF CLAIMS AND DISPUTES

§ 15.5.1 For any claim, dispute or other matter in question arising out of or related to this Agreement, the Owner and the Contractor shall first attempt to resolve such, claim, dispute or other matter at the field level through discussions between the Owner's representative and the Contractor's representative.

§ 15.5.2 If such claim, dispute or other matter in Section 15.5.1 cannot be resolved through the Owner's representative and the Contractor's representative, the Owner's senior representative and the Contractor's senior representative, upon the request of either party, shall meet as soon as conveniently possible, but in no case later than thirty (30) days after such request is made, to attempt to resolve such claim, dispute or other matter.

§ 15.5.3 If after the Senior representatives determine that the claim, dispute or other matter in section 15.5.1 cannot be resolved on terms satisfactory to both parties, the parties may mutually agree to submit the claim, dispute or other matter to non-binding mediation prior to and as a condition precedent to pursuing litigation.

§ 15.5.4 If such claim, dispute or other matter in Section 15.5.1 cannot be resolved by meetings between the parties, and after mediation in accordance with Section 15.3 above, the method of binding dispute resolution shall be litigation in a court of competent jurisdiction.

GENERAL CONDITIONS

The Work of this Contract shall be subject to the American Institute of Architects Document A201, "General Conditions of the Contract for Construction", herein referred to as the General Conditions.

SUPPLEMENTARY CONDITIONS

The supplementary Conditions contain changes and additions to the General Conditions. Where any part of the General Conditions is modified or voided by the Supplementary Conditions, the remaining unaltered provisions shall remain in effect.

ARTICLE 1 Make the following changes:

1.1.3.1 **Add the following:** Asbestos material encountered in the existing structure of the Project, and its treatment or removal is a part of the Work. The disposition of such material will be the responsibility of the Contractor. The Contractor shall be required to take appropriate precautions for Workers performing tasks in asbestos environments, ie. Basements, pipe tunnels, etc.

1.2.3 **Add the following:** When applied to materials and equipment required for the Work, the words "furnish", "install" and "provide" shall mean the following:

- .1 The word "provide" shall mean to furnish, pay for, deliver, install, adjust, clean and otherwise make materials and equipment fit and ready for their intended use.
- .2 The word "furnish" shall mean to secure, pay for, deliver to site, unload and uncrate materials and equipment.
- .3 The word "install" shall mean to place in position, incorporate in the work, adjust, clean, make fit and ready for use and perform all services except those included under the term "furnish".
- .4 The phrase "furnish and install" shall be equivalent to the word "provide". Each shall be interpreted to mean "the Contractor shall furnish all labor, material and equipment and install...".
- .5 "As required" shall mean as required to produce a fully completed project or result to the satisfaction of the Architect.
- .6 Where discrepancies or conflicts occur:
 - .1 Amendments and Addenda shall take precedence over the Specifications.
 - .2 The Specifications shall take precedence over the Drawings.
 - .3 Stated dimensions shall take precedence over scaled dimensions.
 - .4 Large-scale detail drawings shall take precedence over small-scale drawings.
 - .5 Schedules shall take precedence over other data on the drawings.
- .7 Instructions or specifications of a particular manufacturer as referred to herein shall be binding as a part of this Specification. Obtain such written instructions and maintain on the job with the Specification.
- .8 Schedules of materials in various sections of the Specifications are furnished to assist the Contractor. Contractor shall verify the schedules with the Drawings and shall provide any additional materials indicated on the Drawings but not included in the schedules. The greater quantity or highest quality will govern.

Add the following:

- 1.2.5 All work shown or referred to in the Contract Documents shall be included in the Contract excepting those items which are specifically noted as being "provided under another contract" or "provided by the Owner", or "not in contract (NIC)".
- 1.2.6 Parties to the Contract shall not take advantage of obvious error or apparent discrepancy in Contract Documents. Notice of discovered error or discrepancy shall immediately be given in writing to the Architect to make such corrections and interpretations as he may deem necessary for completion of the work in a satisfactory and acceptable manner.

ARTICLE 2 Make the following changes:

- 2.3.6 **Revise to read as follows:** "Contractor shall be furnished up to three (3) sets of Contract Drawings and Specifications, and two (2) copies of each drawing which is issued after the date of the Contract. The Contractor shall pay costs of reproduction for any additional copies of Drawings or Specifications he requires."

ARTICLE 3 Make the following changes:

Add the following:

- 3.4.5 Per AIA A701 Instructions to Bidders, Article 3.3.2.1, should the Contractor wish to substitute another product or method for products or methods specified or shown in the Contract Documents, whether specified or shown in Contract Documents, whether or not such phrases as "equal to" or "based on" are used, he shall apply in writing for approval. He shall enclose such data as Architect requires to evaluate products. The Architect's decision shall be final. Contractor is responsible for space requirements of substitutions, he shall execute necessary changes in adjacent and relocated situations, he shall execute necessary changes in adjacent and relocated work which are due to such substitutions, without additional cost and he shall be responsible for delays required for evaluation of proposed substitutions.
- 3.5.4.1 Specified Product Warranty: Issued by a manufacturer or fabricator for compliance with requirements of the Contract Documents. Refer to sections of Specifications for requirements of specified warranties.
- 3.5.4.2 Coincidental Product Warranty: Available on a product incorporated into the work, by virtue of manufacturer's publication of warranty without regard for application requirement, a non-specified warranty. Contractor shall identify such warranties as they apply.
- 3.5.6.1 Warranty Obligations
 - .1 Contractor shall restore or remove-and-replace warranted work to its originally specified condition, at such time during warranty as it does not comply with or fulfill terms of warranty.
 - .2 Contractor shall restore or remove-and-replace other work which has been damaged by failure of warranted work, or which must be removed and replaced to gain access to warranted work.

- .3 Cost of restoration or removal-and-replacement is Contractor's obligation, without regard to whether Owner has already benefited from use of failing work.
- .4 Except as otherwise indicated or required by governing regulations, warranties do not cover consequential damage to property other than the Work of the Contract.
- .5 Upon restoration or removal-and-replacement of warranted work which has failed, Contractor shall reinstate the warranty by issuing newly executed form, for at least the remaining period of time of the original warranty, but for not less than half of the original warranty period, or not less than one year, whichever is greater.
- .6 Warranties and warranty periods shall not diminish implied warranties, and shall not deprive Owner of actions, rights and remedies otherwise available if the Contractor fails to fulfill the requirements of the Contract Documents.
- .7 Owner reserves the right to reject coincidental product warranties which conflict with or are less than the requirements of the Contract Documents.

3.5.8 Contractor shall furnish fully executed warranties to Owner in accordance with the General Conditions and Section 017700.

3.6 **Add the following:** No amount shall be included in the bid for State Sales Tax or for Federal Excise Tax on materials or supplies purchased for this project. The Owner will supply tax exempt number.

3.7.1 **Add the following:** The Contractor shall pay costs charged by utility companies for service connections, inspections and tests, and related utility company fees normally assessed as part of the construction process.

ARTICLE 4 Make the following changes:

4.2.13 Add to the first sentence, after "...relating to aesthetic effect..."

"and except for claims which have been waived by making or acceptance of final payment as provided by Subparagraphs 9.10.3 and 9.10.4,"

Add the following:

4.3 The provisions of Article 15 notwithstanding, the Contractor expressly agrees to joinder in arbitration proceedings between Owner/Architect upon specific written request of the Owner. This agreement shall be valid with the Architect's acceptance of an equal provision in their respective contracts.

ARTICLE 6 Add the following:

6.3.1 In a dispute between the Owner and the Contractor concerning rubbish and orderliness on the site, the Owner may have the rubbish removed and charge the cost to the Contractor. Upon written notification from the Architect that the project requires cleaning, the Contractor shall within 24 hours remove all rubbish and hazards from the project and shall arrange his material and equipment in an orderly manner on the site. If this cleaning is not completed within 24 hours, the Owner may engage labor to clean up the projects to

his satisfaction and deduct the costs from any monies due the Contractor.

ARTICLE 7 Add the following:

7.2.2 The Contractor's proposal for changes in the Work shall be itemized completely and in detail and shall include material costs and quantities, labor wages, time, insurance, pensions and equipment rental other than small tools, and the number of additional calendar days, if any, which are required to complete the Work.

Where unit prices have been established, the proposal shall state the quantity involved and the applicable unit price.

7.5 ALLOWANCE FOR OVERHEAD AND PROFIT

7.5.1 The allowance for overhead and profit is compensation for administration, superintendence, materials for temporary structures, additional premiums on bonds and the use of small tools.

7.5.2 For additions, deletions or other changes in the Work ordered under method 7.3.3.3, the Contractor may apply an allowance of up to fifteen percent (15%) for profit and overhead to the net cost of the work actually performed by him.

7.5.3 Work to be performed by a subcontractor may include an allowance for the subcontractor's overhead and profit not to exceed ten percent (10%) of the net cost. The Contractor is permitted up to a **five percent (5%)** allowance to be applied against the net cost to a subcontractor. In no case shall the total allowance exceed fifteen percent (15%) of the net cost of work performed by the subcontractor.

7.5.4 The Contractor's allowance of up to ten percent (10%) on changes involving more than one (1) subcontractor shall be applied only to the combined net of cost additions and deductions of all subcontractors.

7.5.5 There shall be no allowance for overhead and profit for the Contractor or any subcontractor on changes resulting in a net deduction.

7.5.6 The provisions of this Article shall apply only to subcontractors as defined in Article 5. Allowance for overhead and profit will be accepted only for those who are direct subcontractors.

ARTICLE 9 Make the following changes:

9.3.1 **Revise** "ten days" to read "fifteen (15) days".

Add the following:

9.3.1.3 During progress of the Work, the Owner will pay Contractor ninety-five percent (95%) of the total amount of each monthly payment due. The remaining five percent (5%) will be retained by the Owner until the Project is substantially completed. There will be no further reduction considered until final acceptance of the Project in accordance with the Contract Documents.

9.3.2 **Add the following:** If the Contractor does not submit evidence of payment to vendor for material and equipment stored, the Architect will recommend deduction of the amount previously allowed for the items stored from the current or subsequent Application for Payment. Contractor must submit to the Architect partial and final Lien Wavers as construction progresses through completion.

Add the following:

9.3.2.1 Contractor may include in Application for Payment the delivered cost of equipment and non-perishable materials delivered and stored at the site but not incorporated in the work, under the following conditions:

- .1 Items to be protected from fire, theft, vandalism, weather and other damage.
- .2 Storage procedures and areas to be approved.
- .3 Items to be available at all times for inspection by the Owner and Architect.

9.3.4 Contractor shall furnish with Application for Payment an invoice establishing value of material and equipment stored at the site along with a statement of amount to be paid the vendor.

- .1 Such stored items are subject to inspection by Architect before payment is recommended.
- .2 Contractor shall furnish Owner with Certificate of Insurance in accordance with Contract Documents for the full value of the items stored at the site.

9.6.2.1 Contractor shall furnish Architect with satisfactory evidence of payment to vendors supplying material and equipment for approved storage. This shall be done within thirty (30) days after the date of progress payment. Satisfactory evidence of payment shall be one (1) of the following:

- .1 Contractor's canceled check in correct amount with identification of invoices paid.
- .2 A letter or telegram from vendor with authorized signature stating amounts and invoices paid.
- .3 A receipted invoice.

9.6.7.1 Payment for material and equipment delivered and stored shall not relieve Contractor of responsibility for furnishing equipment and material required for the work in the same manner as if such payment were not made.

9.10.6 A prerequisite to final payment shall be that the Contractor furnish proof that he has completed all specification requirements covering the following item as applicable:

Warranties; As-built Drawings; Operation and Maintenance Manuals, including Training; Attic Stock; Conclusive Evidence of the review of all CHRO Set-Aside Plans from the Prime and all Sub-tier Trade Contractors.

ARTICLE 10 **Add the following:**

10.3.4.1 The Contractor shall not bring hazardous materials onto the site nor use in

the Work without compliance with the following conditions.

- .2 The Contractor shall be solely responsible for the handling, storage, and use of explosive or other hazardous materials when their use is permitted. For such use, the Contractor shall obtain necessary permits from regulating agencies and submit copies of permits to the Architect for review before proceeding with use.
- .3 Contractor shall obtain insurance for use of hazardous material and furnish certificates of insurance in keeping with Conditions of the Contract.

ARTICLE 11 Make the following changes:

11.1.1 **Revise** “authorized to do business in the jurisdiction in which the Project is located” to read “licensed to do business in Connecticut”.

11.1.2 **Revise** “authorized to do business in the jurisdiction in which the Project is located” to read “licensed to do business in Connecticut”.

11.2.2 **Revise** “prior to commencement of the Work” to read “within ten (10) days of Notice of Award”.

END OF SECTION

Application and Certificate for Payment

TO OWNER: PROJECT: APPLICATION NO: 002 DISTRIBUTION TO:
 PERIOD TO: OWNER:
 CONTRACT FOR: General Construction ARCHITECT:
 CONTRACT DATE: CONTRACTOR:
 PROJECT NOS: / / FIELD:
 OTHER:

FROM VIA ARCHITECT:
 CONTRACTOR: ARCHITECT:

CONTRACTOR'S APPLICATION FOR PAYMENT

Application is made for payment, as shown below, in connection with the Contract. Continuation Sheet, AIA Document G703, is attached.

1. ORIGINAL CONTRACT SUM \$0.00
2. NET CHANGE BY CHANGE ORDERS \$0.00
3. CONTRACT SUM TO DATE (Line 1 ± 2) \$0.00
4. TOTAL COMPLETED & STORED TO DATE (Column G on G703) \$0.00
5. RETAINAGE:
 - a. 0 % of Completed Work (Column D + E on G703) \$0.00
 - b. 0 % of Stored Material (Column F on G703) \$0.00

Total Retainage (Lines 5a + 5b or Total in Column I of G703) \$0.00
6. TOTAL EARNED LESS RETAINAGE \$0.00
 (Line 4 Less Line 5 Total)
7. LESS PREVIOUS CERTIFICATES FOR PAYMENT \$0.00
 (Line 6 from prior Certificate)
8. CURRENT PAYMENT DUE \$0.00
9. BALANCE TO FINISH, INCLUDING RETAINAGE (Line 3 less Line 6) \$0.00

The undersigned Contractor certifies that to the best of the Contractor's knowledge, information and belief the Work covered by this Application for Payment has been completed in accordance with the Contract Documents, that all amounts have been paid by the Contractor for Work for which previous Certificates for Payment were issued and payments received from the Owner, and that current payment shown herein is now due.

CONTRACTOR:

By: _____ Date: _____
 State of: _____
 County of: _____
 Subscribed and sworn to before me this _____ day of _____

Notary Public:

My Commission expires: _____

ARCHITECT'S CERTIFICATE FOR PAYMENT

In accordance with the Contract Documents, based on on-site observations and the data comprising this application, the Architect certifies to the Owner that to the best of the Architect's knowledge, information and belief the Work has progressed as indicated, the quality of the Work is in accordance with the Contract Documents, and the Contractor is entitled to payment of the AMOUNT CERTIFIED.

AMOUNT CERTIFIED \$0.00
 (Attach explanation if amount certified differs from the amount applied. Initial all figures on this Application and on the Continuation Sheet that are changed to conform with the amount certified.)

ARCHITECT:

By: _____ Date: _____

This Certificate is not negotiable. The AMOUNT CERTIFIED is payable only to the Contractor named herein. Issuance, payment and acceptance of payment are without prejudice to any rights of the Owner or Contractor under this Contract.

CHANGE ORDER SUMMARY	ADDITIONS	DEDUCTIONS
Total changes approved in previous months by Owner	\$0.00	\$0.00
Total approved this Month	\$0.00	\$0.00
TOTALS	\$0.00	\$0.00
NET CHANGES by Change Order		\$0.00

Project: 19.003 Hebron Elementary School Contaminated Water Pipe Replacement

**Minimum Rates and Classifications
for Building Construction**

ID# : B 26583

**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: Hebron
State# FAP#:

Project: 19.003 Hebron Elementary School Contaminated Water Pipe Replacement

CLASSIFICATION	Hourly Rate	Benefits
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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
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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	40.21	30.99
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As of: Tuesday, October 01, 2019

Project: 19.003 Hebron Elementary School Contaminated Water Pipe Replacement

2) Boilermaker	38.34	26.01
3a) Bricklayer, Cement Mason, Concrete Finisher (including caulking), Stone Masons	34.72	32.55 + a
3b) Tile Setter	34.90	25.87
3c) Terrazzo Mechanics and Marble Setters	31.69	22.35
3d) Tile, Marble & Terrazzo Finishers	26.70	21.75
3e) Plasterer	33.48	32.06

As of: Tuesday, October 01, 2019

Project: 19.003 Hebron Elementary School Contaminated Water Pipe Replacement

-----LABORERS-----

4) Group 1: Laborers (common or general), acetylene burners, concrete specialists, wrecking laborers, fire watchers.	30.75	20.84
4a) Group 2: Mortar mixers, plaster tender, power buggy operators, powdermen, fireproofers/mixer/nozzleman (Person running mixer and spraying fireproof only).	31.00	20.84
4b) Group 3: Jackhammer operators/pavement breaker, mason tender (brick), mason tender (cement/concrete), forklift operators and forklift operators (masonry).	31.25	20.84
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.	31.75	20.84
4d) Group 5: Air track operator, sand blaster and hydraulic drills.	31.50	20.84

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Project: 19.003 Hebron Elementary School Contaminated Water Pipe Replacement

4e) Group 6: Blasters, nuclear and toxic waste removal.	33.75	20.84
4f) Group 7: Asbestos/lead removal and encapsulation (except it's removal from mechanical systems which are not to be scrapped).	31.75	20.84
4g) Group 8: Bottom men on open air caisson, cylindrical work and boring crew.	29.03	20.84
4h) Group 9: Top men on open air caisson, cylindrical work and boring crew.	28.49	20.84
4i) Group 10: Traffic Control Signalman	18.00	20.84
5) Carpenter, Acoustical Ceiling Installation, Soft Floor/Vinyl Floor/Carpet Laying, Metal Stud Installation, Form Work and Scaffold Building, Drywall Hanging, Modular-Furniture Systems Installers, Lathers, Piledrivers, Resilient Floor Layers.	33.53	25.66

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Project: 19.003 Hebron Elementary School Contaminated Water Pipe Replacement

5a) Millwrights	34.04	26.09
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)	40.00	27.67+3% of gross wage
7a) Elevator Mechanic (Trade License required: R-1,2,5,6)	53.37	33.705+a+b

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

Groundman	26.50	6.5% + 9.00
Linemen/Cable Splicer	48.19	6.5% + 22.00

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Project: 19.003 Hebron Elementary School Contaminated Water Pipe Replacement

8) Glazier (Trade License required: FG-1,2)	38.18	21.80 + a
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9) Ironworker, Ornamental, Reinforcing, Structural, and Precast Concrete Erection	36.67	35.77
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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)	40.97	24.80 + 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)	40.64	24.80 + 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)	39.88	24.80 + a
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Group 4: Trenching Machines; Lighter Derrick; Concrete Finishing Machine; CMI Machine or Similar; Koehring Loader (Skooper). 39.48 24.80 + a

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) 38.87 24.80 + a

Group 5 continued: Side Boom; Combination Hoe and Loader; Directional Driller; Pile Testing Machine. 38.87 24.80 + a

Group 6: Front End Loader (3 up to 7 cubic yards); Bulldozer (rough grade dozer). 38.55 24.80 + a

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). 38.20 24.80 + a

Group 8: Mechanic, grease truck operator, hydroblaster; barrier mover; power stone spreader; welding; work boat under 26 ft.; transfer machine. 37.79 24.80 + a

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Project: 19.003 Hebron Elementary School Contaminated Water Pipe Replacement

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). 37.34 24.80 + a

Group 10: Vibratory hammer; ice machine; diesel and air, hammer, etc. 35.24 24.80 + a

Group 11: Conveyor, earth roller, power pavement breaker (whiphammer), robot demolition equipment. 35.24 24.80 + a

Group 12: Wellpoint operator. 35.18 24.80 + a

Group 13: Compressor battery operator. 34.58 24.80 + a

Group 14: Elevator operator; tow motor operator (solid tire no rough terrain). 33.41 24.80 + a

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Group 15: Generator Operator; Compressor Operator; Pump Operator; Welding Machine Operator; Heater Operator. 32.99 24.80 + a

Group 16: Maintenance Engineer/Oiler. 32.32 24.80 + a

Group 17: Portable asphalt plant operator; portable crusher plant operator; portable concrete plant operator. 36.76 24.80 + a

Group 18: Power safety boat; vacuum truck; zim mixer; sweeper; (Minimum for any job requiring a CDL license). 34.26 24.80 + a

-----PAINTERS (Including Drywall Finishing)-----

10a) Brush and Roller 34.62 21.80

Project: 19.003 Hebron Elementary School Contaminated Water Pipe Replacement

10b) Taping Only/Drywall Finishing	35.37	21.80
10c) Paperhanger and Red Label	35.12	21.80
10e) Blast and Spray	37.62	21.80
11) Plumber (excluding HVAC pipe installation) (Trade License required: P-1,2,6,7,8,9 J-1,2,3,4 SP-1,2)	43.62	32.06
12) Well Digger, Pile Testing Machine	37.26	24.05 + a
13) Roofer (composition)	37.60	20.65

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Project: 19.003 Hebron Elementary School Contaminated Water Pipe Replacement

14) Roofer (slate & tile)	38.10	20.65
15) Sheetmetal Worker (Trade License required for HVAC and Ductwork: SM-1,SM-2,SM-3,SM-4,SM-5,SM-6)	37.98	38.31
16) Pipefitter (Including HVAC work) 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)	(Trade	43.62 32.06

-----TRUCK DRIVERS-----

17a) 2 Axle	29.51	24.52 + a
17b) 3 Axle, 2 Axle Ready Mix	29.62	24.52 + a

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Project: 19.003 Hebron Elementary School Contaminated Water Pipe Replacement

17c) 3 Axle Ready Mix	29.67	24.52 + a
17d) 4 Axle, Heavy Duty Trailer up to 40 tons	29.72	24.52 + a
17e) 4 Axle Ready Mix	29.77	24.52 + a
17f) Heavy Duty Trailer (40 Tons and Over)	29.98	24.52 + a
17g) Specialized Earth Moving Equipment (Other Than Conventional Type on-the-Road Trucks and Semi-Trailers, Including Euclids)	29.77	24.52 + a
18) Sprinkler Fitter (Trade License required: F-1,2,3,4)	45.57	24.33 + a

As of: Tuesday, October 01, 2019

Project: 19.003 Hebron Elementary School Contaminated Water Pipe Replacement

19) Theatrical Stage Journeyman	25.76	7.34
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Project: 19.003 Hebron Elementary School Contaminated Water Pipe Replacement

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: Tuesday, October 01, 2019

Project: 19.003 Hebron Elementary School Contaminated Water Pipe Replacement

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: Tuesday, October 01, 2019

CONNECTICUT DEPARTMENT OF LABOR
WAGE AND WORKPLACE STANDARDS DIVISION

CONTRACTORS WAGE CERTIFICATION FORM
Construction Manager at Risk/General Contractor/Prime Contractor

I, _____ of _____
Officer, Owner, Authorized Rep. Company Name

do hereby certify that the _____
Company Name

Street

City

and all of its subcontractors will pay all workers on the

Project Name and Number

Street and City

the wages as listed in the schedule of prevailing rates required for such project (a copy of which is attached hereto).

Signed

Subscribed and sworn to before me this _____ day of _____, _____.

Notary Public

Return to:
Connecticut Department of Labor
Wage & Workplace Standards Division
200 Folly Brook Blvd.
Wethersfield, CT 06109

Rate Schedule Issued (Date): _____

**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.

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.

Information Bulletin ***Occupational Classifications***

The Connecticut Department of Labor has the responsibility to properly determine "job classification" on prevailing wage projects covered under C.G.S. Section 31-53(d).

Note: This information is intended to provide a sample of some occupational classifications for guidance purposes only. It is not an all-inclusive list of each occupation's duties. This list is being provided only to highlight some areas where a contractor may be unclear regarding the proper classification. If unsure, the employer should seek guidelines for CTDOL.

Below are additional clarifications of specific job duties performed for certain classifications:

- **ASBESTOS WORKERS**

Applies all insulating materials, protective coverings, coatings and finishes to all types of mechanical systems.

- **ASBESTOS INSULATOR**

Handle, install apply, fabricate, distribute, prepare, alter, repair, dismantle, heat and frost insulation, including penetration and fire stopping work on all penetration fire stop systems.

- **BOILERMAKERS**

Erects hydro plants, incomplete vessels, steel stacks, storage tanks for water, fuel, etc. Builds incomplete boilers, repairs heat exchanges and steam generators.

- **BRICKLAYERS, CEMENT MASONS, CEMENT FINISHERS, MARBLE MASONS, PLASTERERS, STONE MASONS, PLASTERERS. STONE MASONS, TERRAZZO WORKERS, TILE SETTERS**

Lays building materials such as brick, structural tile and concrete cinder, glass, gypsum, terra cotta block. Cuts, tools and sets marble, sets stone, finishes concrete, applies decorative steel, aluminum and plastic tile, applies cements, sand, pigment and marble chips to floors, stairways, etc.

- **CARPENTERS, MILLWRIGHTS. PILEDRIVERMEN. LATHERS. RESILEINT FLOOR LAYERS, DOCK BUILDERS, DIKERS, DIVER TENDERS**

Constructs, erects, installs and repairs structures and fixtures of wood, plywood and wallboard. Installs, assembles, dismantles, moves industrial machinery. Drives piling into ground to provide foundations for structures such as buildings and bridges, retaining walls for earth embankments, such as cofferdams. Fastens wooden, metal or rockboard lath to walls, ceilings and partitions of buildings, acoustical tile layer, concrete form builder. Applies firestopping materials on fire resistive joint systems only. Installation of curtain/window walls only where attached to wood or metal studs. Installation of insulated material of all types whether blown, nailed or attached in other ways to walls, ceilings and floors of buildings. Assembly and installation of modular furniture/furniture systems. Free-standing furniture is not covered. This includes free standing: student chairs, study top desks, book box desks, computer furniture, dictionary stand, atlas stand, wood shelving, two-position information access station, file cabinets, storage cabinets, tables, etc.

- **LABORER, CLEANING**

- The clean up of any construction debris and the general (heavy/light) cleaning, including sweeping, wash down, mopping, wiping of the construction facility and its furniture, washing, polishing, and dusting.

- **DELIVERY PERSONNEL**

- If delivery of supplies/building materials is to one common point and stockpiled there, prevailing wages are not required. If the delivery personnel are involved in the distribution of the material to multiple locations within the construction site then they would have to be paid prevailing wages for the type of work performed: laborer, equipment operator, electrician, ironworker, plumber, etc.

- An example of this would be where delivery of drywall is made to a building and the delivery personnel distribute the drywall from one "stockpile" location to further sub-locations on each floor. Distribution of material around a construction site is the job of a laborer or tradesman, and not a delivery personnel.

- **ELECTRICIANS**

Install, erect, maintenance, alteration or repair of any wire, cable, conduit, etc., which generates, transforms, transmits or uses electrical energy for light, heat, power or other purposes, including the Installation or maintenance of telecommunication, LAN wiring or computer equipment, and low voltage wiring. ***License required per Connecticut General Statutes: E-1,2 L-5,6 C-5,6 T-1,2 L-1,2 V-1,2,7,8,9.**

- **ELEVATOR CONSTRUCTORS**

Install, erect, maintenance and repair of all types of elevators, escalators, dumb waiters and moving walks. **License required by Connecticut General Statutes: R-1,2,5,6.*

- **FORK LIFT OPERATOR**

Laborers Group 4) Mason Tenders - operates forklift solely to assist a mason to a maximum height of nine (9) feet only.

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

- **GLAZIERS**

Glazing wood and metal sash, doors, partitions, and 2 story aluminum storefronts. Installs glass windows, skylights, store fronts and display cases or surfaces such as building fronts, interior walls, ceilings and table tops and metal store fronts. Installation of aluminum window walls and curtain walls is the "joint" work of glaziers and ironworkers, which require equal composite workforce.

- **IRONWORKERS**

Erection, installation and placement of structural steel, precast concrete, miscellaneous iron, ornamental iron, metal curtain wall, rigging and reinforcing steel. Handling, sorting, and installation of reinforcing steel (rebar). Metal bridge rail (traffic), metal bridge handrail, and decorative security fence installation. Installation of aluminum window walls and curtain walls is the "joint" work of glaziers and ironworkers which require equal composite workforce.

- **INSULATOR**

- Installing fire stopping systems/materials for "Penetration Firestop Systems": transit to cables, electrical conduits, insulated pipes, sprinkler pipe penetrations, ductwork behind radiation, electrical cable trays, fire rated pipe penetrations, natural polypropylene, HVAC ducts, plumbing bare metal, telephone and communication wires, and boiler room ceilings.

- **LABORERS**

Acetylene burners, asphalt rakers, chain saw operators, concrete and power buggy operator, concrete saw operator, fence and guard rail erector (except metal bridge rail (traffic), decorative security fence (non-metal)).

installation.), hand operated concrete vibrator operator, mason tenders, pipelayers (installation of storm drainage or sewage lines on the street only), pneumatic drill operator, pneumatic gas and electric drill operator, powermen and wagon drill operator, air track operator, block paver, curb setters, blasters, concrete spreaders.

- **PAINTERS**

Maintenance, preparation, cleaning, blasting (water and sand, etc.), painting or application of any protective coatings of every description on all bridges and appurtenances of highways, roadways, and railroads. Painting, decorating, hardwood finishing, paper hanging, sign writing, scenic art work and drywall hhg for any and all types of building and residential work.

- **LEAD PAINT REMOVAL**

- Painter's Rate

1. Removal of lead paint from bridges.
2. Removal of lead paint as preparation of any surface to be repainted.
3. Where removal is on a Demolition project prior to reconstruction.

- Laborer's Rate

1. Removal of lead paint from any surface NOT to be repainted.
2. Where removal is on a *TOTAL* Demolition project only.

- **PLUMBERS AND PIPEFITTERS**

Installation, repair, replacement, alteration or maintenance of all plumbing, heating, cooling and piping. ****License required per Connecticut General Statutes: P-1,2,6,7,8,9 J-1,2,3,4 SP-1,2 S-1,2,3,4,5,6,7,8 B-1,2,3,4 D-1,2,3,4.***

- **POWER EQUIPMENT OPERATORS**

Operates several types of power construction equipment such as compressors, pumps, hoists, derricks, cranes, shovels, tractors, scrapers or motor graders, etc. Repairs and maintains equipment. ****License required, crane operators only, per Connecticut General Statutes.***

- **ROOFERS**

Covers roofs with composition shingles or sheets, wood shingles, slate or asphalt and gravel to waterproof roofs, including preparation of surface. (demolition or removal of any type of roofing and or clean-up of any and all areas where a roof is to be relaid.)

- **SHEETMETAL WORKERS**

Fabricate, assembles, installs and repairs sheetmetal products and equipment in such areas as ventilation, air-conditioning, warm air heating, restaurant equipment, architectural sheet metal work, sheetmetal roofing, and aluminum gutters. Fabrication, handling, assembling, erecting, altering, repairing, etc. of coated metal material panels and composite metal material panels when used on building exteriors and interiors as soffits, fascia, louvers, partitions, canopies, cornice, column covers, awnings, beam covers, cladding, sun shades, lighting troughs, spires, ornamental roofing, metal ceilings, mansards, copings, ornamental and ventilation hoods, vertical and horizontal siding panels, trim, etc. The sheet metal classification also applies to the vast variety of coated metal material panels and composite metal material panels that have evolved over the years as an alternative to conventional ferrous and non-ferrous metals like steel, iron, tin, copper, brass, bronze, aluminum, etc. Fabrication, handling, assembling, erecting, altering, repairing, etc. of architectural metal roof, standing seam roof, composite metal roof, metal and composite bathroom/toilet partitions, aluminum gutters, metal and composite lockers and shelving, kitchen equipment, and walk-in coolers. To include testing and air –balancing ancillary to installation and construction.

- **SPRINKLER FITTERS**

Installation, alteration, maintenance and repair of fire protection sprinkler systems.

****License required per Connecticut General Statutes: F-1,2,3,4.***

- **TILE MARBLE AND TERRAZZO FINISHERS**

Assists and tends the tile setter, marble mason and terrazzo worker in the performance of their duties.

- **TRUCK DRIVERS**

~How to pay truck drivers delivering asphalt is under REVISION~

Truck Drivers are required to be paid prevailing wage for time spent "working" directly on the site. These drivers remain covered by the prevailing wage for any time spent transporting between the actual construction location and facilities (such as fabrication, plants, mobile factories, batch plant, borrow pits, job headquarters, tool yards, etc.) dedicated exclusively, or nearly so, to performance of the contract or project, which are so located in proximity to the actual construction location that it is reasonable to include them. ****License required, drivers only, per Connecticut General Statutes.***

For example:

- Material men and deliverymen are not covered under prevailing wage as long as they are not directly involved in the construction process. If, they unload the material, they would then be covered by prevailing wage for the classification they are performing work in: laborer, equipment operator, etc.
- Hauling material off site is not covered provided they are not dumping it at a location outlined above.
- Driving a truck on site and moving equipment or materials on site would be considered covered work, as this is part of the construction process.

➤ *Any questions regarding the proper classification should be directed to:*
Public Contract Compliance Unit
Wage and Workplace Standards Division
Connecticut Department of Labor
200 Folly Brook Blvd, Wethersfield, CT 06109
(860) 263-6543.

Sec. 31-53b. Construction safety and health course. New miner training program. Proof of completion required for mechanics, laborers and workers on public works projects. Enforcement. Regulations. Exceptions. (a) Each contract for a public works project entered into on or after July 1, 2009, by the state or any of its agents, or by any political subdivision of the state or any of its agents, described in subsection (g) of section 31-53, shall contain a provision requiring that each contractor furnish proof with the weekly certified payroll form for the first week each employee begins work on such project that any person performing the work of a mechanic, laborer or worker pursuant to the classifications of labor under section 31-53 on such public works project, pursuant to such contract, has completed a course of at least ten hours in duration in construction safety and health approved by the federal Occupational Safety and Health Administration or, has completed a new miner training program approved by the Federal Mine Safety and Health Administration in accordance with 30 CFR 48 or, in the case of telecommunications employees, has completed at least ten hours of training in accordance with 29 CFR 1910.268.

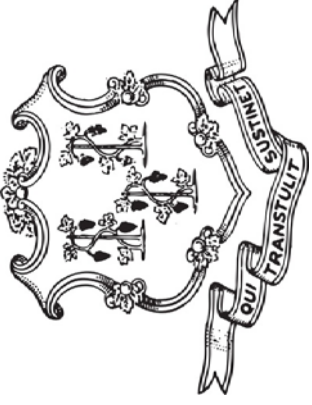
(b) Any person required to complete a course or program under subsection (a) of this section who has not completed the course or program shall be subject to removal from the worksite if the person does not provide documentation of having completed such course or program by the fifteenth day after the date the person is found to be in noncompliance. The Labor Commissioner or said commissioner's designee shall enforce this section.

(c) Not later than January 1, 2009, the Labor Commissioner shall adopt regulations, in accordance with the provisions of chapter 54, to implement the provisions of subsections (a) and (b) of this section. Such regulations shall require that the ten-hour construction safety and health courses required under subsection (a) of this section be conducted in accordance with federal Occupational Safety and Health Administration Training Institute standards, or in accordance with Federal Mine Safety and Health Administration Standards or in accordance with 29 CFR 1910.268, as appropriate. The Labor Commissioner shall accept as sufficient proof of compliance with the provisions of subsection (a) or (b) of this section a student course completion card issued by the federal Occupational Safety and Health Administration Training Institute, or such other proof of compliance said commissioner deems appropriate, dated no earlier than five years before the commencement date of such public works project.

(d) This section shall not apply to employees of public service companies, as defined in section 16-1, or drivers of commercial motor vehicles driving the vehicle on the public works project and delivering or picking up cargo from public works projects provided they perform no labor relating to the project other than the loading and unloading of their cargo.

(P.A. 06-175, S. 1; P.A. 08-83, S. 1.)

History: P.A. 08-83 amended Subsec. (a) by making provisions applicable to public works project contracts entered into on or after July 1, 2009, replacing provision re total cost of work with reference to Sec. 31-53(g), requiring proof in certified payroll form that new mechanic, laborer or worker has completed a 10-hour or more construction safety course and adding provision re new miner training program, amended Subsec. (b) by substituting "person" for "employee" and adding "or program", amended Subsec. (c) by adding "or in accordance with Federal Mine Safety and Health Administration Standards" and setting new deadline of January 1, 2009, deleted former Subsec. (d) re "public building", added new Subsec. (d) re exemptions for public service company employees and delivery drivers who perform no labor other than delivery and made conforming and technical changes, effective January 1, 2009.



THIS IS A PUBLIC WORKS PROJECT

Covered by the

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.

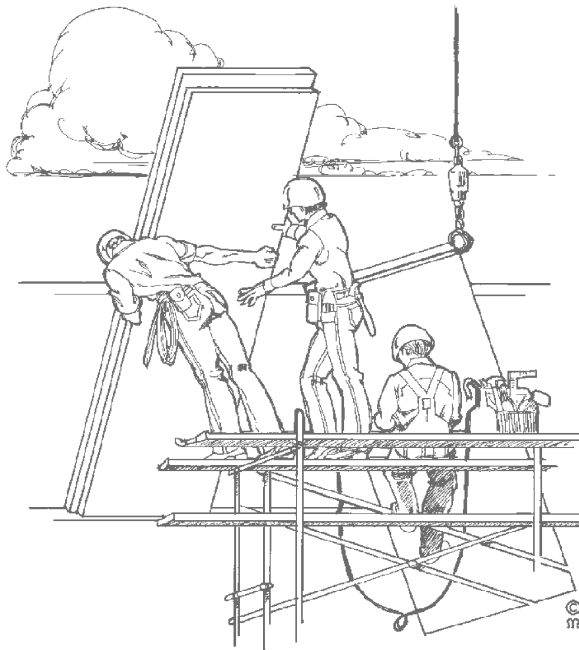
~NOTICE~

TO ALL CONTRACTING AGENCIES

Please be advised that Connecticut General Statutes Section 31-53, requires the contracting agency to certify to the Department of Labor, the total dollar amount of work to be done in connection with such public works project, regardless of whether such project consists of one or more contracts.

Please find the attached “Contracting Agency Certification Form” to be completed and returned to the Department of Labor, Wage and Workplace Standards Division, Public Contract Compliance Unit.

 Inquiries can be directed to (860)263-6543.



CONNECTICUT DEPARTMENT OF LABOR
WAGE AND WORKPLACE STANDARDS DIVISION
CONTRACT COMPLIANCE UNIT

CONTRACTING AGENCY CERTIFICATION FORM

I, _____, acting in my official capacity as _____,
authorized representative title

for _____, located at _____,
contracting agency address

do hereby certify that the total dollar amount of work to be done in connection with
_____, located at _____,
project name and number address

shall be \$_____, which includes all work, regardless of whether such project
consists of one or more contracts.

CONTRACTOR INFORMATION

Name: _____

Address: _____

Authorized Representative: _____

Approximate Starting Date: _____

Approximate Completion Date: _____

Signature

Date

Return To: Connecticut Department of Labor
Wage & Workplace Standards Division
Contract Compliance Unit
200 Folly Brook Blvd.
Wethersfield, CT 06109

Date Issued: _____

[New] In accordance with Section 31-53b (a) of the C.G.S. each contractor shall provide a copy of the OSHA 10 Hour Construction Safety and Health Card for each employee, to be attached to the first certified payroll on the project.

PAYROLL CERTIFICATION FOR PUBLIC WORKS PROJECTS															
Connecticut Department of Labor Wage and Workplace Standards Division 200 Folly Brook Blvd. Wethersfield, CT 06109															
CONTRACTOR NAME AND ADDRESS:						SUBCONTRACTOR NAME & ADDRESS:									
PROJECT NAME & ADDRESS						WORKER'S COMPENSATION INSURANCE CARRIER									
PAYROLL NUMBER	Week-Ending Date	PERSON/WORKER ADDRESS and SECTION	APPR RATE %	MALE/FEMALE AND RACE*	WORK CLASSIFICATION	DAY AND DATE							TOTAL DEDUCTIONS	GROSS PAY FOR THIS PREVAILING RATE JOB	CHECK # AND NET PAY
						S	M	T	W	TH	F	S			
		Trade License Type & Number - OSHA 10 Certification Number		HOURS WORKED EACH DAY		Total ST Hours		Total O/T Hours		TYPE OF FRINGE BENEFITS Per Hour 1 through 6 (see back)		GROSS PAY FOR ALL WORK PERFORMED THIS WEEK		GROSS PAY FOR THIS PREVAILING RATE JOB	
										1. \$		FICA			
										2. \$					
										3. \$					
										4. \$					
										5. \$					
										6. \$					
										1. \$					
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										5. \$					
										6. \$					

*IF REQUIRED

*SEE REVERSE SIDE

PAGE NUMBER ____ OF ____

OSHA 10 ~ ATTACH CARD TO 1ST CERTIFIED PAYROLL

***FRINGE BENEFITS EXPLANATION (P):**

Bona fide benefits paid to approved plans, funds or programs, except those required by Federal or State Law (unemployment tax, worker's compensation, income taxes, etc.).

Please specify the type of benefits provided:

- 1) Medical or hospital care _____
- 2) Pension or retirement _____
- 3) Life Insurance _____
- 4) Disability _____
- 5) Vacation, holiday _____
- 6) Other (please specify) _____

CERTIFIED STATEMENT OF COMPLIANCE

For the week ending date of _____,

I, _____ of _____, (hereafter known as

Employer) in my capacity as _____ (title) do hereby certify and state:

Section A:

1. All persons employed on said project have been paid the full weekly wages earned by them during the week in accordance with Connecticut General Statutes, section 31-53, as amended. Further, I hereby certify and state the following:

- a) The records submitted are true and accurate;
- b) The rate of wages paid to each mechanic, laborer or workman and the amount of payment or contributions paid or payable on behalf of each such employee to any employee welfare fund, as defined in Connecticut General Statutes, section 31-53 (h), are not less than the prevailing rate of wages and the amount of payment or contributions paid or payable on behalf of each such employee to any employee welfare fund, as determined by the Labor Commissioner pursuant to subsection Connecticut General Statutes, section 31-53 (d), and said wages and benefits are not less than those which may also be required by contract;
- c) The Employer has complied with all of the provisions in Connecticut General Statutes, section 31-53 (and Section 31-54 if applicable for state highway construction);
- d) Each such employee of the Employer is covered by a worker's compensation insurance policy for the duration of his employment which proof of coverage has been provided to the contracting agency;
- e) The Employer does not receive kickbacks, which means any money, fee, commission, credit, gift, gratuity, thing of value, or compensation of any kind which is provided directly or indirectly, to any prime contractor, prime contractor employee, subcontractor, or subcontractor employee for the purpose of improperly obtaining or rewarding favorable treatment in connection with a prime contract or in connection with a prime contractor in connection with a subcontractor relating to a prime contractor; and
- f) The Employer is aware that filing a certified payroll which he knows to be false is a class D felony for which the employer may be fined up to five thousand dollars, imprisoned for up to five years or both.

2. OSHA~The employer shall affix a copy of the construction safety course, program or training completion document to the certified payroll required to be submitted to the contracting agency for this project on which such employee's name first appears.

(Signature) (Title) Submitted on (Date)

Section B: Applies to CONNDOT Projects ONLY

That pursuant to CONNDOT contract requirements for reporting purposes only, all employees listed under Section B who performed work on this project are not covered under the prevailing wage requirements defined in Connecticut General Statutes Section 31-53.

(Signature) (Title) Submitted on (Date)

Note: CTDOL will assume all hours worked were performed under Section A unless clearly delineated as Section B WWS-CP1 as such. Should an employee perform work under both Section A and Section B, the hours worked and wages paid must be segregated for reporting purposes.

*****THIS IS A PUBLIC DOCUMENT***
DO NOT INCLUDE SOCIAL SECURITY NUMBERS**

HEBRON SCHOOL DISTRICT APPROVED 2019-2020 ACADEMIC CALENDAR

State Project No: 067-0042 CV

August/September 23

M	T	W	Th	F
26	27	28	29	30
2	3	4	5	6
9	10	11	12	13
16	17	18	19	20
23	24	25	26	27+
30				

26 Staff Development Day
 27 Staff Meeting Day
 28 School Begins
 2 Labor Day
 27 1/2 day Prof. Dev.—Early Dismissal
 30 Rosh Hashanah

October 21

M	T	W	Th	F
	1	2	3	4
	7	8	9	10
	14	15	16	17
	21	22	23	24
	28	29	30+	31+

9 Yom Kippur
 14 Columbus Day Observed
 15 Staff Development Day
 30—31 Parent Conferences—Early Dismissal

November 17

M	T	W	Th	F
				1+
	4	5	6	7
	11	12	13	14
	18	19	20	21
	25	26	27+	28
				29

1 Parent Conference—Early Dismissal
 5 Staff Development Day
 11 Veterans' Day Observed
 27 Early Dismissal
 28 & 29 School Recess

December 15

M	T	W	Th	F
2	3	4	5	6
9	10	11+	12	13
16	17	18	19	20
23	24	25	26	27
30	31			

11 1/2 day Prof. Dev.—Early Dismissal
 23–31 School Recess

January 21

M	T	W	Th	F
		1	2	3
6	7	8	9	10
13	14	15	16	17
20	21	22	23	24
27	28	29	30	31

1 School Recess
 20 M. L. King Jr. Day

February 17

M	T	W	Th	F
3	4	5	6	7
10	11	12	13	14+
17	18	19	20	21
24	25	26	27	28

14 1/2 day Prof. Dev.—Early Dismissal
 17 Presidents' Day
 18 School Recess
 19 Staff Development Day

March 21

M	T	W	Th	F
2	3	4	5	6
9	10	11	12	13
16	17	18	19	20
23	24	25	26+	27+
30	31			

13 Staff Development Day
 26—27 Parent Conferences—Early Dismissal

April 16

M	T	W	Th	F
		1	2	3
	6	7	8	9+
	13	14	15	16
	20	21	22	23
	27	28	29	30

9 1/2 day Prof. Dev.—Early Dismissal
 10 Good Friday
 13-17 School Recess

May 20

M	T	W	Th	F
				1
	4	5	6	7
	11	12	13	14
	18	19	20	21
	25	26	27	28
				29

22 1/2 day Prof. Dev.—Early Dismissal
 25 Memorial Day

June 9

M	T	W	Th	F
1	2	3	4	5
8	9	10	11+	12
15	16	17	18	19
22	23	24	25	26
29	30			

11 180th Day—Last Day of School—Early Dismissal
 Staff Development Day will be the 181st Day

First Day of School: August 28, 2019
Last Day of School: June 11, 2020

Marking Periods
 1st Marking Period - August 28th through November 29th
 2nd Marking Period - December 2nd through March 6th
 3rd Marking Period - March 9th through the last day of school

Parent/Teacher Conferences—October 30, 31, November 1, March 26 & 27

June 12th—19th are designated as make up days for snow or other emergency closings. If by February 3rd six school days have been used, any additional cancelled school days will come from April vacation, February recess, or Professional Development Days

Approved: 12/14/2018

CONTAMINATED WATER PIPING REPLACEMENT

**HEBRON ELEMENTARY SCHOOL
92 CHURCH STREET
HEBRON, CT 06248
STATE PROJECT NO. 067-0042 CV**

S/P+A PROJECT NO. 19.003

Drawing NumberDrawing Name

COVER SHEET

ARCHITECTURAL

G001	NOTES, LEENDS, WALL TYPES & CODE INFORMATION
A100	MAIN FLOOR PLAN
A101	ENLARGED FLOOR PLANS & NOTES
A102	DETAILS & INTERIOR ELEVATIONS
A103	FINISH SCHEDULE & DETAILS

PLUMBING

P001	PLUMBING COVER SHEET
P100	OVERALL PLUMBING DEMOLITION PLAN
P101	ENLARGED PARTIAL SUPPLY PLAN – AREA “A”
P102	ENLARGED PARTIAL SUPPLY PLAN – AREA “B”
P103	ENLARGED PARTIAL SUPPLY PLAN – AREA “C”
P104	ENLARGED PARTIAL SUPPLY PLAN – AREA “D”
P105	ENLARGED PARTIAL SUPPLY PLAN – AREA “E”
P106	ENLARGED PARTIAL SUPPLY PLAN – AREA “F”
P107	ENLARGED PARTIAL SUPPLY PLAN - AREA “G”
P108	ENLARGED PARTIAL SUPPLY PLAN – AREA “H”
P201	SUPPLY ISOMETRIC AREAS A & B
P202	SUPPLY ISOMETRIC AREAS C & D
P203	SUPPLY ISOMETRIC AREAS E & F
P204	SUPPLY ISOMETRIC AREAS G, TUNNEL & BASEMENT
P801	PLUMBING DETAILS
P802	PLUMBING DETAILS
P901	PLUMBING SCHEDULES

ELECTRICAL

E101	ELECTRICAL PARTIAL POWER PLANS
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END OF SECTION

SECTION 011000 – SUMMARY OF WORK

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 Work of the Project is defined by the Contract Documents and consists of interior and exterior renovations of an existing public school building.
- B. The Work generally includes, but is not necessarily, limited to the following major elements:
 - 1. Removal of existing building materials and components, including portions of the plumbing system, selected interior partitions and finishes including CMU partitions, selected toilet partitions for reinstallation, and finished ceilings.
 - 2. Plumbing System Removal includes the following:
 - a. Dismantle all existing domestic water piping and remove or abandon in place. All exposed piping is to be removed and concealed piping is to be abandoned in place.
 - b. Remove all drinking fountains in hallways and classrooms.
 - c. Remove all faucets on all sinks and lavatories.
 - d. Remove wall-hung lavatories in gang bathrooms.
 - e. Remove all flush valves.
 - f. Remove three (3) electric water heaters and one (1) gas meter.
 - 3. Plumbing System Renovation includes the following:
 - a. Provide and install (P&I) new domestic water distribution system.
 - b. (P&I) new drinking fountains in hallways and classrooms at existing locations.
 - c. (P&I) new faucets for all sinks and lavatories.
 - d. (P&I) new wash-stations for gang bathrooms.
 - e. (P&I) new sensor flush valves.
 - f. (P&I) one (1) new electric water heater with recirculation pump and two (2) new gas water heaters with recirculation pump.
 - 4. Provision of new building materials and components, including plumbing piping, selected interior partitions and finishes including CMU partitions, and toilet accessories.
 - 5. Patching of finished ceilings.
 - 6. Offsite legal disposal of all removed materials.

1.3 CONTRACTOR USE OF PREMISES

- A. General: Limit use of the premises to construction activities in areas indicated. Do not disturb portions of Project site beyond areas in which the Work is indicated.

- 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 Owner.
- C. Keep driveways and entrances serving the premises clear and available to the Owner and emergency vehicles at all times. Do not use these areas for parking or storage of materials. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on site.
 - 1. Contractor is responsible to check and verify the Town's schedules for local road closures at all times during construction.
- 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 during the construction period.
 - 1. Contractor is responsible to secure project area/site from intrusions during unoccupied (after hours) period of time. Any temporary doors and /or window coverings that may be necessary to complete repairs are the Contractors responsibility to furnish and install as part of the project scope.
- F. **Dates Available for Contractor Use of Existing Building:**
 - 1. **November 28, 2019 through December 1, 2019.**
 - 2. **December 21, 2019 through January 1, 2020.**
 - 3. **February 15, 2020 through February 18, 2020.**
 - 4. **April 10, 2020 through April 19, 2020.**
 - 5. **June 20, 2020, through August 14, 2020.**

1.4 OWNER OCCUPANCY

- A. Owner Occupancy: The Owner will occupy the site and existing building during the entire construction period. Cooperate with the Owner during construction operations to minimize conflicts and facilitate Owner and Public usage of the remainder of the site. Perform the Work so as not to interfere with the Owner's operations. Pre-schedule construction operations with the Owner.
 - 1. Maintain access to existing adjacent occupied or used facilities. Do not close or obstruct walkways, or other occupied or used facilities without written permission from Owner and approval of authorities having jurisdiction.
 - 2. Notify Owner not less than 72 hours in advance of activities that will affect Owner's operations.
- B. Utility Relocations: Schedule utility relocations that affect the building as early as possible. Coordinate Contractor's schedules with the utility companies.

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 occupants of the Hebron Elementary School building 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 Owner), the Contractor shall be required to suspend operations (at no cost to the Owner), that produce the offending effects until such time as the building is not occupied, or as approved by the Owner.
- C. Meaningful Instruction: Meaningful instruction (as determined by the Owner) must be facilitated and possible within the Hebron Elementary School 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.
- C. Hours: Work can be completed during normal business hours, or as directed by the Owner, and must not be disruptive to operations per Owner's discretion. Coordination with the Owner will be required.
- D. 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.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 011000

SECTION 012200 - UNIT PRICES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for unit prices.
- B. Related Sections:
 - 1. Section 012600 "Contract Modification Procedures" for procedures for submitting and handling Change Orders.

1.3 DEFINITIONS

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

1.4 PROCEDURES

- A. Unit prices include all necessary material, plus cost for delivery, installation, insurance, applicable taxes, overhead, and profit.
- B. Measurement and Payment: Refer to individual Specification Sections for work that requires establishment of unit prices. Methods of measurement and payment for unit prices are specified in those Sections.
- C. Owner reserves the right to reject Contractor's measurement of work-in-place that involves use of established unit prices and to have this work measured, at Owner's expense, by an independent surveyor acceptable to Contractor.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 SCHEDULE OF UNIT PRICES

- A. A schedule of Unit Prices is on the Bid Form.

END OF SECTION 012200

SECTION 012300 - ALTERNATES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for alternates.

1.3 DEFINITIONS

- A. Alternate: An amount proposed by bidders and stated on the Bid Form for certain work defined in the Bidding Requirements that may be added to or deducted from the base bid amount if Owner decides to accept a corresponding change either in the amount of construction to be completed or in the products, materials, equipment, systems, or installation methods described in the Contract Documents.
 - 1. Alternates described in this Section are part of the Work only if enumerated in the Agreement.
 - 2. The cost or credit for each alternate is the net addition to or deduction from the Contract Sum to incorporate alternate into the Work. No other adjustments are made to the Contract Sum.

1.4 PROCEDURES

- A. Coordination: Modify or adjust affected adjacent work as necessary to completely integrate work of the alternate into Project.
 - 1. Include as part of each alternate, miscellaneous devices, accessory objects, and similar items incidental to or required for a complete installation whether or not indicated as part of alternate.
- B. Notification: Immediately following award of the Contract, notify each party involved, in writing, of the status of each alternate. Indicate if alternates have been accepted, rejected, or deferred for later consideration. Include a complete description of negotiated modifications to alternates.
- C. Execute accepted alternates under the same conditions as other work of the Contract. No extensions of time shall be granted for accepted alternates.
- D. Schedule: A schedule of alternates is included at the end of this Section. Specification Sections referenced in schedule contain requirements for materials necessary to achieve the work described under each alternate.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 SCHEDULE OF ALTERNATES

- A. **ADD ALTERNATE NO. 1: Fully-Copper Water Distribution System:** Add to the Base Bid the labor, materials and equipment to incorporate into the scope of work a fully-copper water distribution system instead of copper mains and PEX branches, as indicated in the Specifications and the Drawings. The Work includes the provision of all related components of the Rooms.

END OF SECTION 012300

SECTION 012500 - SUBSTITUTION PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for substitutions.
- B. Related Sections:
 - 1. Section 016000 "Product Requirements" for requirements for submitting comparable product submittals for products by listed manufacturers.
 - 2. Divisions 02 through 49 Sections for specific requirements and limitations for substitutions.

1.3 DEFINITIONS

- A. Substitutions: Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents and proposed by Contractor.
 - 1. Substitutions for Cause: Changes proposed by Contractor that are required due to changed Project conditions, such as unavailability of product, regulatory changes, or unavailability of required warranty terms.
 - 2. Substitutions for Convenience: Changes proposed by Contractor or Owner that are not required in order to meet other Project requirements but may offer advantage to Contractor or Owner.

1.4 SUBMITTALS

- A. Substitution Requests: Submit three (3) copies of each request for consideration. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.
 - 1. Substitution Request Form: Use **CSI Form 13.1A**.
 - 2. Documentation: Show compliance with requirements for substitutions and the following, as applicable:
 - a. Statement indicating why specified product or fabrication or installation cannot be provided, if applicable.
 - b. Coordination information, including a list of changes or modifications needed to other parts of the Work and to construction performed by Owner and separate contractors, that will be necessary to accommodate proposed substitution.
 - c. Detailed comparison of significant qualities of proposed substitution with those of the Work specified. Include annotated copy of applicable specification section. Significant qualities may include attributes such as performance, weight, size,

- durability, visual effect, sustainable design characteristics, warranties, and specific features and requirements indicated. Indicate deviations, if any, from the Work specified.
- d. Product Data, including drawings and descriptions of products and fabrication and installation procedures.
 - e. Samples, where applicable or requested.
 - f. Certificates and qualification data, where applicable or requested.
 - g. List of similar installations for completed projects with project names and addresses and names and addresses of Architects and Owners.
 - h. Material test reports from a qualified testing agency indicating and interpreting test results for compliance with requirements indicated.
 - i. Research reports evidencing compliance with building code in effect for Project, from ICC-ES.
 - j. Detailed comparison of Contractor's construction schedule using proposed substitution with products specified for the Work, including effect on the overall Contract Time. If specified product or method of construction cannot be provided within the Contract Time, include letter from manufacturer, on manufacturer's letterhead, stating date of receipt of purchase order, lack of availability, or delays in delivery.
 - k. Cost information, including a proposal of change, if any, in the Contract Sum.
 - l. Contractor's certification that proposed substitution complies with requirements in the Contract Documents except as indicated in substitution request, is compatible with related materials, and is appropriate for applications indicated.
 - m. Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results.
3. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within seven (7) days of receipt of a request for substitution. Architect will notify Contractor of acceptance or rejection of proposed substitution within fifteen (15) days of receipt of request, or seven (7) days of receipt of additional information or documentation, whichever is later.
- a. Forms of Acceptance: Change Order, Construction Change Directive, or Architect's Supplemental Instructions for minor changes in the Work.
 - b. Use product specified if Architect does not issue a decision on use of a proposed substitution within time allocated.

1.5 QUALITY ASSURANCE

- A. Compatibility of Substitutions: Investigate and document compatibility of proposed substitution with related products and materials. Engage qualified testing agency to perform compatibility tests recommended by manufacturers.

1.6 PROCEDURES

- A. Coordination: Modify or adjust affected work as necessary to integrate work of the approved substitutions.

PART 2 - PRODUCTS

2.1 SUBSTITUTIONS

A. Substitutions for Cause: Submit requests for substitution immediately upon discovery of need for change, but not later than fifteen (15) days prior to time required for preparation and review of related submittals.

1. Conditions: Architect will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:

- a. Requested substitution is consistent with the Contract Documents and will produce indicated results.
- b. Substitution request is fully documented and properly submitted.
- c. Requested substitution will not adversely affect Contractor's construction schedule.
- d. Requested substitution has received necessary approvals of authorities having jurisdiction.
- e. Requested substitution is compatible with other portions of the Work.
- f. Requested substitution has been coordinated with other portions of the Work.
- g. Requested substitution provides specified warranty.
- h. If requested substitution involves more than one (1) contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.

B. Substitutions for Convenience: Architect will consider requests for substitution if received within sixty (60) days after the Notice to Proceed. Requests received after that time may be considered or rejected at discretion of Architect.

1. Conditions: Architect will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:

- a. Requested substitution offers Owner a substantial advantage in cost, time, energy conservation, or other considerations, after deducting additional responsibilities Owner must assume. Owner's additional responsibilities may include compensation to Architect for redesign and evaluation services, increased cost of other construction by Owner, and similar considerations.
- b. Requested substitution does not require extensive revisions to the Contract Documents.
- c. Requested substitution is consistent with the Contract Documents and will produce indicated results.
- d. Substitution request is fully documented and properly submitted.
- e. Requested substitution will not adversely affect Contractor's construction schedule.
- f. Requested substitution has received necessary approvals of authorities having jurisdiction.
- g. Requested substitution is compatible with other portions of the Work.
- h. Requested substitution has been coordinated with other portions of the Work.

SUBSTITUTION PROCEDURES

- i. Requested substitution provides specified warranty.
- j. If requested substitution involves more than one (1) contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.

PART 3 - EXECUTION (Not Used)

END OF SECTION 012500

SECTION 012600 - CONTRACT MODIFICATION PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for handling and processing Contract modifications.
- B. Related Sections:
 - 1. Section 016000 "Product Requirements" for administrative procedures for handling requests for substitutions made after Contract award.

1.3 MINOR CHANGES IN THE WORK

- A. Architect will issue supplemental instructions authorizing minor changes in the Work, not involving adjustment to the Contract Sum or the Contract Time, on AIA Document G710, "Architect's Supplemental Instructions."

1.4 PROPOSAL REQUESTS

- A. Owner-Initiated Proposal Requests: Architect will issue a detailed description of proposed changes in the Work that may require adjustment to the Contract Sum or the Contract Time. If necessary, the description will include supplemental or revised Drawings and Specifications.
 - 1. Proposal Requests issued by Architect are not instructions either to stop work in progress or to execute the proposed change.
 - 2. Within time specified in Proposal Request or twenty (20) days, when not otherwise specified, after receipt of Proposal Request, submit a quotation estimating cost adjustments to the Contract Sum and the Contract Time necessary to execute the change.
 - a. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
 - b. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
 - c. Include costs of labor and supervision directly attributable to the change.
 - d. Include an updated Contractor's construction schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
 - e. Quotation Form: Use forms acceptable to Architect.

CONTRACT MODIFICATION PROCEDURES

- B. Contractor-Initiated Proposals: If latent or changed conditions require modifications to the Contract, Contractor may initiate a claim by submitting a request for a change to the Architect.
1. Include a statement outlining reasons for the change and the effect of the change on the Work. Provide a complete description of the proposed change. Indicate the effect of the proposed change on the Contract Sum and the Contract Time.
 2. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
 3. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
 4. Include costs of labor and supervision directly attributable to the change.
 5. Include an updated Contractor's construction schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
 6. Comply with requirements in Section 012500 "Substitution Procedures" if the proposed change requires substitution of one product or system for product or system specified.
 7. Proposal Request Form: Use form acceptable to Architect.

1.5 CHANGE ORDER PROCEDURES

- A. On Owner's approval of a Proposal Request, Architect will issue a Change Order for signatures of Owner and Contractor on AIA Document G701.

1.6 CONSTRUCTION CHANGE DIRECTIVE

- A. Construction Change Directive: Architect may issue a Construction Change Directive on AIA Document G714. Construction Change Directive instructs Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order.
1. Construction Change Directive contains a complete description of change in the Work. It also designates method to be followed to determine change in the Contract Sum or the Contract Time.
- B. Documentation: Maintain detailed records on a time and material basis of work required by the Construction Change Directive.
1. After completion of change, submit an itemized account and supporting data necessary to substantiate cost and time adjustments to the Contract.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 012600

SECTION 012900 - PAYMENT PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section specifies administrative and procedural requirements necessary to prepare and process Applications for Payment.
- B. Related Sections:
 - 1. Section 012600 "Contract Modification Procedures" for administrative procedures for handling changes to the Contract.
 - 2. Section 013200 "Construction Progress Documentation" for administrative requirements governing the preparation and submittal of the Contractor's construction schedule.
 - 3. Section 013300 "Submittal Procedures" for administrative requirements governing the preparation and submittal of the submittal schedule.

1.3 SCHEDULE OF VALUES

- A. Coordination: Coordinate preparation of the schedule of values with preparation of Contractor's construction schedule.
 - 1. Correlate line items in the schedule of values with other required administrative forms and schedules, including the following:
 - a. Application for Payment forms with continuation sheets.
 - b. Submittal schedule.
 - c. Items required to be indicated as separate activities in Contractor's construction schedule.
 - 2. Submit the schedule of values to Architect at earliest possible date but no later than seven (7) days before the date scheduled for submittal of initial Applications for Payment.
- B. Format and Content: Use the Project Manual table of contents as a guide to establish line items for the schedule of values. Provide at least one (1) line item for each Specification Section.
 - 1. Identification: Include the following Project identification on the schedule of values:
 - a. Project name and location.
 - b. Name of Architect.
 - c. Architect's project number.
 - d. Contractor's name and address.
 - e. Date of submittal.

2. Arrange schedule of values consistent with format of AIA Document G703.
3. Provide a breakdown of the Contract Sum in enough detail to facilitate continued evaluation of Applications for Payment and progress reports. Coordinate with the Project Manual table of contents. Provide multiple line items for principal subcontract amounts in excess of five percent (5%) of Contract Sum.
4. Round amounts to nearest whole dollar; total shall equal the Contract Sum.
5. Provide a separate line item in the schedule of values for each part of the Work where Applications for Payment may include materials or equipment purchased or fabricated and stored, but not yet installed.
 - a. Differentiate between items stored on-site and items stored off-site. If required, include evidence of insurance.
6. Provide separate line items in the schedule of values for initial cost of materials, for each subsequent stage of completion, and for total installed value of that part of the Work.
7. Each item in the schedule of values and Applications for Payment shall be complete. Include total cost and proportionate share of general overhead and profit for each item.
 - a. Temporary facilities and other major cost items that are not direct cost of actual work-in-place may be shown either as separate line items in the schedule of values or distributed as general overhead expense, at Contractor's option.
8. Schedule Updating: Update and resubmit the schedule of values before the next Applications for Payment when Change Orders or Construction Change Directives result in a change in the Contract Sum.

1.4 APPLICATIONS FOR PAYMENT

- A. Each Application for Payment shall be consistent with previous applications and payments as certified by Architect and paid for by Owner.
 1. Initial Application for Payment, Application for Payment at time of Substantial Completion, and final Application for Payment involve additional requirements.
- B. Payment Application Times: The date for each progress payment is indicated in the Agreement between Owner and Contractor. The period of construction work covered by each Application for Payment is the period indicated in the Agreement.
- C. Application for Payment Forms: Use AIA Document G702 and AIA Document G703 as form for Applications for Payment.
- D. Application Preparation: Complete every entry on form. Notarize and execute by a person authorized to sign legal documents on behalf of Contractor. Architect will return incomplete applications without action.
 1. Entries shall match data on the schedule of values and Contractor's construction schedule. Use updated schedules if revisions were made.
 2. Include amounts for work completed following previous Application for Payment, whether or not payment has been received. Include only amounts for work completed at time of Application for Payment.

3. Include amounts of Change Orders and Construction Change Directives issued before last day of construction period covered by application.
 4. Indicate separate amounts for work being carried out under Owner-requested project acceleration.
- E. Stored Materials: Include in Application for Payment amounts applied for materials or equipment purchased or fabricated and stored, but not yet installed. Differentiate between items stored on-site and items stored off-site.
1. Provide certificate of insurance, evidence of transfer of title to Owner, and consent of surety to payment, for stored materials.
 2. Provide supporting documentation that verifies amount requested, such as paid invoices. Match amount requested with amounts indicated on documentation; do not include overhead and profit on stored materials.
 3. Provide summary documentation for stored materials indicating the following:
 - a. Materials previously stored and included in previous Applications for Payment.
 - b. Work completed for this Application utilizing previously stored materials.
 - c. Additional materials stored with this Application.
 - d. Total materials remaining stored, including materials with this Application.
- F. Transmittal: Submit three (3) signed and notarized original copies of each Application for Payment to Architect by a method ensuring receipt within twenty-four (24) hours. One (1) copy shall include waivers of lien and similar attachments if required.
1. Transmit each copy with a transmittal form listing attachments and recording appropriate information about application.
- G. Waivers of Mechanic's Lien: With each Application for Payment, submit waivers of mechanic's liens from subcontractors, sub-subcontractors, and suppliers for construction period covered by the previous application.
1. Submit partial waivers on each item for amount requested in previous application, after deduction for retainage, on each item.
 2. When an application shows completion of an item, submit conditional final or full waivers.
 3. Owner reserves the right to designate which entities involved in the Work must submit waivers.
 4. Submit final Application for Payment with or preceded by conditional final waivers from every entity involved with performance of the Work covered by the application who is lawfully entitled to a lien.
 5. Waiver Forms: Submit waivers of lien on forms, executed in a manner acceptable to Owner.
- H. Initial Application for Payment: Administrative actions and submittals that must precede or coincide with submittal of first Application for Payment include the following:
1. List of subcontractors.
 2. Schedule of values.
 3. Contractor's construction schedule (preliminary if not final).
 4. Products list (preliminary if not final).

5. Schedule of unit prices.
 6. Submittal schedule (preliminary if not final).
 7. List of Contractor's staff assignments.
 8. List of Contractor's principal consultants.
 9. Copies of building permits.
 10. Copies of authorizations and licenses from authorities having jurisdiction for performance of the Work.
 11. Initial progress report.
 12. Report of preconstruction conference.
 13. Certificates of insurance and insurance policies.
 14. Performance and payment bonds.
 15. Data needed to acquire Owner's insurance.
- I. Application for Payment at Substantial Completion: After issuing the Certificate of Substantial Completion, submit an Application for Payment showing one hundred percent (100%) completion for portion of the Work claimed as substantially complete.
1. Include documentation supporting claim that the Work is substantially complete and a statement showing an accounting of changes to the Contract Sum.
 2. This application shall reflect Certificates of Partial Substantial Completion issued previously for Owner occupancy of designated portions of the Work.
- J. Final Payment Application: Submit final Application for Payment with releases and supporting documentation not previously submitted and accepted, including, but not limited, to the following:
1. Evidence of completion of Project closeout requirements.
 2. Insurance certificates for products and completed operations where required and proof that taxes, fees, and similar obligations were paid.
 3. Updated final statement, accounting for final changes to the Contract Sum.
 4. AIA Document G706, "Contractor's Affidavit of Payment of Debts and Claims."
 5. AIA Document G706A, "Contractor's Affidavit of Release of Liens."
 6. AIA Document G707, "Consent of Surety to Final Payment."
 7. Evidence that claims have been settled.
 8. Final meter readings for utilities, a measured record of stored fuel, and similar data as of date of Substantial Completion or when Owner took possession of and assumed responsibility for corresponding elements of the Work.
 9. Final liquidated damages settlement statement.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 012900

SECTION 013100 - PROJECT MANAGEMENT AND COORDINATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative provisions for coordinating construction operations on Project including, but not limited to, the following:
 - 1. General project coordination procedures.
 - 2. Administrative and supervisory personnel.
 - 3. Coordination drawings.
 - 4. Requests for Information (RFIs).
 - 5. Project meetings.
- B. Each contractor shall participate in coordination requirements. Certain areas of responsibility are assigned to a specific contractor.
- C. Related Sections:
 - 1. Section 013200 "Construction Progress Documentation" for preparing and submitting Contractor's construction schedule.
 - 2. Section 017300 "Execution" for procedures for coordinating general installation and field-engineering services, including establishment of benchmarks and control points.
 - 3. Section 017700 "Closeout Procedures" for coordinating closeout of the Contract.

1.3 DEFINITIONS

- A. RFI: Request from Owner, Architect, or Contractor seeking information from each other during construction.

1.4 COORDINATION

- A. Coordination: Coordinate construction operations included in different Sections of the Specifications to ensure efficient and orderly installation of each part of the Work. Coordinate construction operations, included in different Sections, that depend on each other for proper installation, connection, and operation.
 - 1. Schedule construction operations in sequence required to obtain the best results where installation of one (1) part of the Work depends on installation of other components, before or after its own installation.
 - 2. Coordinate installation of different components to ensure maximum performance and accessibility for required maintenance, service, and repair.
 - 3. Make adequate provisions to accommodate items scheduled for later installation.

- B. Prepare memoranda for distribution to each party involved, outlining special procedures required for coordination. Include such items as required notices, reports, and list of attendees at meetings.
 - 1. Prepare similar memoranda for Owner and separate Contractors if coordination of their Work is required.
- C. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities to avoid conflicts and to ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:
 - 1. Preparation of Contractor's construction schedule.
 - 2. Preparation of the schedule of values.
 - 3. Installation and removal of temporary facilities and controls.
 - 4. Delivery and processing of submittals.
 - 5. Progress meetings.
 - 6. Pre-installation conferences.
 - 7. Project closeout activities.
 - 8. Startup and adjustment of systems.
 - 9. Project closeout activities.
- D. Conservation: Coordinate construction activities to ensure that operations are carried out with consideration given to conservation of energy, water, and materials. Coordinate use of temporary utilities to minimize waste.
 - 1. Salvage materials and equipment involved in performance of, but not actually incorporated into, the Work. Refer to other Sections for disposition of salvaged materials that are designated as Owner's property.

1.5 COORDINATION DRAWINGS

- A. Coordination Drawings, General: Prepare coordination drawings in accordance with requirements in individual Sections, where installation is not completely shown on Shop Drawings, where limited space availability necessitates coordination, or if coordination is required to facilitate integration of products and materials fabricated or installed by more than one entity.
 - 1. Content: Project-specific information, drawn accurately to a scale large enough to indicate and resolve conflicts. Do not base coordination drawings on standard printed data. Include the following information, as applicable:
 - a. Use applicable Drawings as a basis for preparation of coordination drawings. Prepare sections, elevations, and details as needed to describe relationship of various systems and components.
 - b. Coordinate the addition of trade-specific information to the coordination drawings by multiple Contractors in a sequence that best provides for coordination of the information and resolution of conflicts between installed components before submitting for review.
 - c. Indicate functional and spatial relationships of components of architectural, structural, civil, mechanical, and electrical systems.

- d. Indicate space requirements for routine maintenance and for anticipated replacement of components during the life of the installation.
- e. Show location and size of access doors required for access to concealed dampers, valves, and other controls.
- f. Indicate required installation sequences.
- g. Indicate dimensions shown on the Drawings. Specifically note dimensions that appear to be in conflict with submitted equipment and minimum clearance requirements. Provide alternate sketches to Architect indicating proposed resolution of such conflicts. Minor dimension changes and difficult installations will not be considered changes to the Contract.

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

- 1. Floor Plans and Reflected Ceiling Plans: Show architectural and structural elements, and mechanical, plumbing, fire protection, fire alarm, and electrical Work. Show locations of visible ceiling-mounted devices relative to acoustical ceiling grid. Supplement plan drawings with section drawings where required to adequately represent the Work.
- 2. Plenum Space: Indicate subframing for support of ceiling and wall systems, mechanical and electrical equipment, and related Work. Locate components within ceiling plenum to accommodate layout of light fixtures indicated on Drawings. Indicate areas of conflict between light fixtures and other components.
- 3. Mechanical Rooms: Provide coordination drawings for mechanical rooms showing plans and elevations of mechanical, plumbing, fire protection, fire alarm, and electrical equipment.
- 4. Structural Penetrations: Indicate penetrations and openings required for all disciplines.
- 5. Slab Edge and Embedded Items: Indicate slab edge locations and sizes and locations of embedded items for metal fabrications, sleeves, anchor bolts, bearing plates, angles, door floor closers, slab depressions for floor finishes, curbs and housekeeping pads, and similar items.
- 6. Mechanical and Plumbing Work: Show the following:
 - a. Sizes and bottom elevations of ductwork, piping, and conduit runs, including insulation, bracing, flanges, and support systems.
 - b. Dimensions of major components, such as dampers, valves, diffusers, access doors, cleanouts and electrical distribution equipment.
 - c. Fire-rated enclosures around ductwork.
- 7. Electrical Work: Show the following:
 - a. Runs of vertical and horizontal conduit 1¼ inch diameter and larger.
 - b. Light fixture, exit light, emergency battery pack, smoke detector, and other fire alarm locations.
 - c. Panel board, switch board, switchgear, transformer, busway, generator, and motor control center locations.
 - d. Location of pull boxes and junction boxes, dimensioned from column center lines.
- 8. Fire Protection System: Show the following:
 - a. Locations of standpipes, mains piping, branch lines, pipe drops, and sprinkler heads.

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

1.6 KEY PERSONNEL

- A. Key Personnel Names: Within fifteen (15) days of starting construction operations, submit a list of key personnel assignments, including superintendent and other personnel in attendance at Project site. Identify individuals and their duties and responsibilities; list addresses and telephone numbers, including home, office, and cellular telephone numbers and email addresses. Provide names, addresses, and telephone numbers of individuals assigned as standbys in the absence of individuals assigned to Project.
 1. Post copies of list in project meeting room, in temporary field office, and by each temporary telephone. Keep list current at all times.

1.7 REQUESTS FOR INFORMATION (RFIs)

- A. General: Immediately on discovery of the need for additional information or interpretation of the Contract Documents, Contractor shall prepare and submit an RFI in the form specified.
 1. Architect will return RFIs submitted to Architect by other entities controlled by Contractor with no response.
 2. Coordinate and submit RFIs in a prompt manner so as to avoid delays in Contractor's work or work of subcontractors.
- B. Content of the RFI: Include a detailed, legible description of item needing information or interpretation and the following:
 1. Project name.
 2. Project number.
 3. Date.
 4. Name of Contractor.
 5. Name of Architect.
 6. RFI number, numbered sequentially.
 7. RFI subject.
 8. Specification Section number and title and related paragraphs, as appropriate.
 9. Drawing number and detail references, as appropriate.
 10. Field dimensions and conditions, as appropriate.
 11. Contractor's suggested resolution. If Contractor's solution(s) impacts the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.
 12. Contractor's signature.
 13. Attachments: Include sketches, descriptions, measurements, photos, Product Data, Shop Drawings, coordination drawings, and other information necessary to fully describe items needing interpretation.

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- a. Include dimensions, thicknesses, structural grid references, and details of affected materials, assemblies, and attachments on attached sketches.
- C. RFI Forms: AIA Document G716.
- D. Architect's Action: Architect will review each RFI, determine action required, and respond. Allow seven (7) working days for Architect's response for each RFI. RFIs received by Architect after 1:00 p.m. will be considered as received the following working day.
 - 1. The following RFIs will be returned without action:
 - a. Requests for approval of submittals.
 - b. Requests for approval of substitutions.
 - c. Requests for coordination information already indicated in the Contract Documents.
 - d. Requests for adjustments in the Contract Time or the Contract Sum.
 - e. Requests for interpretation of Architect's actions on submittals.
 - f. Incomplete RFIs or inaccurately prepared RFIs.
 - 2. Architect's action may include a request for additional information, in which case Architect's time for response will date from time of receipt of additional information.
 - 3. Architect's action on RFIs that may result in a change to the Contract Time or the Contract Sum may be eligible for Contractor to submit Change Proposal according to Section 012600 "Contract Modification Procedures."
 - a. If Contractor believes the RFI response warrants change in the Contract Time or the Contract Sum, notify Architect in writing within ten (10) days of receipt of the RFI response.
- E. On receipt of Architect's action, update the RFI log and immediately distribute the RFI response to affected parties. Review response and notify Architect, copy to and Construction Administrator within seven (7) days if Contractor disagrees with response.
- F. RFI Log: Prepare, maintain, and submit a tabular log of RFIs organized by the RFI number. Submit log weekly. Include the following:
 - 1. Project name.
 - 2. Name and address of Contractor.
 - 3. Name and address of Architect.
 - 4. RFI number including RFIs that were dropped and not submitted.
 - 5. RFI description.
 - 6. Date the RFI was submitted.
 - 7. Date Architect's response was received.
 - 8. Identification of related Minor Change in the Work, Construction Change Directive, and Proposal Request, as appropriate.

1.8 PROJECT MEETINGS

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

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1. Attendees: Inform participants and others involved, and individuals whose presence is required, of date and time of each meeting. Notify Owner and Architect of scheduled meeting dates and times.
 2. Agenda: Prepare the meeting agenda. Distribute the agenda to all invited attendees.
 3. Minutes: Entity responsible for conducting meeting will record significant discussions and agreements achieved. Distribute the meeting minutes to everyone concerned, including Owner, and Architect, within three (3) days of the meeting.
- B. Preconstruction Conference: Schedule and conduct a preconstruction conference before starting construction, at a time convenient to Owner and Architect, but no later than fifteen (15) days after execution of the Agreement.
1. Conduct the conference to review responsibilities and personnel assignments.
 2. Attendees: Authorized representatives of Owner, Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the conference. Participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
 3. Agenda: Discuss items of significance that could affect progress, including the following:
 - a. Tentative construction schedule.
 - b. Phasing.
 - c. Critical work sequencing and long-lead items.
 - d. Designation of key personnel and their duties.
 - e. Lines of communications.
 - f. Procedures for processing field decisions and Change Orders.
 - g. Procedures for RFIs.
 - h. Procedures for testing and inspecting.
 - i. Procedures for processing Applications for Payment.
 - j. Distribution of the Contract Documents.
 - k. Submittal procedures.
 - l. Sustainable design requirements.
 - m. Preparation of record documents.
 - n. Work restrictions.
 - o. Working hours.
 - p. Owner's occupancy requirements.
 - q. Responsibility for temporary facilities and controls.
 - r. Procedures for moisture and mold control.
 - s. Procedures for disruptions and shutdowns.
 - t. Construction waste management and recycling.
 - u. Parking availability.
 - v. Office, work, and storage areas.
 - w. Equipment deliveries and priorities.
 - x. First aid.
 - y. Security.
 - z. Progress cleaning.
 4. Minutes: Entity responsible for conducting meeting will record and distribute meeting minutes.

- C. Preinstallation Conferences: Conduct a preinstallation conference at Project site before each construction activity that requires coordination with other construction.
1. Attendees: Installer and representatives of manufacturers and fabricators involved in or affected by the installation and its coordination or integration with other materials and installations that have preceded or will follow, shall attend the meeting. Advise Architect of scheduled meeting dates.
 2. Agenda: Review progress of other construction activities and preparations for the particular activity under consideration, including requirements for the following:
 - a. Contract Documents.
 - b. Options.
 - c. Related RFIs.
 - d. Related Change Orders.
 - e. Purchases.
 - f. Deliveries.
 - g. Submittals.
 - h. Review of mockups.
 - i. Possible conflicts.
 - j. Compatibility problems.
 - k. Time schedules.
 - l. Weather limitations.
 - m. Manufacturer's written recommendations.
 - n. Warranty requirements.
 - o. Compatibility of materials.
 - p. Acceptability of substrates.
 - q. Temporary facilities and controls.
 - r. Space and access limitations.
 - s. Regulations of authorities having jurisdiction.
 - t. Testing and inspecting requirements.
 - u. Installation procedures.
 - v. Coordination with other work.
 - w. Required performance results.
 - x. Protection of adjacent work.
 - y. Protection of construction and personnel.
 3. Record significant conference discussions, agreements, and disagreements, including required corrective measures and actions.
 4. Reporting: Distribute minutes of the meeting to each party present and to other parties requiring information.
 5. Do not proceed with installation if the conference cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of the Work and reconvene the conference at earliest feasible date.
- D. Project Closeout Conference: Schedule and conduct a Project closeout conference, at a time convenient to Owner and Architect, but no later than thirty (30) days prior to the scheduled date of Substantial Completion.
1. Conduct the conference to review requirements and responsibilities related to Project closeout.

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2. Attendees: Authorized representatives of Owner, Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the meeting. Participants at the meeting shall be familiar with Project and authorized to conclude matters relating to the Work.
 3. Agenda: Discuss items of significance that could affect or delay Project closeout, including the following:
 - a. Preparation of record documents.
 - b. Procedures required prior to inspection for Substantial Completion and for final inspection for acceptance.
 - c. Submittal of written warranties.
 - d. Requirements for preparing sustainable design documentation.
 - e. Requirements for preparing operations and maintenance data.
 - f. Requirements for demonstration and training.
 - g. Preparation of Contractor's punch list.
 - h. Procedures for processing Applications for Payment at Substantial Completion and for final payment.
 - i. Submittal procedures.
 - j. Installation of Owner's furniture, fixtures, and equipment.
 - k. Responsibility for removing temporary facilities and controls.
 4. Minutes: Entity conducting meeting will record and distribute meeting minutes.
- E. Progress Meetings: Conduct progress meetings at biweekly intervals.
1. Coordinate dates of meetings with preparation of payment requests.
 2. Attendees: In addition to representatives of Owner and Architect, each Contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the meeting shall be familiar with Project and authorized to conclude matters relating to the Work.
 3. Agenda: Review and correct or approve minutes of previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.
 - a. Contractor's Construction Schedule: Review progress since the last meeting. Determine whether each activity is on time, ahead of schedule, or behind schedule, in relation to Contractor's construction schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.
 - 1) Review schedule for next period.
 - b. Review present and future needs of each entity present, including the following:
 - 1) Interface requirements.
 - 2) Sequence of operations.
 - 3) Status of submittals.
 - 4) Deliveries.
 - 5) Off-site fabrication.

- 6) Access.
 - 7) Site utilization.
 - 8) Temporary facilities and controls.
 - 9) Progress cleaning.
 - 10) Quality and work standards.
 - 11) Status of correction of deficient items.
 - 12) Field observations.
 - 13) Status of RFIs.
 - 14) Status of proposal requests.
 - 15) Pending changes.
 - 16) Status of Change Orders.
 - 17) Pending claims and disputes.
 - 18) Documentation of information for payment requests.
4. Minutes: Entity responsible for conducting the meeting will record and distribute the meeting minutes to each party present and to parties requiring information.
- a. Schedule Updating: Revise Contractor's construction schedule after each progress meeting where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with the report of each meeting.
- F. Coordination Meetings: Conduct Project coordination meetings at required intervals. Project coordination meetings are in addition to specific meetings held for other purposes, such as progress meetings and preinstallation conferences.
1. Agenda: Review and correct or approve minutes of the previous coordination meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.
 - a. Combined Contractor's Construction Schedule: Review progress since the last coordination meeting. Determine whether each contract is on time, ahead of schedule, or behind schedule, in relation to combined Contractor's construction schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.
 - b. Schedule Updating: Revise combined Contractor's construction schedule after each coordination meeting where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with report of each meeting.
 - c. Review present and future needs of each contractor present, including the following:
 - 1) Interface requirements.
 - 2) Sequence of operations.
 - 3) Status of submittals.
 - 4) Deliveries.
 - 5) Off-site fabrication.
 - 6) Access.
 - 7) Site utilization.
 - 8) Temporary facilities and controls.
 - 9) Work hours.

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- 10) Hazards and risks.
 - 11) Progress cleaning.
 - 12) Quality and work standards.
 - 13) Change Orders.
2. Reporting: Record meeting results and distribute copies to everyone in attendance and to others affected by decisions or actions resulting from each meeting.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 013100

SECTION 013200 - CONSTRUCTION PROGRESS DOCUMENTATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

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

- 1. Contractor's construction schedule.
- 2. Daily construction reports.
- 3. Material location reports.
- 4. Field condition reports.
- 5. Special reports.

- B. Related Sections:

- 1. Section 013300 "Submittal Procedures" for submitting schedules and reports.
- 2. Section 014000 "Quality Requirements" for submitting a schedule of tests and inspections.

1.3 DEFINITIONS

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

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

- B. Cost Loading: The allocation of the schedule of values for the completion of an activity as scheduled. The sum of costs for all activities must equal the total Contract Sum, unless otherwise approved by Architect.

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

- D. Event: The starting or ending point of an activity.

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

1. Float time is not for the exclusive use or benefit of either Owner or Contractor, but is a jointly owned, expiring Project resource available to both parties as needed to meet schedule milestones and Contract completion date.
2. Free float is the amount of time an activity can be delayed without adversely affecting the early start of the successor activity.
3. Total float is the measure of leeway in starting or completing an activity without adversely affecting the planned Project completion date.

F. Resource Loading: The allocation of manpower and equipment necessary for the completion of an activity as scheduled.

1.4 INFORMATIONAL SUBMITTALS

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

1. PDF electronic file.

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

1. Submit a working electronic copy of schedule, using software indicated, and labeled to comply with requirements for submittals. Include type of schedule (initial or updated) and date on label.

C. Daily Construction Reports: Submit at weekly intervals.

D. Material Location Reports: Submit at weekly intervals.

E. Field Condition Reports: Submit at time of discovery of differing conditions.

F. Special Reports: Submit at time of unusual event.

G. Qualification Data: For scheduling consultant.

1.5 QUALITY ASSURANCE

A. Prescheduling Conference: Conduct conference at Project site to comply with requirements in Section 013100 "Project Management and Coordination." Review methods and procedures related to the preliminary construction schedule and Contractor's construction schedule, including, but not limited to, the following:

1. Review software limitations and content and format for reports.
2. Verify availability of qualified personnel needed to develop and update schedule.
3. Discuss constraints, including phasing, work stages and area separations.
4. Review delivery dates for Owner-furnished products.
5. Review schedule for work of Owner's separate contracts.
6. Review time required for review of submittals and resubmittals.
7. Review requirements for tests and inspections by independent testing and inspecting agencies.
8. Review time required for completion and startup procedures.
9. Review and finalize list of construction activities to be included in schedule.

10. Review submittal requirements and procedures.
11. Review procedures for updating schedule.

1.6 COORDINATION

- A. Coordinate preparation and processing of schedules and reports with performance of construction activities and with scheduling and reporting of separate onractors.
- B. Coordinate Contractor's construction schedule with the schedule of values, list of subcontracts, submittal schedule, progress reports, payment requests, and other required schedules and reports.
 1. Secure time commitments for performing critical elements of the Work from entities involved.
 2. Coordinate each construction activity in the network with other activities and schedule them in proper sequence.

PART 2 - PRODUCTS

2.1 CONTRACTOR'S CONSTRUCTION SCHEDULE, GENERAL

- A. Time Frame: Extend schedule from date established for the Notice to Proceed to date of Substantial Completion.
 1. Contract completion date shall not be changed by submission of a schedule that shows an early completion date, unless specifically authorized by Change Order.
- B. Activities: Treat each story or separate area as a separate numbered activity for each principal element of the Work. Comply with the following:
 1. Activity Duration: Define activities so no activity is longer than twenty (20) days, unless specifically allowed by Architect.
 2. Procurement Activities: Include procurement process activities for the following long lead items and major items, requiring a cycle of more than sixty (60) days, as separate activities in schedule. Procurement cycle activities include, but are not limited to, submittals, approvals, purchasing, fabrication, and delivery.
 3. Submittal Review Time: Include review and resubmittal times indicated in Section 013300 "Submittal Procedures" in schedule. Coordinate submittal review times in Contractor's construction schedule with submittal schedule.
 4. Startup and Testing Time: Include not less than fifteen (15) days for startup and testing.
 5. Substantial Completion: Indicate completion in advance of date established for Substantial Completion, and allow time for Architect's administrative procedures necessary for certification of Substantial Completion.
 6. Punch List and Final Completion: Include not more than thirty (30) days for punch list and final completion.
- C. Constraints: Include constraints and work restrictions indicated in the Contract Documents and as follows in schedule, and show how the sequence of the Work is affected.
 1. Phasing: Arrange list of activities on schedule by phase.

CONSTRUCTION PROGRESS DOCUMENTATION

2. Work Restrictions: Show the effect of the following items on the schedule:
 - a. Coordination with existing construction.
 - b. Uninterruptible services.
 - c. Use of premises restrictions.
 - d. Provisions for future construction.
 - e. Seasonal variations.
 - f. Environmental control.

3. Work Stages: Indicate important stages of construction for each major portion of the Work, including, but not limited to, the following:
 - a. Subcontract awards.
 - b. Submittals.
 - c. Purchases.
 - d. Mockups.
 - e. Fabrication.
 - f. Sample testing.
 - g. Deliveries.
 - h. Installation.
 - i. Tests and inspections.
 - j. Adjusting.
 - k. Curing.
 - l. Startup and placement into final use and operation.

4. Construction Areas: Identify each major area of construction for each major portion of the Work. Indicate where each construction activity within a major area must be sequenced or integrated with other construction activities to provide for the following:
 - a. Structural completion.
 - b. Permanent space enclosure.
 - c. Completion of mechanical installation.
 - d. Completion of electrical installation.
 - e. Substantial Completion.

- D. Milestones: Include milestones indicated in the Contract Documents in schedule, including, but not limited to, the Notice to Proceed, Substantial Completion, and final completion.

- E. Cost Correlation: At the head of schedule, provide a cost correlation line, indicating planned and actual costs. On the line, show dollar volume of the Work performed as of dates used for preparation of payment requests.
 1. Refer to Section 012900 "Payment Procedures" for cost reporting and payment procedures.

- F. Upcoming Work Summary: Prepare summary report indicating activities scheduled to occur or commence prior to submittal of next schedule update. Summarize the following issues:
 1. Unresolved issues.
 2. Unanswered RFIs.
 3. Rejected or unreturned submittals.

4. Notations on returned submittals.

- G. Recovery Schedule: When periodic update indicates the Work is fourteen (14) or more calendar days behind the current approved schedule, submit a separate recovery schedule indicating means by which Contractor intends to regain compliance with the schedule. Indicate changes to working hours, working days, crew sizes, and equipment required to achieve compliance, and date by which recovery will be accomplished.
- H. Computer Scheduling Software: Prepare schedules using current version of a program that has been developed specifically to manage construction schedules.

2.2 CONTRACTOR'S CONSTRUCTION SCHEDULE (GANTT CHART)

- A. Gantt-Chart Schedule: Submit a comprehensive, fully developed, horizontal Gantt-chart-type, Contractor's construction schedule within thirty (30) days of date established for the Notice to Proceed. Base schedule on the start-up construction schedule and additional information received since the start of Project.
- B. Preparation: Indicate each significant construction activity separately. Identify first workday of each week with a continuous vertical line.
 - 1. For construction activities that require three months or longer to complete, indicate an estimated completion percentage in ten percent (10%) increments within time bar.

2.3 REPORTS

- A. Daily Construction Reports: Prepare a daily construction report recording the following information concerning events at Project site:
 - 1. List of subcontractors at Project site.
 - 2. List of separate contractors at Project site.
 - 3. Approximate count of personnel at Project site.
 - 4. Equipment at Project site.
 - 5. Material deliveries.
 - 6. High and low temperatures and general weather conditions, including presence of rain or snow.
 - 7. Accidents.
 - 8. Meetings and significant decisions.
 - 9. Unusual events (refer to special reports).
 - 10. Stoppages, delays, shortages, and losses.
 - 11. Meter readings and similar recordings.
 - 12. Emergency procedures.
 - 13. Orders and requests of authorities having jurisdiction.
 - 14. Change Orders received and implemented.
 - 15. Construction Change Directives received and implemented.
 - 16. Services connected and disconnected.
 - 17. Equipment or system tests and startups.
 - 18. Partial completions and occupancies.
 - 19. Substantial Completions authorized.

- B. Material Location Reports: At weekly intervals, prepare and submit a comprehensive list of materials delivered to and stored at Project site. List shall be cumulative, showing materials previously reported plus items recently delivered. Include with list a statement of progress on and delivery dates for materials or items of equipment fabricated or stored away from Project site.
- C. Field Condition Reports: Immediately on discovery of a difference between field conditions and the Contract Documents, prepare and submit a detailed report. Submit with a Request for Information. Include a detailed description of the differing conditions, together with recommendations for changing the Contract Documents.

2.4 SPECIAL REPORTS

- A. General: Submit special reports directly to Owner within one (1) day of an occurrence. Distribute copies of report to parties affected by the occurrence.
- B. Reporting Unusual Events: When an event of an unusual and significant nature occurs at Project site, whether or not related directly to the Work, prepare and submit a special report. List chain of events, persons participating, response by Contractor's personnel, evaluation of results or effects, and similar pertinent information. Advise Owner in advance when these events are known or predictable.

PART 3 - EXECUTION

3.1 CONTRACTOR'S CONSTRUCTION SCHEDULE

- A. Contractor's Construction Schedule Updating: At monthly intervals, update schedule to reflect actual construction progress and activities. Issue schedule one (1) week before each regularly scheduled progress meeting.
 - 1. Revise schedule immediately after each meeting or other activity where revisions have been recognized or made. Issue updated schedule concurrently with the report of each such meeting.
 - 2. Include a report with updated schedule that indicates every change, including, but not limited to, changes in logic, durations, actual starts and finishes, and activity durations.
 - 3. As the Work progresses, indicate final completion percentage for each activity.
- B. Distribution: Distribute copies of approved schedule to Architect, Owner, separate contractors, testing and inspecting agencies, and other parties identified by Contractor with a need-to-know schedule responsibility.
 - 1. Post copies in Project meeting rooms and temporary field offices.
 - 2. When revisions are made, distribute updated schedules to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned portion of the Work and are no longer involved in performance of construction activities.

END OF SECTION 013200

SECTION 013233 - PHOTOGRAPHIC DOCUMENTATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for the following:
 - 1. Periodic construction photographs.
- B. Related Sections:
 - 1. Section 013300 "Submittal Procedures" for submitting photographic documentation.
 - 2. Section 017700 "Closeout Procedures" for submitting photographic documentation as project record documents at Project closeout.

PART 2 - PRODUCTS

2.1 PHOTOGRAPHIC MEDIA

- A. Digital Images: Provide images in JPG format, produced by a digital camera with minimum sensor size of eight (8) megapixels, and at an image resolution of not less than 1600 by 1200 pixels and 400 dpi.

PART 3 - EXECUTION

3.1 CONSTRUCTION PHOTOGRAPHS

- A. General: Take photographs using the maximum range of depth of field, and that are in focus, to clearly show the Work. Photographs with blurry or out-of-focus areas will not be accepted.
 - 1. Maintain key plan with each set of construction photographs that identifies each photographic location.
- B. Digital Images: Submit digital images exactly as originally recorded in the digital camera, without alteration, manipulation, editing, or modifications using image-editing software.
 - 1. Date and Time: Include date and time in file name for each image.
 - 2. Field Office Images: Maintain one set of images accessible in the field office at Project site, available at all times for reference. Identify images in the same manner as those submitted to Architect.

PHOTOGRAPHIC DOCUMENTATION

- C. Periodic Construction Photographs: Take eighteen to twenty (18-20) photographs weekly, with timing each month adjusted to coincide with the cutoff date associated with each Application for Payment. Select vantage points to show status of construction and progress since last photographs were taken.
- D. Additional Photographs: Architect may request photographs in addition to periodic photographs specified.
 - 1. In emergency situations, take additional photographs within twenty-four (24) hours of request.
 - 2. Circumstances that could require additional photographs include, but are not limited to, the following:
 - a. Immediate follow-up when on-site events result in construction damage or losses.
 - b. Substantial Completion of a major phase or component of the Work.

END OF SECTION 013233

SECTION 013300 - SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes requirements for the submittal schedule and administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other submittals.
- B. Related Sections:
 - 1. Section 017823 "Operation and Maintenance Data" for submitting operation and maintenance manuals.
 - 2. Section 017839 "Project Record Documents" for submitting record Drawings, record Specifications, and record Product Data.
 - 3. Section 017900 "Demonstration and Training" for submitting video recordings of demonstration of equipment and training of Owner's personnel.

1.3 DEFINITIONS

- A. Action Submittals: Written and graphic information and physical samples that require Architect's responsive action. Action submittals are those submittals indicated in individual Specification Sections as action submittals.
- B. Informational Submittals: Written and graphic information and physical samples that do not require Architect's responsive action. Submittals may be rejected for not complying with requirements. Informational submittals are those submittals indicated in individual Specification Sections as informational submittals.
- C. File Transfer Protocol (FTP): Communications protocol that enables transfer of files to and from another computer over a network and that serves as the basis for standard Internet protocols. An FTP site is a portion of a network located outside of network firewalls within which internal and external users are able to access files.
- D. Portable Document Format (PDF): An open standard file format licensed by Adobe Systems used for representing documents in a device-independent and display resolution-independent fixed-layout document format.

1.4 ACTION SUBMITTALS

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

1. Coordinate submittal schedule with list of subcontracts, the schedule of values, and Contractor's construction schedule.
2. Initial Submittal: Submit concurrently with start-up construction schedule. Include submittals required during the first sixty (60) days of construction. List those submittals required to maintain orderly progress of the Work and those required early because of long lead time for manufacture or fabrication.
3. Final Submittal: Submit concurrently with the first complete submittal of Contractor's construction schedule.
 - a. Submit revised submittal schedule to reflect changes in current status and timing for submittals.
4. Format: Arrange the following information in a tabular format:
 - a. Scheduled date for first submittal.
 - b. Specification Section number and title.
 - c. Submittal Category: Action, informational.
 - d. Name of subcontractor.
 - e. Description of the Work covered.
 - f. Scheduled date for Architect's final release or approval.
 - g. Scheduled dates for purchasing.
 - h. Scheduled dates for installation.

1.5 SUBMITTAL ADMINISTRATIVE REQUIREMENTS

- A. Architect's Digital Data Files: Electronic copies of CAD Drawings of the Contract Drawings will **not** be provided by Architect for Contractor's use in preparing submittals unless requested and Architect's user agreement properly completed.
- B. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.
 1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
 2. Submit all submittal items required for each Specification Section concurrently unless partial submittals for portions of the Work are indicated on approved submittal schedule.
 3. Submit action submittals and informational submittals required by the same Specification Section as separate packages under separate transmittals.
 4. Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.
 - a. Architect reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.
- C. Processing Time: Allow time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Architect's receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.

SUBMITTAL PROCEDURES

1. Initial Review: Allow ten (10) days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. Architect will advise Contractor when a submittal being processed must be delayed for coordination.
 2. Resubmittal Review: Allow ten (10) days for review of each resubmittal.
 3. Sequential Review: Where sequential review of submittals by Architect's consultants, Owner, or other parties is indicated, allow fifteen (15) days for initial review of each submittal.
- D. Identification and Information: Place a permanent label or title block on each paper copy submittal item for identification.
1. Indicate name of firm or entity that prepared each submittal on label or title block.
 2. Provide a space on label or beside title block to record Contractor's review and approval markings and action taken by Architect.
 3. Include the following information for processing and recording action taken:
 - a. Project name.
 - b. Date.
 - c. Name of Architect.
 - d. Name of Contractor.
 - e. Name of subcontractor.
 - f. Name of supplier.
 - g. Name of manufacturer.
 - h. Submittal number or other unique identifier, including revision identifier.
 - 1) Submittal number shall use Specification Section number followed by a decimal point and then a sequential number (e.g., 061000.01). Resubmittals shall include an alphabetic suffix after another decimal point (e.g., 061000.01.A).
 - i. Number and title of appropriate Specification Section.
 - j. Drawing number and detail references, as appropriate.
 - k. Location(s) where product is to be installed, as appropriate.
 - l. Other necessary identification.
- E. Identification and Information: Identify and incorporate information in each electronic submittal file as follows:
1. Assemble complete submittal package into a single indexed file with links enabling navigation to each item.
 2. Name file with submittal number or other unique identifier, including revision identifier.
 - a. File name shall use project identifier and Specification Section number followed by a decimal point and then a sequential number (e.g., LNHS-061000.01). Resubmittals shall include an alphabetic suffix after another decimal point (e.g., LNHS-061000.01.A).
 3. Provide means for insertion to permanently record Contractor's review and approval markings and action taken by Architect.
 4. Include the following information on an inserted cover sheet:

- a. Project name.
 - b. Date.
 - c. Name and address of Architect.
 - d. Name of Contractor.
 - e. Name of firm or entity that prepared submittal.
 - f. Name of subcontractor.
 - g. Name of supplier.
 - h. Name of manufacturer.
 - i. Number and title of appropriate Specification Section.
 - j. Drawing number and detail references, as appropriate.
 - k. Location(s) where product is to be installed, as appropriate.
 - l. Related physical samples submitted directly.
 - m. Other necessary identification.
5. Include the following information as keywords in the electronic file metadata:
- a. Project name.
 - b. Number and title of appropriate Specification Section.
 - c. Manufacturer name.
 - d. Product name.
- F. Options: Identify options requiring selection by the Architect.
- G. Deviations: Identify deviations from the Contract Documents on submittals.
- H. Additional Paper Copies: Unless additional copies are required for final submittal, and unless Architect observes noncompliance with provisions in the Contract Documents, initial submittal may serve as final submittal.
- I. Transmittal: Assemble each submittal individually and appropriately for transmittal and handling. Transmit each submittal using a transmittal form. Architect will return submittals, without review received from sources other than Contractor.
1. Transmittal Form: Provide locations on form for the following information:
- a. Project name.
 - b. Date.
 - c. Destination (To:).
 - d. Source (From:).
 - e. Names of subcontractor, manufacturer, and supplier.
 - f. Category and type of submittal.
 - g. Submittal purpose and description.
 - h. Specification Section number and title.
 - i. Indication of full or partial submittal.
 - j. Drawing number and detail references, as appropriate.
 - k. Transmittal number, numbered consecutively.
 - l. Submittal and transmittal distribution record.
 - m. Remarks.
 - n. Signature of transmitter.

2. On an attached separate sheet, prepared on Contractor's letterhead, record relevant information, requests for data, revisions other than those requested by Architect on previous submittals, and deviations from requirements in the Contract Documents, including minor variations and limitations. Include same identification information as related submittal.
- J. Resubmittals: Make resubmittals in same form and number of copies as initial submittal.
1. Note date and content of previous submittal.
 2. Note date and content of revision in label or title block and clearly indicate extent of revision.
 3. Resubmit submittals until they are marked with approval notation from Architect's action stamp.
- K. Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, installers, authorities having jurisdiction, and others as necessary for performance of construction activities. Show distribution on transmittal forms.
- L. Use for Construction: Use only final submittals that are marked with approval notation from Architect's action stamp.

PART 2 - PRODUCTS

2.1 SUBMITTAL PROCEDURES

- A. General Submittal Procedure Requirements: Prepare and submit submittals required by individual Specification Sections. Types of submittals are indicated in individual Specification Sections.
1. Submit electronic submittals via email as PDF electronic files.
 - a. Architect will return annotated file. Annotate and retain one (1) copy of file as an electronic Project record document file.
 2. Certificates and Certifications Submittals: Provide a statement (attached) that includes signature of entity responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity.
 - a. Provide a digital signature with digital certificate on electronically-submitted certificates and certifications where indicated.
 - b. Provide a notarized statement on original paper copy certificates and certifications where indicated.
 3. Test and Inspection Reports Submittals: Comply with requirements specified in Section 014000 "Quality Requirements."
- B. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.

1. If information must be specially prepared for submittal because standard published data are not suitable for use, submit as Shop Drawings, not as Product Data.
 2. Mark each copy of each submittal to show which products and options are applicable.
 3. Include the following information, as applicable:
 - a. Manufacturer's catalog cuts.
 - b. Manufacturer's product specifications.
 - c. Standard color charts.
 - d. Statement of compliance with specified referenced standards.
 - e. Testing by recognized testing agency.
 - f. Application of testing agency labels and seals.
 - g. Notation of coordination requirements.
 - h. Availability and delivery time information.
 4. For equipment, include the following in addition to the above, as applicable:
 - a. Wiring diagrams showing factory-installed wiring.
 - b. Printed performance curves.
 - c. Operational range diagrams.
 - d. Clearances required to other construction, if not indicated on accompanying Shop Drawings.
 5. Submit Product Data before or concurrent with Samples.
- C. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data.
1. Preparation: Fully illustrate requirements in the Contract Documents. Include the following information, as applicable:
 - a. Identification of products.
 - b. Schedules.
 - c. Compliance with specified standards.
 - d. Notation of coordination requirements.
 - e. Notation of dimensions established by field measurement.
 - f. Relationship and attachment to adjoining construction clearly indicated.
 - g. Seal and signature of professional engineer if specified.
 2. Sheet Size: Except for templates, patterns, and similar full-size drawings, submit Shop Drawings on sheets at least 8½ by 11 inches but no larger than 30 by 42 inches.
- D. Samples: Submit Samples for review of kind, color, pattern, and texture for a check of these characteristics with other elements and for a comparison of these characteristics between submittal and actual component as delivered and installed.
1. Transmit Samples that contain multiple, related components such as accessories together in one (1) submittal package.
 2. Identification: Attach label on unexposed side of Samples that includes the following:
 - a. Generic description of Sample.
 - b. Product name and name of manufacturer.

- c. Sample source.
 - d. Number and title of applicable Specification Section.
 3. Disposition: Maintain sets of approved Samples at Project site, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.
 - a. Samples that may be incorporated into the Work are indicated in individual Specification Sections. Such Samples must be in an undamaged condition at time of use.
 - b. Samples not incorporated into the Work, or otherwise designated as Owner's property, are the property of Contractor.
- E. Product Schedule: As required in individual Specification Sections, prepare a written summary indicating types of products required for the Work and their intended location. Include the following information in tabular form:
 1. Type of product. Include unique identifier for each product indicated in the Contract Documents.
 2. Manufacturer and product name, and model number if applicable.
 3. Number and name of room or space.
 4. Location within room or space.
- F. Subcontract List: Prepare a written summary identifying individuals or firms proposed for each portion of the Work, including those who are to furnish products or equipment fabricated to a special design. Include the following information in tabular form:
 1. Name, address, and telephone number of entity performing subcontract or supplying products.
 2. Number and title of related Specification Section(s) covered by subcontract.
 3. Drawing number and detail references, as appropriate, covered by subcontract.
- G. Qualification Data: Prepare written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, contact information of Architects and Owners, and other information specified.
- H. Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements in the Contract Documents. Submit record of Welding Procedure Specification and Procedure Qualification Record on American Welding Society (AWS) forms. Include names of firms and personnel certified.
- I. Installer Certificates: Submit written statements on manufacturer's letterhead certifying that Installer complies with requirements in the Contract Documents and, where required, is authorized by manufacturer for this specific Project.
- J. Manufacturer Certificates: Submit written statements on manufacturer's letterhead certifying that manufacturer complies with requirements in the Contract Documents. Include evidence of manufacturing experience where required.
- K. Product Certificates: Submit written statements on manufacturer's letterhead certifying that product complies with requirements in the Contract Documents.

- L. Material Certificates: Submit written statements on manufacturer's letterhead certifying that material complies with requirements in the Contract Documents.
- M. Material Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements in the Contract Documents.
- N. Product Test Reports: Submit written reports indicating current product produced by manufacturer complies with requirements in the Contract Documents. Base reports on evaluation of tests performed by manufacturer and witnessed by a qualified testing agency, or on comprehensive tests performed by a qualified testing agency.
- O. Research Reports: Submit written evidence, from a model code organization acceptable to authorities having jurisdiction, that product complies with building code in effect for Project. Include the following information:
 - 1. Name of evaluation organization.
 - 2. Date of evaluation.
 - 3. Time period when report is in effect.
 - 4. Product and manufacturers' names.
 - 5. Description of product.
 - 6. Test procedures and results.
 - 7. Limitations of use.
- P. Schedule of Tests and Inspections: Comply with requirements specified in Section 014000 "Quality Requirements."
- Q. Preconstruction Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of tests performed before installation of product, for compliance with performance requirements in the Contract Documents.
- R. Compatibility Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of compatibility tests performed before installation of product. Include written recommendations for primers and substrate preparation needed for adhesion.
- S. Field Test Reports: Submit reports indicating and interpreting results of field tests performed either during installation of product or after product is installed in its final location, for compliance with requirements in the Contract Documents.
- T. Maintenance Data: Comply with requirements specified in Section 017823 "Operation and Maintenance Data."

PART 3 - EXECUTION

3.1 CONTRACTOR'S REVIEW

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

- B. Approval Stamp: Stamp each submittal with a uniform, approval stamp. Include Project name and location, submittal number, Specification Section title and number, name of reviewer, date of Contractor's approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents.

3.2 ARCHITECT'S ACTION

- A. General: Architect will not review submittals that do not bear Contractor's approval stamp and will return them without action.
- B. Action Submittals: Architect will review each submittal, make marks to indicate corrections or modifications required, and return it. Architect will stamp each submittal with an action stamp and will mark stamp appropriately to indicate action.
- C. Informational Submittals: Architect will review each submittal and will not return it, or will return it if it does not comply with requirements. Architect will forward each submittal to appropriate party.
- D. Partial submittals prepared for a portion of the Work will be reviewed when use of partial submittals has received prior approval from Architect.
- E. Incomplete submittals are not acceptable, will be considered nonresponsive, and will be returned without review.
- F. Submittals not required by the Contract Documents may not be reviewed and may be discarded.

END OF SECTION 013300

SECTION 014000 - QUALITY REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for quality assurance and quality control.
- B. Testing and inspecting services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with the Contract Document requirements.

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

- C. Related Sections:

- 1. Section 013200 "Construction Progress Documentation" for developing a schedule of required tests and inspections.
- 2. Divisions 02 through 49 Sections for specific test and inspection requirements.

1.3 DEFINITIONS

- A. Quality-Assurance Services: Activities, actions, and procedures performed before and during execution of the Work to guard against defects and deficiencies and substantiate that proposed construction will comply with requirements.
- B. Quality-Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work to evaluate that actual products incorporated into the Work and completed construction comply with requirements. Services do not include contract enforcement activities performed by Architect.
- C. Preconstruction Testing: Tests and inspections performed specifically for the Project before products and materials are incorporated into the Work to verify performance or compliance with specified criteria.

- D. Product Testing: Tests and inspections that are performed by an NRTL, an NVLAP, or a testing agency qualified to conduct product testing and acceptable to authorities having jurisdiction, to establish product performance and compliance with specified requirements.
- E. Source Quality-Control Testing: Tests and inspections that are performed at the source, i.e., plant, mill, factory, or shop.
- F. Field Quality-Control Testing: Tests and inspections that are performed on-site for installation of the Work and for completed Work.
- G. Testing Agency: An entity engaged to perform specific tests, inspections, or both. Testing laboratory shall mean the same as testing agency.
- H. Installer/Applicator/Erector: Contractor or another entity engaged by Contractor as an employee, Subcontractor, or Sub-subcontractor, to perform a particular construction operation, including installation, erection, application, and similar operations.
 - 1. Use of trade-specific terminology in referring to a trade or entity does not require that certain construction activities be performed by accredited or unionized individuals, or that requirements specified apply exclusively to specific trade or trades.
- I. Experienced: When used with an entity or individual, "experienced" means having successfully completed a minimum of five (5) previous projects similar in nature, size, and extent to this Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.

1.4 CONFLICTING REQUIREMENTS

- A. Referenced Standards: If compliance with two (2) or more standards is specified and the standards establish different or conflicting requirements for minimum quantities or quality levels, comply with the most stringent requirement. Refer conflicting requirements that are different, but apparently equal, to Architect for a decision before proceeding.
- B. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of requirements. Refer uncertainties to Architect for a decision before proceeding.

1.5 INFORMATIONAL SUBMITTALS

- A. Contractor's Statement of Responsibility: When required by authorities having jurisdiction, submit copy of written statement of responsibility sent to authorities having jurisdiction before starting work on the following systems.
 - 1. Seismic-force resisting system, designated seismic system, or component listed in the designated seismic system quality assurance plan prepared by the Architect.

- B. Testing Agency Qualifications: For testing agencies specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include proof of qualifications in the form of a recent report on the inspection of the testing agency by a recognized authority.
- C. Schedule of Tests and Inspections: Prepare in tabular form and include the following:
 - 1. Specification Section number and title.
 - 2. Entity responsible for performing tests and inspections.
 - 3. Description of test and inspection.
 - 4. Identification of applicable standards.
 - 5. Identification of test and inspection methods.
 - 6. Number of tests and inspections required.
 - 7. Time schedule or time span for tests and inspections.
 - 8. Requirements for obtaining samples.
 - 9. Unique characteristics of each quality-control service.

1.6 REPORTS AND DOCUMENTS

- A. Test and Inspection Reports: Prepare and submit certified written reports specified in other Sections. Include the following:
 - 1. Date of issue.
 - 2. Project title and number.
 - 3. Name, address, and telephone number of testing agency.
 - 4. Dates and locations of samples and tests or inspections.
 - 5. Names of individuals making tests and inspections.
 - 6. Description of the Work and test and inspection method.
 - 7. Identification of product and Specification Section.
 - 8. Complete test or inspection data.
 - 9. Test and inspection results and an interpretation of test results.
 - 10. Record of temperature and weather conditions at time of sample taking and testing and inspecting.
 - 11. Comments or professional opinion on whether tested or inspected Work complies with the Contract Document requirements.
 - 12. Name and signature of laboratory inspector.
 - 13. Recommendations on retesting and reinspecting.
- B. Manufacturer's Technical Representative's Field Reports: Prepare written information documenting manufacturer's technical representative's tests and inspections specified in other Sections. Include the following:
 - 1. Name, address, and telephone number of technical representative making report.
 - 2. Statement on condition of substrates and their acceptability for installation of product.
 - 3. Statement that products at Project site comply with requirements.
 - 4. Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.
 - 5. Results of operational and other tests and a statement of whether observed performance complies with requirements.
 - 6. Statement whether conditions, products, and installation will affect warranty.
 - 7. Other required items indicated in individual Specification Sections.

- C. Factory-Authorized Service Representative's Reports: Prepare written information documenting manufacturer's factory-authorized service representative's tests and inspections specified in other Sections. Include the following:
 - 1. Name, address, and telephone number of factory-authorized service representative making report.
 - 2. Statement that equipment complies with requirements.
 - 3. Results of operational and other tests and a statement of whether observed performance complies with requirements.
 - 4. Statement whether conditions, products, and installation will affect warranty.
 - 5. Other required items indicated in individual Specification Sections.
- D. Permits, Licenses, and Certificates: For Owner's records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, correspondence, records, and similar documents, established for compliance with standards and regulations bearing on performance of the Work.

1.7 QUALITY ASSURANCE

- A. General: Qualifications paragraphs in this article establish the minimum qualification levels required; individual Specification Sections specify additional requirements.
- B. Manufacturer Qualifications: A firm experienced in manufacturing products or systems similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
- C. Fabricator Qualifications: A firm experienced in producing products similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
- D. Installer Qualifications: A firm or individual experienced in installing, erecting, or assembling work similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.
- E. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of the system, assembly, or product that are similar to those indicated for this Project in material, design, and extent.
- F. Specialists: Certain Specification Sections require that specific construction activities shall be performed by entities who are recognized experts in those operations. Specialists shall satisfy qualification requirements indicated and shall be engaged for the activities indicated.
 - 1. Requirements of authorities having jurisdiction shall supersede requirements for specialists.
- G. Testing Agency Qualifications: An NRTL, an NVLAP, or an independent agency with the experience and capability to conduct testing and inspecting indicated, as documented according to ASTM E 329; and with additional qualifications specified in individual Sections; and where required by authorities having jurisdiction, that is acceptable to authorities.

1. NRTL: A nationally recognized testing laboratory according to 29 CFR 1910.7.
2. NVLAP: A testing agency accredited according to NIST's National Voluntary Laboratory Accreditation Program.

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

1.8 QUALITY CONTROL

- A. Owner Responsibilities: Where quality-control services are indicated as Owner's responsibility, Owner will engage a qualified testing agency to perform these services.
1. Owner will furnish Contractor with names, addresses, and telephone numbers of testing agencies engaged and a description of types of testing and inspecting they are engaged to perform.
 2. Payment for these services will be made from testing and inspecting allowances, as authorized by Change Orders.
 3. Costs for retesting and reinspecting construction that replaces or is necessitated by work that failed to comply with the Contract Documents will be charged to Contractor, and the Contract Sum will be adjusted by Change Order.
- B. Contractor Responsibilities: Tests and inspections not explicitly assigned to Owner are Contractor's responsibility. Perform additional quality-control activities required to verify that the Work complies with requirements, whether specified or not.
1. Unless otherwise indicated, provide quality-control services specified and those required by authorities having jurisdiction. Perform quality-control services required of Contractor by authorities having jurisdiction, whether specified or not.
 2. Where services are indicated as Contractor's responsibility, engage a qualified testing agency to perform these quality-control services.
 - a. Contractor shall not employ same entity engaged by Owner, unless agreed to in writing by Owner.
 3. Notify testing agencies at least twenty-four (24) hours in advance of time when Work that requires testing or inspecting will be performed.
 4. Where quality-control services are indicated as Contractor's responsibility, submit a certified written report, in duplicate, of each quality-control service.
 5. Testing and inspecting requested by Contractor and not required by the Contract Documents are Contractor's responsibility.
 6. Submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.

- C. **Manufacturer's Field Services:** Where indicated, engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including service connections. Report results in writing as specified in Section 013300 "Submittal Procedures."
- D. **Manufacturer's Technical Services:** Where indicated, engage a manufacturer's technical representative to observe and inspect the Work. Manufacturer's technical representative's services include participation in preinstallation conferences, examination of substrates and conditions, verification of materials, observation of Installer activities, inspection of completed portions of the Work, and submittal of written reports.
- E. **Retesting/Reinspecting:** Regardless of whether original tests or inspections were Contractor's responsibility, provide quality-control services, including retesting and reinspecting, for construction that replaced Work that failed to comply with the Contract Documents.
- F. **Testing Agency Responsibilities:** Cooperate with Architect, and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.
 - 1. Notify Architect and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
 - 2. Determine the location from which test samples will be taken and in which in-situ tests are conducted.
 - 3. Conduct and interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from requirements.
 - 4. Submit a certified written report, in duplicate, of each test, inspection, and similar quality-control service through Contractor.
 - 5. Do not release, revoke, alter, or increase the Contract Document requirements or approve or accept any portion of the Work.
 - 6. Do not perform any duties of Contractor.
- G. **Associated Services:** Cooperate with agencies performing required tests, inspections, and similar quality-control services, and provide reasonable auxiliary services as requested. Notify agency sufficiently in advance of operations to permit assignment of personnel. Provide the following:
 - 1. Access to the Work.
 - 2. Incidental labor and facilities necessary to facilitate tests and inspections.
 - 3. Adequate quantities of representative samples of materials that require testing and inspecting. Assist agency in obtaining samples.
 - 4. Facilities for storage and field curing of test samples.
 - 5. Delivery of samples to testing agencies.
 - 6. Preliminary design mix proposed for use for material mixes that require control by testing agency.
 - 7. Security and protection for samples and for testing and inspecting equipment at Project site.
- H. **Coordination:** Coordinate sequence of activities to accommodate required quality-assurance and -control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting.
 - 1. Schedule times for tests, inspections, obtaining samples, and similar activities.

- I. Schedule of Tests and Inspections: Prepare a schedule of tests, inspections, and similar quality-control services required by the Contract Documents Coordinate and submit concurrently with Contractor's construction schedule. Update as the Work progresses.
 - 1. Distribution: Distribute schedule to Owner, Architect, testing agencies, and each party involved in performance of portions of the Work where tests and inspections are required.

1.9 SPECIAL TESTS AND INSPECTIONS

- A. Special Tests and Inspections: Conducted by a qualified testing agency as required by authorities having jurisdiction, as indicated in individual Specification Sections, and as follows:
 - 1. Verifying that manufacturer maintains detailed fabrication and quality-control procedures and reviewing the completeness and adequacy of those procedures to perform the Work.
 - 2. Notifying Architect, and Contractor promptly of irregularities and deficiencies observed in the Work during performance of its services.
 - 3. Submitting a certified written report of each test, inspection, and similar quality-control service to Architect, Contractor and to authorities having jurisdiction.
 - 4. Submitting a final report of special tests and inspections at Substantial Completion, which includes a list of unresolved deficiencies.
 - 5. Interpreting tests and inspections and stating in each report whether tested and inspected work complies with or deviates from the Contract Documents.
 - 6. Retesting and reinspecting corrected work.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 TEST AND INSPECTION LOG

- A. Prepare a record of tests and inspections. Include the following:
 - 1. Date test or inspection was conducted.
 - 2. Description of the Work tested or inspected.
 - 3. Date test or inspection results were transmitted to Architect.
 - 4. Identification of testing agency or special inspector conducting test or inspection.
- B. Maintain log at Project site. Post changes and modifications as they occur. Provide access to test and inspection log for Architect's reference during normal working hours.

3.2 REPAIR AND PROTECTION

- A. General: On completion of testing, inspecting, sample taking, and similar services, repair damaged construction and restore substrates and finishes.
 - 1. Provide materials and comply with installation requirements specified in other Specification Sections or matching existing substrates and finishes. Restore patched areas and extend restoration into adjoining areas with durable seams that are as invisible

QUALITY REQUIREMENTS

as possible. Comply with the Contract Document requirements for cutting and patching in Section 017300 "Execution."

- B. Protect construction exposed by or for quality-control service activities.
- C. Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for quality-control services.

END OF SECTION 014000

SECTION 014200 - REFERENCES

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 DEFINITIONS

- A. General: Basic Contract definitions are included in the Conditions of the Contract.
- B. "Approved": When used to convey Architect's action on Contractor's submittals, applications, and requests, "approved" is limited to Architect's duties and responsibilities as stated in the Conditions of the Contract.
- C. "Directed": A command or instruction by Architect. Other terms including "requested," "authorized," "selected," "required," and "permitted" have the same meaning as "directed."
- D. "Indicated": Requirements expressed by graphic representations or in written form on Drawings, in Specifications, and in other Contract Documents. Other terms including "shown," "noted," "scheduled," and "specified" have the same meaning as "indicated."
- E. "Regulations": Laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, and rules, conventions, and agreements within the construction industry that control performance of the Work.
- F. "Furnish": Supply and deliver to Project site, ready for unloading, unpacking, assembly, installation, and similar operations.
- G. "Install": Operations at Project site including unloading, temporarily storing, unpacking, assembling, erecting, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations.
- H. "Provide": Furnish and install, complete and ready for the intended use.
- I. "Project Site": Space available for performing construction activities. The extent of Project site is shown on Drawings and may or may not be identical with the description of the land on which Project is to be built.

1.3 INDUSTRY STANDARDS

- A. Applicability of Standards: Unless the Contract Documents include more stringent requirements, applicable construction industry standards have the same force and effect as if bound or copied directly into the Contract Documents to the extent referenced. Such standards are made a part of the Contract Documents by reference.
- B. Publication Dates: Comply with standards in effect as of date of the Contract Documents unless otherwise indicated.

- C. Copies of Standards: Each entity engaged in construction on Project should be familiar with industry standards applicable to its construction activity. Copies of applicable standards are not bound with the Contract Documents.
1. Where copies of standards are needed to perform a required construction activity, obtain copies directly from publication source.

1.4 ABBREVIATIONS AND ACRONYMS

- A. Industry Organizations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Names, telephone numbers, and Web sites are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

AA	Aluminum Association, Inc. (The) www.aluminum.org	(703) 358-2960
AABC	Associated Air Balance Council www.aabchq.com	(202) 737-0202
AAMA	American Architectural Manufacturers Association www.aamanet.org	(847) 303-5664
AASHTO	American Association of State Highway and Transportation Officials www.transportation.org	(202) 624-5800
ACI	American Concrete Institute www.concrete.org	(248) 848-3700
AGA	American Gas Association www.aga.org	(202) 824-7000
AHA	American Hardboard Association (Now part of CPA)	
AI	Asphalt Institute www.asphaltinstitute.org	(859) 288-4960
AIA	American Institute of Architects (The) www.aia.org	(800) 242-3837 (202) 626-7300
AISC	American Institute of Steel Construction www.aisc.org	(800) 644-2400 (312) 670-2400
AISI	American Iron and Steel Institute www.steel.org	(202) 452-7100
ALSC	American Lumber Standard Committee, Incorporated www.alsc.org	(301) 972-1700

REFERENCES

AMCA	Air Movement and Control Association International, Inc. www.amca.org	(847) 394-0150
ANSI	American National Standards Institute www.ansi.org	(202) 293-8020
APA	APA - The Engineered Wood Association www.apawood.org	(253) 565-6600
ARI	Air-Conditioning & Refrigeration Institute www.ari.org	(703) 524-8800
ARMA	Asphalt Roofing Manufacturers Association www.asphaltroofing.org	(202) 207-0917
ASCE	American Society of Civil Engineers www.asce.org	(800) 548-2723 (703) 295-6300
ASCE/SEI	American Society of Civil Engineers/Structural Engineering Institute (See ASCE)	
ASHRAE	American Society of Heating, Refrigerating and Air- Conditioning Engineers www.ashrae.org	(800) 527-4723 (404) 636-8400
ASME	ASME International (American Society of Mechanical Engineers International) www.asme.org	(800) 843-2763 (973) 882-1170
ASSE	American Society of Sanitary Engineering www.asse-plumbing.org	(440) 835-3040
ASTM	ASTM International (American Society for Testing and Materials International) www.astm.org	(610) 832-9500
AWI	Architectural Woodwork Institute www.awinet.org	(571) 323-3636
AWPA	American Wood Protection Association (Formerly: American Wood Preservers' Association) www.awpa.com	(205) 733-4077
AWS	American Welding Society www.aws.org	(800) 443-9353 (305) 443-9353
AWWA	American Water Works Association www.awwa.org	(800) 926-7337 (303) 794-7711
BHMA	Builders Hardware Manufacturers Association www.buildershardware.com	(212) 297-2122

REFERENCES

BICSI	BICSI, Inc. www.bicsi.org	(800) 242-7405 (813) 979-1991
CDA	Copper Development Association www.copper.org	(800) 232-3282 (212) 251-7200
CGA	Compressed Gas Association www.cganet.com	(703) 788-2700
CISCA	Ceilings & Interior Systems Construction Association www.cisca.org	(630) 584-1919
CISPI	Cast Iron Soil Pipe Institute www.cispi.org	(423) 892-0137
CPPA	Corrugated Polyethylene Pipe Association www.cppa-info.org	(800) 510-2772 (202) 462-9607
CRI	Carpet and Rug Institute (The) www.carpet-rug.com	(800) 882-8846 (706) 278-3176
CRSI	Concrete Reinforcing Steel Institute www.crsi.org	(847) 517-1200
CSA	CSA International (Formerly: IAS - International Approval Services) www.csa-international.org	(866) 797-4272 (416) 747-4000
CSI	Construction Specifications Institute (The) www.csinet.org	(800) 689-2900 (703) 684-0300
DHI	Door and Hardware Institute www.dhi.org	(703) 222-2010
EIA	Electronic Industries Alliance www.eia.org	(703) 907-7500
EJMA	Expansion Joint Manufacturers Association, Inc. www.ejma.org	(914) 332-0040
ESD	ESD Association (Electrostatic Discharge Association) www.esda.org	(315) 339-6937
FM Approvals	FM Approvals LLC www.fmglobal.com	(781) 762-4300
FM Global	FM Global (Formerly: FMG - FM Global) www.fmglobal.com	(401) 275-3000

REFERENCES

FSA	Fluid Sealing Association www.fluidsealing.com	(610) 971-4850
FSC	Forest Stewardship Council www.fsc.org	49 228 367 66 0
GA	Gypsum Association www.gypsum.org	(202) 289-5440
GANA	Glass Association of North America www.glasswebsite.com	(785) 271-0208
HI	Hydraulic Institute www.pumps.org	(973) 267-9700
HMMA	Hollow Metal Manufacturers Association (Part of NAAMM)	
HPVA	Hardwood Plywood & Veneer Association www.hpva.org	(703) 435-2900
ICEA	Insulated Cable Engineers Association, Inc. www.icea.net	(770) 830-0369
IEC	International Electrotechnical Commission www.iec.ch	41 22 919 02 11
IEEE	Institute of Electrical and Electronics Engineers, Inc. (The) www.ieee.org	(212) 419-7900
IESNA	Illuminating Engineering Society of North America www.iesna.org	(212) 248-5000
IGCC	Insulating Glass Certification Council www.igcc.org	(315) 646-2234
IGMA	Insulating Glass Manufacturers Alliance www.igmaonline.org	(613) 233-1510
ISO	International Organization for Standardization www.iso.ch	41 22 749 01 11
	Available from ANSI www.ansi.org	(202) 293-8020
MFMA	Metal Framing Manufacturers Association, Inc. www.metalframingmfg.org	(312) 644-6610
MPI	Master Painters Institute www.paintinfo.com	(888) 674-8937 (604) 298-7578

REFERENCES

MSS	Manufacturers Standardization Society of The Valve and Fittings Industry Inc. www.mss-hq.com	(703) 281-6613
NAAMM	National Association of Architectural Metal Manufacturers www.naamm.org	(630) 942-6591
NACE	NACE International (National Association of Corrosion Engineers International) www.nace.org	(800) 797-6623 (281) 228-6200
NADCA	National Air Duct Cleaners Association www.nadca.com	(202) 737-2926
NAIMA	North American Insulation Manufacturers Association www.naima.org	(703) 684-0084
NCMA	National Concrete Masonry Association www.ncma.org	(703) 713-1900
NEBB	National Environmental Balancing Bureau www.nebb.org	(301) 977-3698
NECA	National Electrical Contractors Association www.necanet.org	(301) 657-3110
NeLMA	Northeastern Lumber Manufacturers' Association www.nelma.org	(207) 829-6901
NEMA	National Electrical Manufacturers Association www.nema.org	(703) 841-3200
NETA	InterNational Electrical Testing Association www.netaworld.org	(888) 300-6382 (269) 488-6382
NFPA	NFPA (National Fire Protection Association) www.nfpa.org	(800) 344-3555 (617) 770-3000
NFRC	National Fenestration Rating Council www.nfrc.org	(301) 589-1776
NHLA	National Hardwood Lumber Association www.natlhardwood.org	(800) 933-0318 (901) 377-1818
NLGA	National Lumber Grades Authority www.nlga.org	(604) 524-2393
NRCA	National Roofing Contractors Association www.nrca.net	(800) 323-9545 (847) 299-9070

REFERENCES

NRMCA	National Ready Mixed Concrete Association www.nrmca.org	(888) 846-7622 (301) 587-1400
NSF	NSF International (National Sanitation Foundation International) www.nsf.org	(800) 673-6275 (734) 769-8010
NWWDA	National Wood Window and Door Association (Now WDMA)	
PDI	Plumbing & Drainage Institute www.pdionline.org	(800) 589-8956 (978) 557-0720
PGI	PVC Geomembrane Institute http://pgi-tp.ce.uiuc.edu	(217) 333-3929
RCSC	Research Council on Structural Connections www.boltcouncil.org	
RFCI	Resilient Floor Covering Institute www.rfci.com	(301) 340-8580
RIS	Redwood Inspection Service www.redwoodinspection.com	(888) 225-7339 (415) 382-0662
SDI	Steel Door Institute www.steeldoor.org	(440) 899-0010
SEI/ASCE	Structural Engineering Institute/American Society of Civil Engineers (See ASCE)	
SIGMA	Sealed Insulating Glass Manufacturers Association (Now IGMA)	
SMA	Screen Manufacturers Association www.smacentral.org	(561) 533-0991
SMACNA	Sheet Metal and Air Conditioning Contractors' National Association www.smacna.org	(703) 803-2980
SPIB	Southern Pine Inspection Bureau (The) www.spib.org	(850) 434-2611
SSINA	Specialty Steel Industry of North America www.ssina.com	(800) 982-0355 (202) 342-8630
SSPC	SSPC: The Society for Protective Coatings www.sspc.org	(877) 281-7772 (412) 281-2331

REFERENCES

STI	Steel Tank Institute www.steeltank.com	(847) 438-8265
TCA	Tile Council of America, Inc. (Now TCNA)	
TIA/EIA	Telecommunications Industry Association/Electronic Industries Alliance www.tiaonline.org	(703) 907-7700
TMS	The Masonry Society www.masonrysociety.org	(303) 939-9700
TPI	Truss Plate Institute, Inc. www.tpinst.org	(703) 683-1010
UL	Underwriters Laboratories Inc. www.ul.com	(877) 854-3577 (847) 272-8800
UNI	Uni-Bell PVC Pipe Association www.uni-bell.org	(972) 243-3902
USGBC	U.S. Green Building Council www.usgbc.org	(800) 795-1747
WCLIB	West Coast Lumber Inspection Bureau www.wclib.org	(800) 283-1486 (503) 639-0651
WCMA	Window Covering Manufacturers Association www.wcmanet.org	(212) 297-2122
WDMA	Window & Door Manufacturers Association (Formerly: NWWDA - National Wood Window and Door Association) www.wdma.com	(800) 223-2301 (847) 299-5200
WWPA	Western Wood Products Association www.wwpa.org	(503) 224-3930

- B. Code Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Names, telephone numbers, and Web sites are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

IAPMO	International Association of Plumbing and Mechanical Officials www.iapmo.org	(909) 472-4100
ICC	International Code Council www.iccsafe.org	(888) 422-7233

REFERENCES

ICC-ES	ICC Evaluation Service, Inc. www.icc-es.org	(800) 423-6587 (562) 699-0543
UBC	Uniform Building Code (See ICC)	
<p>C. Federal Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Names, telephone numbers, and Web sites are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.</p>		
CE	Army Corps of Engineers www.usace.army.mil	(202) 761-0011
DOC	Department of Commerce www.commerce.gov	(202) 482-2000
DOE	Department of Energy www.energy.gov	(202) 586-9220
EPA	Environmental Protection Agency www.epa.gov	(202) 272-0167
FDA	Food and Drug Administration www.fda.gov	(888) 463-6332
GSA	General Services Administration www.gsa.gov	(800) 488-3111
LBL	Lawrence Berkeley National Laboratory www.lbl.gov	(510) 486-4000
NIST	National Institute of Standards and Technology www.nist.gov	(301) 975-6478
OSHA	Occupational Safety & Health Administration www.osha.gov	(800) 321-6742 (202) 693-1999
SD	State Department www.state.gov	(202) 647-4000
USDA	Department of Agriculture www.usda.gov	(202) 720-2791
<p>D. Standards and Regulations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the standards and regulations in the following list. Names, telephone numbers, and Web sites are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.</p>		

SECTION 015000 - TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes requirements for temporary support facilities, and security and protection facilities.
- B. Related Requirements:
 - 1. Section 011000 "Summary" for work restrictions and limitations on utility interruptions.

1.3 USE CHARGES

- A. General: Installation and removal of and use charges for temporary facilities shall be included in the Contract Sum unless otherwise indicated. Allow other entities to use temporary services and facilities without cost, including, but not limited to, Architect, testing agencies, and authorities having jurisdiction.
- B. Water and Sewer Service from Existing System: Water from Owner's existing water system is available for use without metering, but the Contractor will pay for the entire water bill that is generated during the times when the Contractor controls the building and prior to substantial completion. The Contractor will pay for the utility bills submitted by the Owner, within 15 days of their receipt by the Contractor, making the payment out to the Owner. Provide connections and extensions of services as required for construction operations.
- C. Electric Power Service from Existing System: Electric power from Owner's existing system is available for use without metering but the Contractor will pay for the entire power bill that is generated during the times when the Contractor controls the building and prior to substantial completion. The Contractor will pay for the utility bills submitted by the Owner, within 15 days of their receipt by the Contractor, making the payment out to the Owner. Provide connections and extensions of services as required for construction operations.

D. INFORMATIONAL SUBMITTALS

- E. Site Plan: Show temporary facilities, utility hookups, staging areas, and parking areas for construction personnel.

1.4 QUALITY ASSURANCE

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

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

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Chain-Link Fencing: Minimum 2-inch, 0.148-inch-thick, galvanized steel, chain-link fabric fencing; minimum 6 feet high with galvanized steel pipe posts; minimum 2-3/8-inch-OD line posts and 2-7/8-inch-OD corner and pull posts, with 1-5/8-inch-OD top rails.
- B. Polyethylene Sheet: Reinforced, fire-resistive sheet, 10 mils minimum thickness, with flame-spread rating of 15 or less per ASTM E 84.
- C. Insulation: Unfaced mineral-fiber blanket, manufactured from glass, slag wool, or rock wool; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively.

2.2 TEMPORARY FACILITIES

- A. Field Offices, General: Prefabricated or mobile units with serviceable finishes, temperature controls, and foundations adequate for normal loading. Unit must be large enough for regular job meetings, plan review areas, submittal storage and other job file and administrative functions.
- B. Storage and Fabrication Sheds: Provide sheds sized, furnished, and equipped to accommodate materials and equipment for construction operations.
 - 1. Sheds to be metal box storage units or have wood floors raised above the ground.
 - 2. Store combustible materials apart from building.

2.3 EQUIPMENT

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

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Locate facilities where they will serve Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required by progress of the Work.
- B. Provide each facility ready for use when needed to avoid delay. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.

3.2 TEMPORARY UTILITY INSTALLATION

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

TEMPORARY FACILITIES AND CONTROLS

1. Arrange with utility company, Owner, and existing users for time when service can be interrupted, if necessary, to make connections for temporary services.
- B. Sanitary Facilities: Provide temporary toilets, wash facilities, and drinking water for use of construction personnel. Comply with requirements of authorities having jurisdiction for type, number, location, operation, and maintenance of fixtures and facilities.
- C. Heating and Cooling: The Contractor may use the existing heating and cooling required by construction activities for conditioning the building and maintaining it against adverse weather conditions. The new equipment cannot be used for curing or drying of completed installations or for protecting installed construction from adverse effects of low temperatures or high humidity and temporary equipment must be used for those purposes. Select equipment that will not have a harmful effect on completed installations or elements being installed. Provide sub-meters for gas and electric service, with costs charged to the General Contractor.
- D. Ventilation and Humidity Control: Provide temporary ventilation required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed. Coordinate ventilation requirements to produce ambient condition required and minimize energy consumption.
 1. Provide dehumidification systems when required to reduce substrate moisture levels to level required to allow installation or application of finishes.
- E. Electric Power Service: Pay for electric power service as referenced in Section 1.3 above. Protect electric power service from damage. Maintain equipment in a condition acceptable to Owner.
- F. Lighting: Provide temporary lighting with local switching that provides adequate illumination for construction operations, observations, inspections, and traffic conditions.
 1. Install and operate temporary lighting that fulfills security and protection requirements without operating entire system.
- G. Telephone Service: Provide temporary telephone service in common-use facilities for use by all construction personnel. Install one (1) telephone line for each field office.
 1. Provide additional telephone lines for the following:
 - a. Provide a dedicated telephone line for each facsimile machine in each field office.
 - b. Provide one (1) telephone line for Owner's use.
 2. At each telephone, post a list of important telephone numbers.
 - a. Police and fire departments.
 - b. Ambulance service.
 - c. Contractor's home office.
 - d. Engineer's office.
 - e. Engineers' offices.
 - f. Owner's office.
 - g. Principal subcontractors' field and home offices.

- H. Water Service: Pay for water service as referenced in Section 1.3 above. Protect water service lines from damage from freezing and other sources of damage. Maintain equipment in a condition acceptable to Owner.

3.3 SUPPORT FACILITIES INSTALLATION

- A. General: Comply with the following:
 - 1. Provide construction for temporary sheds located within construction area or within 30 feet of building lines that is noncombustible according to ASTM E 136. Comply with NFPA 241.
- B. Traffic Controls: Comply with requirements of authorities having jurisdiction.
 - 1. Protect existing site improvements to remain including curbs, pavement, and utilities.
 - 2. Maintain access for fire-fighting equipment and access to fire hydrants.
- C. Parking: The existing parking areas may be used by the contractor if it is restored to its condition at the time that the site is vacated by the Owner. Provide temporary parking areas as required for construction personnel.
- D. Waste Disposal Facilities: Provide waste-collection containers in sizes adequate to handle waste from construction operations. Comply with requirements of authorities having jurisdiction. Comply with progress cleaning requirements in Section 017300 "Execution."

3.4 SECURITY AND PROTECTION FACILITIES INSTALLATION

- A. Protection of Existing Facilities: Protect existing vegetation, equipment, structures, utilities, and other improvements at Project site and on adjacent properties, except those indicated to be removed or altered. Repair damage to existing facilities.
 - 1. The Contractor shall locate and mark the exact locations of the utilities or services and adequately protect them from damage during the work. In the event that any are accidentally disturbed, the Contractor shall repair or replace such damage immediately and restore service as promptly as possible.
- B. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction as required to comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.
- C. Barricades, Warning Signs, and Lights: Comply with requirements of authorities having jurisdiction for erecting structurally adequate barricades, including warning signs and lighting.
- D. Temporary Egress: Maintain temporary egress from existing occupied facilities as indicated and as required by authorities having jurisdiction.
- E. Temporary Enclosures: Provide temporary enclosures for protection of construction, in progress and completed, from exposure, foul weather, other construction operations, and similar activities. Provide temporary weathertight enclosure for building exterior.

1. Where heating or cooling is needed and permanent enclosure is not complete, insulate temporary enclosures.

3.5 OPERATION, TERMINATION, AND REMOVAL

- A. Temporary Facility Changeover: Do not change over from using temporary security and protection facilities to permanent facilities until Substantial Completion.
- B. Termination and Removal: Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.
 1. Materials and facilities that constitute temporary facilities are property of Contractor. Owner reserves right to take possession of Project identification signs.
 2. At Substantial Completion, repair, renovate, and clean permanent facilities used during construction period. Comply with final cleaning requirements specified in Section 017700 "Closeout Procedures."

END OF SECTION 015000

SECTION 016000 - PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for selection of products for use in Project; product delivery, storage, and handling; manufacturers' standard warranties on products; special warranties; and comparable products.
- B. Related Sections:
 - 1. Section 012500 "Substitution Procedures" for requests for substitutions.
 - 2. Section 014200 "References" for applicable industry standards for products specified.

1.3 DEFINITIONS

- A. Products: Items obtained for incorporating into the Work, whether purchased for Project or taken from previously purchased stock. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.
 - 1. Named Products: Items identified by manufacturer's product name, including make or model number or other designation shown or listed in manufacturer's published product literature, that is current as of date of the Contract Documents.
 - 2. New Products: Items that have not previously been incorporated into another project or facility. Products salvaged or recycled from other projects are not considered new products.
 - 3. Comparable Product: Product that is demonstrated and approved through submittal process to have the indicated qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics that equal or exceed those of specified product.
- B. Basis-of-Design Product Specification: A specification in which a specific manufacturer's product is named and accompanied by the words "basis-of-design product," including make or model number or other designation, to establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of additional manufacturers named in the specification.

1.4 ACTION SUBMITTALS

- A. Comparable Product Requests: Submit request for consideration of each comparable product. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.

1. Include data to indicate compliance with the requirements specified in "Comparable Products" Article.
2. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within one (1) week of receipt of a comparable product request. Architect will notify Contractor of approval or rejection of proposed comparable product request within fifteen (15) days of receipt of request, or seven (7) days of receipt of additional information or documentation, whichever is later.
 - a. Form of Approval: As specified in Section 013300 "Submittal Procedures."
 - b. Use product specified if Architect does not issue a decision on use of a comparable product request within time allocated.

B. Basis-of-Design Product Specification Submittal: Comply with requirements in Section 013300 "Submittal Procedures." Show compliance with requirements.

1.5 QUALITY ASSURANCE

- A. Compatibility of Options: If Contractor is given option of selecting between two (2) or more products for use on Project, select product compatible with products previously selected, even if previously selected products were also options.
1. Each contractor is responsible for providing products and construction methods compatible with products and construction methods of other contractors.
 2. If a dispute arises between contractors over concurrently selectable but incompatible products, Architect will determine which products shall be used.

1.6 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, and handle products using means and methods that will prevent damage, deterioration, and loss, including theft and vandalism. Comply with manufacturer's written instructions.

B. Delivery and Handling:

1. Schedule delivery to minimize long-term storage at Project site and to prevent overcrowding of construction spaces.
2. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.
3. Deliver products to Project site in an undamaged condition in manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
4. Inspect products on delivery to determine compliance with the Contract Documents and to determine that products are undamaged and properly protected.

C. Storage:

1. Store products to allow for inspection and measurement of quantity or counting of units.
2. Store materials in a manner that will not endanger Project structure.
3. Store products that are subject to damage by the elements, under cover in a weathertight enclosure above ground, with ventilation adequate to prevent condensation.

4. Store foam plastic from exposure to sunlight, except to extent necessary for period of installation and concealment.
5. Comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.
6. Protect stored products from damage and liquids from freezing.
7. Provide a secure location and enclosure at Project site for storage of materials and equipment by Owner's construction forces. Coordinate location with Owner.

1.7 PRODUCT WARRANTIES

- A. Warranties specified in other Sections shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents.
 1. Manufacturer's Warranty: Written warranty furnished by individual manufacturer for a particular product and specifically endorsed by manufacturer to Owner.
 2. Special Warranty: Written warranty required by the Contract Documents to provide specific rights for Owner.
- B. Special Warranties: Prepare a written document that contains appropriate terms and identification, ready for execution.
 1. Manufacturer's Standard Form: Modified to include Project-specific information and properly executed.
 2. Specified Form: When specified forms are included with the Specifications, prepare a written document using indicated form properly executed.
 3. Refer to Divisions 02 through 49. Sections for specific content requirements and particular requirements for submitting special warranties.
- C. Submittal Time: Comply with requirements in Section 017700 "Closeout Procedures."

PART 2 - PRODUCTS

2.1 PRODUCT SELECTION PROCEDURES

- A. General Product Requirements: Provide products that comply with the Contract Documents, are undamaged and, unless otherwise indicated, are new at time of installation.
 1. Provide products complete with accessories, trim, finish, fasteners, and other items needed for a complete installation and indicated use and effect.
 2. Standard Products: If available, and unless custom products or nonstandard options are specified, provide standard products of types that have been produced and used successfully in similar situations on other projects.
 3. Owner reserves the right to limit selection to products with warranties not in conflict with requirements of the Contract Documents.
 4. Where products are accompanied by the term "as selected," Architect will make selection.
 5. Descriptive, performance, and reference standard requirements in the Specifications establish salient characteristics of products.

6. Or Equal: For products specified by name and accompanied by the term "or equal," or "or approved equal," or "or approved," comply with requirements in "Comparable Products" Article to obtain approval for use of an unnamed product.

B. Product Selection Procedures:

1. Product: Where Specifications name a single manufacturer and product, provide the named product that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
2. Manufacturer/Source: Where Specifications name a single manufacturer or source, provide a product by the named manufacturer or source that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
3. Products:
 - a. Restricted List: Where Specifications include a list of names of both manufacturers and products, provide one (1) of the products listed that complies with requirements. Comparable products or substitutions for Contractor's convenience will be considered, unless otherwise indicated.
 - b. Nonrestricted List: Where Specifications include a list of names of both available manufacturers and products, provide one (1) of the products listed, or an unnamed product, that complies with requirements. Comply with requirements in "Comparable Products" Article for consideration of an unnamed product.
4. Manufacturers:
 - a. Restricted List: Where Specifications include a list of manufacturers' names, provide a product by one (1) of the manufacturers listed that complies with requirements. Comparable products or substitutions for Contractor's convenience will be considered, unless otherwise indicated.
 - b. Nonrestricted List: Where Specifications include a list of available manufacturers, provide a product by one (1) of the manufacturers listed, or a product by an unnamed manufacturer, that complies with requirements. Comply with requirements in "Comparable Products" Article for consideration of an unnamed manufacturer's product.
5. Basis-of-Design Product: Where Specifications name a product, or refer to a product indicated on Drawings, and include a list of manufacturers, provide the specified or indicated product or a comparable product by one (1) of the other named manufacturers. Drawings and Specifications indicate sizes, profiles, dimensions, and other characteristics that are based on the product named. Comply with requirements in "Comparable Products" Article for consideration of an unnamed product by one (1) of the other named manufacturers.

C. Visual Matching Specification: Where Specifications require "match Architect's sample", provide a product that complies with requirements and matches Architect's sample. Architect's decision will be final on whether a proposed product matches.

1. If no product available within specified category matches and complies with other specified requirements, comply with requirements in Section 012500 "Substitution Procedures" for proposal of product.

- D. Visual Selection Specification: Where Specifications include the phrase "as selected by Architect from manufacturer's full range" or similar phrase, select a product that complies with requirements. Architect will select color, gloss, pattern, density, or texture from manufacturer's product line that includes both standard and premium items.

2.2 COMPARABLE PRODUCTS

- A. Conditions for Consideration: Architect will consider Contractor's request for comparable product when the following conditions are satisfied. If the following conditions are not satisfied, Architect may return requests without action, except to record noncompliance with these requirements:
1. Evidence that the proposed product does not require revisions to the Contract Documents, that it is consistent with the Contract Documents and will produce the indicated results, and that it is compatible with other portions of the Work.
 2. Detailed comparison of significant qualities of proposed product with those named in the Specifications. Significant qualities include attributes such as performance, weight, size, durability, visual effect, and specific features and requirements indicated.
 3. Evidence that proposed product provides specified warranty.
 4. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners, if requested.
 5. Samples, if requested.

PART 3 - EXECUTION (Not Used)

END OF SECTION 016000

SECTION 017300 - EXECUTION

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 general administrative and procedural requirements governing execution of the Work including, but not limited to, the following:

- 1. Installation of the Work.
- 2. Cutting and patching.
- 3. Progress cleaning.
- 4. Starting and adjusting.
- 5. Protection of installed construction.
- 6. Correction of the Work.

- B. Related Sections:

- 1. Section 013300 "Submittal Procedures" for submitting surveys.
- 2. Section 017700 "Closeout Procedures" for submitting Project Record Documents, recording of Owner-accepted deviations from indicated lines and levels, and final cleaning.

1.3 DEFINITIONS

- A. Cutting: Removal of in-place construction necessary to permit installation or performance of other work.
- B. Patching: Fitting and repair work required to restore construction to original conditions after installation of other work.

1.4 QUALITY ASSURANCE

- A. Cutting and Patching: Comply with requirements for and limitations on cutting and patching of construction elements.

- 1. Structural Elements: When cutting and patching structural elements, notify Architect of locations and details of cutting and await directions from the Architect before proceeding. Shore, brace, and support structural element during cutting and patching. Do not cut and patch structural elements in a manner that could change their load-carrying capacity or increase deflection
- 2. Operational Elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or that results in increased maintenance or decreased operational life or safety.

3. Other Construction Elements: Do not cut and patch other construction elements or components in a manner that could change their load-carrying capacity, that results in reducing their capacity to perform as intended, or that results in increased maintenance or decreased operational life or safety
 4. Visual Elements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch exposed construction in a manner that would, in Architect's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.
- B. Manufacturer's Installation Instructions: Obtain and maintain on-site manufacturer's written recommendations and instructions for installation of products and equipment.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. General: Comply with requirements specified in other Sections.
- B. In-Place Materials: Use materials for patching identical to in-place materials. For exposed surfaces, use materials that visually match in-place adjacent surfaces to the fullest extent possible.
1. If identical materials are unavailable or cannot be used, use materials that, when installed, will provide a match acceptable to the Architect for the visual and functional performance of in-place materials.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Existing Conditions: The existence and location of underground and other utilities and construction indicated as existing are not guaranteed. Before beginning sitework, investigate and verify the existence and location of underground utilities, mechanical and electrical systems, and other construction affecting the Work.
1. Before construction, verify the location and invert elevation at points of connection of sanitary sewer, storm sewer, and water-service piping; underground electrical services, and other utilities.
 2. Furnish location data for work related to Project that must be performed by public utilities serving Project site.
- B. Examination and Acceptance of Conditions: Before proceeding with each component of the Work, examine substrates, areas, and conditions, with Installer or Applicator present where indicated, for compliance with requirements for installation tolerances and other conditions affecting performance. Record observations.
1. Written Report: Where a written report listing conditions detrimental to performance of the Work is required by other Sections, include the following:

- a. Description of the Work.
 - b. List of detrimental conditions, including substrates.
 - c. List of unacceptable installation tolerances.
 - d. Recommended corrections.
2. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.
 3. Examine roughing-in for mechanical and electrical systems to verify actual locations of connections before equipment and fixture installation.
 4. Examine walls, floors, and roofs for suitable conditions where products and systems are to be installed.
 5. Proceed with installation only after unsatisfactory conditions have been corrected. Proceeding with the Work indicates acceptance of surfaces and conditions.

3.2 PREPARATION

- A. Existing Utility Information: Furnish information to local utility that is necessary to adjust, move, or relocate existing utility structures, utility poles, lines, services, or other utility appurtenances located in or affected by construction. Coordinate with authorities having jurisdiction.
- B. Field Measurements: Take field measurements as required to fit the Work properly. Recheck measurements before installing each product. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
- C. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.
- D. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents caused by differing field conditions outside the control of the Contractor, submit a request for information to Architect according to requirements in Section 013100 "Project Management and Coordination."

3.3 INSTALLATION

- A. General: Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.
 1. Make vertical work plumb and make horizontal work level.
 2. Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.
 3. Conceal pipes, ducts, and wiring in finished areas, unless otherwise indicated.
 4. Maintain minimum headroom clearance of 96 inches in occupied spaces and 90 inches in unoccupied spaces.
- B. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.

- C. Install products at the time and under conditions that will ensure the best possible results. Maintain conditions required for product performance until Substantial Completion.
- D. Conduct construction operations so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy.
- E. Tools and Equipment: Do not use tools or equipment that produce harmful noise levels.
- F. Templates: Obtain and distribute to the parties involved templates for work specified to be factory prepared and field installed. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing products to comply with indicated requirements.
- G. Attachment: Provide blocking and attachment plates and anchors and fasteners of adequate size and number to securely anchor each component in place, accurately located and aligned with other portions of the Work. Where size and type of attachments are not indicated, verify size and type required for load conditions.
 - 1. Mounting Heights: Where mounting heights are not indicated, mount components at heights directed by Architect.
 - 2. Allow for building movement, including thermal expansion and contraction.
 - 3. Coordinate installation of anchorages. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.
- H. Joints: Make joints of uniform width. Where joint locations in exposed work are not indicated, arrange joints for the best visual effect. Fit exposed connections together to form hairline joints.
- I. Hazardous Materials: Use products, cleaners, and installation materials that are not considered hazardous.

3.4 CUTTING AND PATCHING

- A. Cutting and Patching, General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.
 - 1. Cut in-place construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.
- B. Temporary Support: Provide temporary support of work to be cut.
- C. Protection: Protect in-place construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.
- D. Adjacent Occupied Areas: Where interference with use of adjoining areas or interruption of free passage to adjoining areas is unavoidable, coordinate cutting and patching.

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- E. Existing Utility Services: Where existing services are required to be removed, relocated, or abandoned, bypass such systems before cutting to minimize interruption to occupied areas.
- F. Cutting: Cut in-place construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.
1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots neatly to minimum size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
 2. Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
 3. Concrete and Masonry: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.
 4. Mechanical and Electrical Services: Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting.
 5. Proceed with patching after construction operations requiring cutting are complete.
- G. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other work. Patch with durable seams that are as invisible as practicable. Provide materials and comply with installation requirements specified in other Sections, where applicable.
1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate physical integrity of installation.
 2. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will minimize evidence of patching and refinishing.
 - a. Clean piping, conduit, and similar features before applying paint or other finishing materials.
 - b. Restore damaged pipe covering to its original condition.
 3. Floors and Walls: Where walls or partitions that are removed extend one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform finish, color, texture, and appearance. Remove in-place floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.
 - a. Where patching occurs in a painted surface, prepare substrate and apply primer and intermediate paint coats appropriate for substrate over the patch, and apply final paint coat over entire unbroken surface containing the patch. Provide additional coats until patch blends with adjacent surfaces.
 4. Ceilings: Patch, repair, or rehang in-place ceilings as necessary to provide an even-plane surface of uniform appearance.
 5. Exterior Building Enclosure: Patch components in a manner that restores enclosure to a weathertight condition.

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- H. Cleaning: Clean areas and spaces where cutting and patching are performed. Remove paint, mortar, oils, putty, and similar materials from adjacent finished surfaces.

3.5 PROGRESS CLEANING

- A. General: Clean Project site and work areas daily, including common areas. Enforce requirements strictly. Dispose of materials lawfully.
1. Comply with requirements in NFPA 241 for removal of combustible waste materials and debris.
 2. Do not hold waste materials more than seven (7) days during normal weather or three (3) days if the temperature is expected to rise above 80 deg F (27 deg C).
 3. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.
 - a. Utilize containers intended for holding waste materials of type to be stored.
 4. Coordinate progress cleaning for joint-use areas where more than one installer has worked.
- B. Site: Maintain Project site free of waste materials and debris.
- C. Work Areas: Clean areas where work is in progress to the level of cleanliness necessary for proper execution of the Work.
1. Remove liquid spills promptly.
 2. Where dust would impair proper execution of the Work, broom-clean or vacuum the entire work area, as appropriate.
- D. Installed Work: Keep installed work clean. Clean installed surfaces according to written instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended, use cleaning materials that are not hazardous to health or property and that will not damage exposed surfaces.
- E. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.
- F. Exposed Surfaces in Finished Areas: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.
- G. Waste Disposal: Do not bury or burn waste materials on-site. Do not wash waste materials down sewers or into waterways. Comply with waste disposal requirements in Section 015000 "Temporary Facilities and Controls."
- H. During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.
- I. Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.

- J. Limiting Exposures: Supervise construction operations to assure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.

3.6 STARTING AND ADJUSTING

- A. Start equipment and operating components to confirm proper operation. Remove malfunctioning units, replace with new units, and retest.
- B. Adjust equipment for proper operation. Adjust operating components for proper operation without binding.
- C. Test each piece of equipment to verify proper operation. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- D. Manufacturer's Field Service: Comply with qualification requirements in Section 014000 "Quality Requirements."

3.7 PROTECTION OF INSTALLED CONSTRUCTION

- A. Provide final protection and maintain conditions that ensure installed Work is without damage or deterioration at time of Substantial Completion.
- B. Comply with manufacturer's written instructions for temperature and relative humidity.

3.8 CORRECTION OF THE WORK

- A. Repair or remove and replace defective construction. Restore damaged substrates and finishes.
 - 1. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment.
- B. Restore permanent facilities used during construction to their specified condition.
- C. Remove and replace damaged surfaces that are exposed to view if surfaces cannot be repaired without visible evidence of repair.
- D. Repair components that do not operate properly. Remove and replace operating components that cannot be repaired.
- E. Remove and replace chipped, scratched, and broken glass or reflective surfaces.

END OF SECTION 017300

SECTION 017700 - CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for contract closeout, including, but not limited to, the following:

- 1. Substantial Completion procedures.
- 2. Final completion procedures.
- 3. Warranties.
- 4. Final cleaning.
- 5. Repair of the Work.

- B. Related Sections:

- 1. Section 017300 "Execution" for progress cleaning of Project site.
- 2. Section 017823 "Operation and Maintenance Data" for operation and maintenance manual requirements.
- 3. Section 017839 "Project Record Documents" for submitting Record Drawings, Record Specifications, and Record Product Data.
- 4. Section 017900 "Demonstration and Training" for requirements for instructing Owner's personnel.
- 5. Divisions 02 through 49 Sections for specific closeout and special cleaning requirements for the Work in those Sections.

1.3 ACTION SUBMITTALS

- A. Product Data: For cleaning agents.
- B. Contractor's List of Incomplete Items: Initial submittal at Substantial Completion.
- C. Certified List of Incomplete Items: Final submittal at Final Completion.

1.4 CLOSEOUT SUBMITTALS

- A. Certificates of Release: From authorities having jurisdiction.
- B. Certificate of Insurance: For continuing coverage.

1.5 MAINTENANCE MATERIAL SUBMITTALS

- A. Schedule of Maintenance Material Items: For maintenance material submittal items specified in other Sections.

1.6 SUBSTANTIAL COMPLETION

- A. Preliminary Procedures: Before requesting inspection for determining date of Substantial Completion, complete the following. List items below that are incomplete with request.
1. Prepare a list of items to be completed and corrected (punch list), the value of items on the list, and reasons why the Work is not complete.
 2. Advise Owner of pending insurance changeover requirements.
 3. Submit specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
 4. Obtain and submit releases permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
 5. Prepare and submit Project Record Documents, operation and maintenance manuals, final completion construction photographic documentation, damage or settlement surveys, property surveys, and similar final record information.
 6. Deliver tools, spare parts, extra materials, and similar items to location designated by Owner. Label with manufacturer's name and model number where applicable.
 7. Make final changeover of permanent locks and deliver keys to Owner. Advise Owner's personnel of changeover in security provisions.
 8. Complete startup testing of systems.
 9. Submit test/adjust/balance records.
 10. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.
 11. Advise Owner of changeover in heat and other utilities.
 12. Submit changeover information related to Owner's occupancy, use, operation, and maintenance.
 13. Complete final cleaning requirements, including touchup painting.
 14. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.
- B. Inspection: Submit a written request for inspection for Substantial Completion. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare the Certificate of Substantial Completion after inspection or will notify Contractor of items, either on Contractor's list or additional items identified by Architect, that must be completed or corrected before certificate will be issued.
1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.
 2. Results of completed inspection will form the basis of requirements for final completion.

1.7 FINAL COMPLETION

- A. Preliminary Procedures: Before requesting final inspection for determining final completion, complete the following:
1. Submit a final Application for Payment according to Section 012900 "Payment Procedures."
 2. Submit certified copy of Architect's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Architect. The certified copy

of the list shall state that each item has been completed or otherwise resolved for acceptance.

3. Submit evidence of final, continuing insurance coverage complying with insurance requirements.
4. Submit pest-control final inspection report and warranty.
5. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems.
6. Secure and provide both temporary and final Certificate of Occupancy from the Building Official, meeting all local and state permit closeout requirements.

B. Inspection: Submit a written request for final inspection for acceptance. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare a final Certificate for Payment after inspection or will notify Contractor of construction that must be completed or corrected before certificate will be issued.

1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.

1.8 LIST OF INCOMPLETE ITEMS (PUNCH LIST)

A. Organization of List: Include name and identification of each space and area affected by construction operations for incomplete items and items needing correction including, if necessary, areas disturbed by Contractor that are outside the limits of construction. Use **CSI Form 14.1A**.

1. Organize list of spaces in sequential order, starting with exterior areas first and proceeding from lowest floor to highest floor.
2. Organize items applying to each space by major element, including categories for ceiling, individual walls, floors, equipment, and building systems.
3. Include the following information at the top of each page:
 - a. Project name.
 - b. Date.
 - c. Name of Architect.
 - d. Name of Contractor.
 - e. Page number.
4. Submit list of incomplete items in the following format:
 - a. PDF electronic file. Architect will return annotated file.

1.9 WARRANTIES

A. Submittal Time: Submit written warranties on request of Architect for designated portions of the Work where commencement of warranties other than date of Substantial Completion is indicated.

B. Partial Occupancy: Submit properly executed warranties within fifteen (15) days of completion of designated portions of the Work that are completed and occupied or used by Owner during construction period by separate agreement with Contractor.

- C. Organize warranty documents into an orderly sequence based on the table of contents of the Project Manual.
 - 1. Bind warranties and bonds in heavy-duty, three-ring, vinyl-covered, loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8½-by-11-inch paper.
 - 2. Provide heavy paper dividers with plastic-covered tabs for each separate warranty. Mark tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product and the name, address, and telephone number of Installer.
 - 3. Identify each binder on the front and spine with the typed or printed title "WARRANTIES," Project name, and name of Contractor.
 - 4. Scan warranties and bonds and assemble complete warranty and bond submittal package into a single indexed electronic PDF file with links enabling navigation to each item. Provide table of contents at beginning of document.

- D. Provide additional copies of each warranty to include in operation and maintenance manuals.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Cleaning Agents: Use cleaning materials and agents recommended by manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.

PART 3 - EXECUTION

3.1 FINAL CLEANING

- A. General: Perform final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.

- B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.
 - 1. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for entire Project or for a designated portion of Project:
 - a. Clean Project site, yard, and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter, and other foreign substances.
 - b. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.
 - c. Rake grounds that are neither planted nor paved to a smooth, even-textured surface.

- d. Remove tools, construction equipment, machinery, and surplus material from Project site.
- e. Remove snow and ice to provide safe access to building.
- f. Remove labels that are not permanent.
- g. Leave Project clean and ready for occupancy.

3.2 REPAIR OF THE WORK

- A. Complete repair and restoration operations before requesting inspection for determination of Substantial Completion.
- B. Repair or remove and replace defective construction. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment. Where damaged or worn items cannot be repaired or restored, provide replacements. Remove and replace operating components that cannot be repaired. Restore damaged construction and permanent facilities used during construction to specified condition.
 - 1. Remove and replace chipped, scratched, and broken glass, reflective surfaces, and other damaged transparent materials.
 - 2. Touch up and otherwise repair and restore marred or exposed finishes and surfaces. Replace finishes and surfaces that already show evidence of repair or restoration.
 - a. Do not paint over "UL" and other required labels and identification, including mechanical and electrical nameplates. Remove paint applied to required labels and identification.
 - 3. Replace parts subject to operating conditions during construction that may impede operation or reduce longevity.
 - 4. Replace burned-out bulbs, bulbs noticeably dimmed by hours of use, and defective and noisy starters in fluorescent and mercury vapor fixtures to comply with requirements for new fixtures.

END OF SECTION 017700

SECTION 017823 - OPERATION AND MAINTENANCE DATA

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for preparing operation and maintenance manuals, including the following:
 - 1. Operation and maintenance documentation directory.
 - 2. Emergency manuals.
 - 3. Operation manuals for systems, subsystems, and equipment.
 - 4. Product maintenance manuals.
 - 5. Systems and equipment maintenance manuals.
- B. Related Sections:
 - 1. Section 013300 "Submittal Procedures" for submitting copies of submittals for operation and maintenance manuals.
 - 2. Divisions 02 through 49 Sections for specific operation and maintenance manual requirements for the Work in those Sections.

1.3 DEFINITIONS

- A. System: An organized collection of parts, equipment, or subsystems united by regular interaction.
- B. Subsystem: A portion of a system with characteristics similar to a system.

1.4 CLOSEOUT SUBMITTALS

- A. Manual Content: Operations and maintenance manual content is specified in individual specification sections to be reviewed at the time of Section submittals. Submit reviewed manual content formatted and organized as required by this Section.
 - 1. Where applicable, clarify and update reviewed manual content to correspond to modifications and field conditions.
- B. Format: Submit operations and maintenance manuals in the following format:
 - 1. Three (3) paper copies. Include a complete operation and maintenance directory. Enclose title pages and directories in clear plastic sleeves. Architect will return two (2) copies.

- C. Initial Manual Submittal: Submit draft copy of each manual at least thirty (30) days before commencing demonstration and training. Architect will comment on whether general scope and content of manual are acceptable.
- D. Final Manual Submittal: Submit each manual in final form prior to requesting inspection for Substantial Completion and at least fifteen (15) days before commencing demonstration and training. Architect will return copy with comments.
 - 1. Correct or modify each manual to comply with Architect's comments. Submit copies of each corrected manual within fifteen (15) days of receipt of Architect's comments and prior to commencing demonstration and training.

PART 2 - PRODUCTS

2.1 OPERATION AND MAINTENANCE DOCUMENTATION DIRECTORY

- A. Organization: Include a section in the directory for each of the following:
 - 1. List of documents.
 - 2. List of systems.
 - 3. List of equipment.
 - 4. Table of contents.
- B. List of Systems and Subsystems: List systems alphabetically. Include references to operation and maintenance manuals that contain information about each system.
- C. List of Equipment: List equipment for each system, organized alphabetically by system. For pieces of equipment not part of system, list alphabetically in separate list.
- D. Tables of Contents: Include a table of contents for each emergency, operation, and maintenance manual.
- E. Identification: In the documentation directory and in each operation and maintenance manual, identify each system, subsystem, and piece of equipment with same designation used in the Contract Documents. If no designation exists, assign a designation according to ASHRAE Guideline 4, "Preparation of Operating and Maintenance Documentation for Building Systems."

2.2 REQUIREMENTS FOR EMERGENCY, OPERATION, AND MAINTENANCE MANUALS

- A. Organization: Unless otherwise indicated, organize each manual into a separate section for each system and subsystem, and a separate section for each piece of equipment not part of a system. Each manual shall contain the following materials, in the order listed:
 - 1. Title page.
 - 2. Table of contents.
 - 3. Manual contents.
- B. Title Page: Include the following information:
 - 1. Subject matter included in manual.

2. Name and address of Project.
 3. Name and address of Owner.
 4. Date of submittal.
 5. Name and contact information for Contractor.
 6. Name and contact information for Architect.
 7. Names and contact information for major consultants to the Architect that designed the systems contained in the manuals.
 8. Cross-reference to related systems in other operation and maintenance manuals.
- C. Table of Contents: List each product included in manual, identified by product name, indexed to the content of the volume, and cross-referenced to Specification Section number in Project Manual.
1. If operation or maintenance documentation requires more than one (1) volume to accommodate data, include comprehensive table of contents for all volumes in each volume of the set.
- D. Manual Contents: Organize into sets of manageable size. Arrange contents alphabetically by system, subsystem, and equipment. If possible, assemble instructions for subsystems, equipment, and components of one (1) system into a single binder.
- E. Manuals, Paper Copy: Submit manuals in the form of hard copy, bound and labeled volumes.
1. Binders: Heavy-duty, three-ring, vinyl-covered, loose-leaf binders, in thickness necessary to accommodate contents, sized to hold 8-1/2-by-11-inch paper; with clear plastic sleeve on spine to hold label describing contents and with pockets inside covers to hold folded oversize sheets.
 - a. If two (2) or more binders are necessary to accommodate data of a system, organize data in each binder into groupings by subsystem and related components. Cross-reference other binders if necessary to provide essential information for proper operation or maintenance of equipment or system.
 - b. Identify each binder on front and spine, with printed title "OPERATION AND MAINTENANCE MANUAL," Project title or name, and subject matter of contents. Indicate volume number for multiple-volume sets.
 2. Dividers: Heavy-paper dividers with plastic-covered tabs for each section of the manual. Mark each tab to indicate contents. Include typed list of products and major components of equipment included in the section on each divider, cross-referenced to Specification Section number and title of Project Manual.
 3. Protective Plastic Sleeves: Transparent plastic sleeves designed to enclose diagnostic software storage media for computerized electronic equipment.
 4. Supplementary Text: Prepared on 8½-by-11-inch white bond paper.
 5. Drawings: Attach reinforced, punched binder tabs on drawings and bind with text.
 - a. If oversize drawings are necessary, fold drawings to same size as text pages and use as foldouts.
 - b. If drawings are too large to be used as foldouts, fold and place drawings in labeled envelopes and bind envelopes in rear of manual. At appropriate locations in manual, insert typewritten pages indicating drawing titles, descriptions of contents, and drawing locations.

2.3 EMERGENCY MANUALS

- A. Content: Organize manual into a separate section for each of the following:
1. Type of emergency.
 2. Emergency instructions.
 3. Emergency procedures.
- B. Type of Emergency: Where applicable for each type of emergency indicated below, include instructions and procedures for each system, subsystem, piece of equipment, and component:
1. Fire.
 2. Flood.
 3. Gas leak.
 4. Water leak.
 5. Power failure.
 6. Water outage.
 7. System, subsystem, or equipment failure.
 8. Chemical release or spill.
- C. Emergency Instructions: Describe and explain warnings, trouble indications, error messages, and similar codes and signals. Include responsibilities of Owner's operating personnel for notification of Installer, supplier, and manufacturer to maintain warranties.
- D. Emergency Procedures: Include the following, as applicable:
1. Instructions on stopping.
 2. Shutdown instructions for each type of emergency.
 3. Operating instructions for conditions outside normal operating limits.
 4. Required sequences for electric or electronic systems.
 5. Special operating instructions and procedures.

2.4 OPERATION MANUALS

- A. Content: In addition to requirements in this Section, include operation data required in individual Specification Sections and the following information:
1. System, subsystem, and equipment descriptions. Use designations for systems and equipment indicated on Contract Documents.
 2. Performance and design criteria if Contractor is delegated design responsibility.
 3. Operating standards.
 4. Operating procedures.
 5. Operating logs.
 6. Wiring diagrams.
 7. Control diagrams.
 8. Piped system diagrams.
 9. Precautions against improper use.
 10. License requirements including inspection and renewal dates.
- B. Descriptions: Include the following:

1. Product name and model number. Use designations for products indicated on Contract Documents.
2. Manufacturer's name.
3. Equipment identification with serial number of each component.
4. Equipment function.
5. Operating characteristics.
6. Limiting conditions.
7. Performance curves.
8. Engineering data and tests.
9. Complete nomenclature and number of replacement parts.

C. Operating Procedures: Include the following, as applicable:

1. Startup procedures.
2. Equipment or system break-in procedures.
3. Routine and normal operating instructions.
4. Regulation and control procedures.
5. Instructions on stopping.
6. Normal shutdown instructions.
7. Seasonal and weekend operating instructions.
8. Required sequences for electric or electronic systems.
9. Special operating instructions and procedures.

D. Systems and Equipment Controls: Describe the sequence of operation, and diagram controls as installed.

E. Piped Systems: Diagram piping as installed, and identify color-coding where required for identification.

2.5 PRODUCT MAINTENANCE MANUALS

A. Content: Organize manual into a separate section for each product, material, and finish. Include source information, product information, maintenance procedures, repair materials and sources, and warranties and bonds, as described below.

B. Source Information: List each product included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual and drawing or schedule designation or identifier where applicable.

C. Product Information: Include the following, as applicable:

1. Product name and model number.
2. Manufacturer's name.
3. Color, pattern, and texture.
4. Material and chemical composition.
5. Reordering information for specially manufactured products.

D. Maintenance Procedures: Include manufacturer's written recommendations and the following:

1. Inspection procedures.
2. Types of cleaning agents to be used and methods of cleaning.
3. List of cleaning agents and methods of cleaning detrimental to product.
4. Schedule for routine cleaning and maintenance.
5. Repair instructions.

E. Repair Materials and Sources: Include lists of materials and local sources of materials and related services.

F. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.

1. Include procedures to follow and required notifications for warranty claims.

2.6 SYSTEMS AND EQUIPMENT MAINTENANCE MANUALS

A. Content: For each system, subsystem, and piece of equipment not part of a system, include source information, manufacturers' maintenance documentation, maintenance procedures, maintenance and service schedules, spare parts list and source information, maintenance service contracts, and warranty and bond information, as described below.

B. Source Information: List each system, subsystem, and piece of equipment included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual and drawing or schedule designation or identifier where applicable.

C. Manufacturers' Maintenance Documentation: Manufacturers' maintenance documentation including the following information for each component part or piece of equipment:

1. Standard maintenance instructions and bulletins.
2. Drawings, diagrams, and instructions required for maintenance, including disassembly and component removal, replacement, and assembly.
3. Identification and nomenclature of parts and components.
4. List of items recommended to be stocked as spare parts.

D. Maintenance Procedures: Include the following information and items that detail essential maintenance procedures:

1. Test and inspection instructions.
2. Troubleshooting guide.
3. Precautions against improper maintenance.
4. Disassembly; component removal, repair, and replacement; and reassembly instructions.
5. Aligning, adjusting, and checking instructions.
6. Demonstration and training video recording, if available.

E. Maintenance and Service Schedules: Include service and lubrication requirements, list of required lubricants for equipment, and separate schedules for preventive and routine maintenance and service with standard time allotment.

1. Scheduled Maintenance and Service: Tabulate actions for daily, weekly, monthly, quarterly, semiannual, and annual frequencies.
 2. Maintenance and Service Record: Include manufacturers' forms for recording maintenance.
- F. Spare Parts List and Source Information: Include lists of replacement and repair parts, with parts identified and cross-referenced to manufacturers' maintenance documentation and local sources of maintenance materials and related services.
- G. Maintenance Service Contracts: Include copies of maintenance agreements with name and telephone number of service agent.
- H. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.
1. Include procedures to follow and required notifications for warranty claims.

PART 3 - EXECUTION

3.1 MANUAL PREPARATION

- A. Emergency Manual: Assemble a complete set of emergency information indicating procedures for use by emergency personnel and by Owner's operating personnel for types of emergencies indicated.
- B. Product Maintenance Manual: Assemble a complete set of maintenance data indicating care and maintenance of each product, material, and finish incorporated into the Work.
- C. Operation and Maintenance Manuals: Assemble a complete set of operation and maintenance data indicating operation and maintenance of each system, subsystem, and piece of equipment not part of a system.
1. Engage a factory-authorized service representative to assemble and prepare information for each system, subsystem, and piece of equipment not part of a system.
 2. Prepare a separate manual for each system and subsystem, in the form of an instructional manual for use by Owner's operating personnel.
- D. Manufacturers' Data: Where manuals contain manufacturers' standard printed data, include only sheets pertinent to product or component installed. Mark each sheet to identify each product or component incorporated into the Work. If data include more than one (1) item in a tabular format, identify each item using appropriate references from the Contract Documents. Identify data applicable to the Work and delete references to information not applicable.
1. Prepare supplementary text if manufacturers' standard printed data are not available and where the information is necessary for proper operation and maintenance of equipment or systems.
- E. Drawings: Prepare drawings supplementing manufacturers' printed data to illustrate the relationship of component parts of equipment and systems and to illustrate control sequence and

flow diagrams. Coordinate these drawings with information contained in record Drawings to ensure correct illustration of completed installation.

1. Do not use original project record documents as part of operation and maintenance manuals.
2. Comply with requirements of newly prepared record Drawings in Section 017839 "Project Record Documents."

END OF SECTION 017823

SECTION 017839 - PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for project record documents, including the following:
 - 1. Record Drawings.
 - 2. Record Specifications.
 - 3. Record Product Data.
 - 4. Miscellaneous record submittals.
- B. Related Sections:
 - 1. Section 017300 "Execution" for final property survey.
 - 2. Section 017700 "Closeout Procedures" for general closeout procedures.
 - 3. Section 017823 "Operation and Maintenance Data" for operation and maintenance manual requirements.
 - 4. Divisions 02 through 49 Sections for specific requirements for project record documents of the Work in those Sections.

1.3 CLOSEOUT SUBMITTALS

- A. Record Drawings: Comply with the following:
 - 1. Number of Copies: Submit one (1) set(s) of marked-up record prints.
- B. Record Specifications: Submit one (1) paper copy of Project's Specifications, including addenda and contract modifications.
- C. Record Product Data: Submit one (1) paper copy of each submittal.
 - 1. Where record Product Data are required as part of operation and maintenance manuals, submit duplicate marked-up Product Data as a component of manual.

PART 2 - PRODUCTS

2.1 RECORD DRAWINGS

- A. Record Prints: Maintain one (1) set of marked-up paper copies of the Contract Drawings and Shop Drawings.

1. Preparation: Mark record prints to show the actual installation where installation varies from that shown originally. Require individual or entity who obtained record data, whether individual or entity is Installer, subcontractor, or similar entity, to provide information for preparation of corresponding marked-up record prints.
 - a. Give particular attention to information on concealed elements that would be difficult to identify or measure and record later.
 - b. Accurately record information in an acceptable drawing technique.
 - c. Record data as soon as possible after obtaining it.
 - d. Record and check the markup before enclosing concealed installations.
 - e. Cross-reference record prints to corresponding archive photographic documentation.
 2. Content: Types of items requiring marking include, but are not limited to, the following:
 - a. Dimensional changes to Drawings.
 - b. Revisions to details shown on Drawings.
 - c. Depths of foundations below first floor.
 - d. Locations and depths of underground utilities.
 - e. Revisions to routing of piping and conduits.
 - f. Revisions to electrical circuitry.
 - g. Actual equipment locations.
 - h. Duct size and routing.
 - i. Locations of concealed internal utilities.
 - j. Changes made by Change Order or Construction Change Directive.
 - k. Changes made following Architect's written orders.
 - l. Details not on the original Contract Drawings.
 - m. Field records for variable and concealed conditions.
 - n. Record information on the Work that is shown only schematically.
 3. Mark the Contract Drawings and Shop Drawings completely and accurately. Utilize personnel proficient at recording graphic information in production of marked-up record prints.
 4. Mark record sets with erasable, red-colored pencil. Use other colors to distinguish between changes for different categories of the Work at same location.
 5. Mark important additional information that was either shown schematically or omitted from original Drawings.
 6. Note Construction Change Directive numbers, alternate numbers, Change Order numbers, and similar identification, where applicable.
- B. Format: Identify and date each record Drawing; include the designation "PROJECT RECORD DRAWING" in a prominent location.
1. Record Prints: Organize record prints and newly prepared record Drawings into manageable sets. Bind each set with durable paper cover sheets. Include identification on cover sheets.
 2. Format:
 - a. Paper copy.
 - b. Digital CADD.
 - c. PDF.
 3. Identification: As follows:

- a. Project name.
- b. Date.
- c. Designation "PROJECT RECORD DRAWINGS."
- d. Name of Architect.
- e. Name of Contractor.

2.2 RECORD SPECIFICATIONS

- A. Preparation: Mark Specifications to indicate the actual product installation where installation varies from that indicated in Specifications, addenda, and contract modifications.
 - 1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
 - 2. Mark copy with the proprietary name and model number of products, materials, and equipment furnished, including substitutions and product options selected.
 - 3. Record the name of manufacturer, supplier, Installer, and other information necessary to provide a record of selections made.
 - 4. For each principal product, indicate whether record Product Data has been submitted in operation and maintenance manuals instead of submitted as record Product Data.
 - 5. Note related Change Orders, record Product Data, and record Drawings where applicable.
- B. Format: Submit record Specifications as:
 - 1. Paper copy.
 - 2. Digital PDF.

2.3 RECORD PRODUCT DATA

- A. Preparation: Mark Product Data to indicate the actual product installation where installation varies substantially from that indicated in Product Data submittal.
 - 1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
 - 2. Include significant changes in the product delivered to Project site and changes in manufacturer's written instructions for installation.
 - 3. Note related Change Orders, record Specifications, and record Drawings where applicable.
- B. Format: Submit record Product Data as paper copy and PDF.
 - 1. Include record Product Data directory organized by specification section number and title, electronically linked to each item of record Product Data.

PART 3 - EXECUTION

3.1 RECORDING AND MAINTENANCE

- A. Recording: Maintain one (1) copy of each submittal during the construction period for project record document purposes. Post changes and modifications to project record documents as they occur; do not wait until the end of Project.

- B. Maintenance of Record Documents and Samples: Store record documents and Samples in the field office apart from the Contract Documents used for construction. Do not use project record documents for construction purposes. Maintain record documents in good order and in a clean, dry, legible condition, protected from deterioration and loss. Provide access to project record documents for Architect's reference during normal working hours.

END OF SECTION 017839

SECTION 017900 - DEMONSTRATION AND TRAINING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for instructing Owner's personnel, including the following:

- 1. Demonstration of operation of systems, subsystems, and equipment.
- 2. Training in operation and maintenance of systems, subsystems, and equipment.

- B. Related Sections:

- 1. Divisions 02 through 49 Sections for specific requirements for demonstration and training for products in those Sections.

1.3 INFORMATIONAL SUBMITTALS

- A. Instruction Program: Submit outline of instructional program for demonstration and training, including a list of training modules and a schedule of proposed dates, times, length of instruction time, and instructors' names for each training module. Include learning objective and outline for each training module.

- 1. Indicate proposed training modules utilizing manufacturer-produced demonstration for systems, equipment, and products.

- B. Attendance Record: For each training module, submit list of participants and length of instruction time.

- C. Evaluations: For each participant and for each training module, submit results and documentation of performance-based test.

1.4 QUALITY ASSURANCE

- A. Facilitator Qualifications: A firm or individual experienced in training or educating maintenance personnel in a training program similar in content and extent to that indicated for this Project, and whose work has resulted in training or education with a record of successful learning performance.

- B. Instructor Qualifications: A factory-authorized service representative experienced in operation and maintenance procedures and training.

1.5 COORDINATION

- A. Coordinate instruction schedule with Owner's operations. Adjust schedule as required to minimize disrupting Owner's operations.
- B. Coordinate instructors, including providing notification of dates, times, length of instruction time, and course content.
- C. Coordinate content of training modules with content of approved emergency, operation, and maintenance manuals. Do not submit instruction program until operation and maintenance data has been reviewed and approved by Architect.

PART 2 - PRODUCTS

2.1 INSTRUCTION PROGRAM

- A. Program Structure: Develop an instruction program that includes individual training modules for each system and for equipment not part of a system, as required by individual Specification Sections.
- B. Training Modules: Develop a learning objective and teaching outline for each module. Include a description of specific skills and knowledge that participant is expected to master. For each module, include instruction for the following as applicable to the system, equipment, or component:
 - 1. Basis of System Design, Operational Requirements, and Criteria: Include the following:
 - a. System, subsystem, and equipment descriptions.
 - b. Performance and design criteria if Contractor is delegated design responsibility.
 - c. Operating standards.
 - d. Regulatory requirements.
 - e. Equipment function.
 - f. Operating characteristics.
 - g. Limiting conditions.
 - h. Performance curves.
 - 2. Documentation: Review the following items in detail:
 - a. Emergency manuals.
 - b. Operations manuals.
 - c. Maintenance manuals.
 - d. Identification systems.
 - e. Warranties and bonds.
 - f. Maintenance service agreements and similar continuing commitments.
 - 3. Emergencies: Include the following, as applicable:
 - a. Instructions on meaning of warnings, trouble indications, and error messages.
 - b. Instructions on stopping.
 - c. Shutdown instructions for each type of emergency.

- d. Operating instructions for conditions outside of normal operating limits.
 - e. Sequences for electric or electronic systems.
 - f. Special operating instructions and procedures.
4. Operations: Include the following, as applicable:
- a. Startup procedures.
 - b. Equipment or system break-in procedures.
 - c. Routine and normal operating instructions.
 - d. Regulation and control procedures.
 - e. Control sequences.
 - f. Safety procedures.
 - g. Instructions on stopping.
 - h. Normal shutdown instructions.
 - i. Operating procedures for emergencies.
 - j. Operating procedures for system, subsystem, or equipment failure.
 - k. Seasonal and weekend operating instructions.
 - l. Required sequences for electric or electronic systems.
 - m. Special operating instructions and procedures.
5. Adjustments: Include the following:
- a. Alignments.
 - b. Checking adjustments.
 - c. Noise and vibration adjustments.
 - d. Economy and efficiency adjustments.
6. Troubleshooting: Include the following:
- a. Diagnostic instructions.
 - b. Test and inspection procedures.
7. Maintenance: Include the following:
- a. Inspection procedures.
 - b. Types of cleaning agents to be used and methods of cleaning.
 - c. List of cleaning agents and methods of cleaning detrimental to product.
 - d. Procedures for routine cleaning
 - e. Procedures for preventive maintenance.
 - f. Procedures for routine maintenance.
 - g. Instruction on use of special tools.
8. Repairs: Include the following:
- a. Diagnosis instructions.
 - b. Repair instructions.
 - c. Disassembly; component removal, repair, and replacement; and reassembly instructions.
 - d. Instructions for identifying parts and components.
 - e. Review of spare parts needed for operation and maintenance.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Assemble educational materials necessary for instruction, including documentation and training module. Assemble training modules into a training manual organized in coordination with requirements in Section 017823 "Operations and Maintenance Data."
- B. Set up instructional equipment at instruction location.

3.2 INSTRUCTION

- A. Facilitator: Engage a qualified facilitator to prepare instruction program and training modules, to coordinate instructors, and to coordinate between Contractor and Owner for number of participants, instruction times, and location.
- B. Engage qualified instructors to instruct Owner's personnel to adjust, operate, and maintain systems, subsystems, and equipment not part of a system.
 - 1. Architect will furnish an instructor to describe basis of system design, operational requirements, criteria, and regulatory requirements.
 - 2. Owner will furnish Contractor with names and positions of participants.
- C. Scheduling: Provide instruction at mutually agreed on times. For equipment that requires seasonal operation, provide similar instruction at start of each season.
 - 1. Schedule training with Owner, through Architect with at least seven (7) days advance notice.
- D. Evaluation: At conclusion of each training module, assess and document each participant's mastery of module by use of a demonstration performance-based test.
- E. Cleanup: Collect used and leftover educational materials and give to Owner. Remove instructional equipment. Restore systems and equipment to condition existing before initial training use.

END OF SECTION 017900

SECTION 024119 - SELECTIVE DEMOLITION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

- 1. Demolition and removal of selected portions of building or structure.
- 2. Salvage of existing items to be reused or recycled.

B. Related Requirements:

- 1. Section 011000 "Summary" for restrictions on use of the premises, Owner-occupancy requirements, and phasing requirements.
- 2. Section 017300 "Execution" for cutting and patching procedures.

1.3 DEFINITIONS

- A. Remove: Detach items from existing construction and dispose of them off-site unless indicated to be salvaged or reinstalled.
- B. Remove and Salvage: Detach items from existing construction, in a manner to prevent damage, and deliver to Owner ready for reuse.
- C. Remove and Reinstall: Detach items from existing construction, in a manner to prevent damage, prepare for reuse, and reinstall where indicated.
- D. Existing to Remain: Leave existing items that are not to be removed and that are not otherwise indicated to be salvaged or reinstalled.
- E. Dismantle: To remove by disassembling or detaching an item from a surface, using gentle methods and equipment to prevent damage to the item and surfaces; disposing of items unless indicated to be salvaged or reinstalled.

1.4 MATERIALS OWNERSHIP

- A. Unless otherwise indicated, demolition waste becomes property of Contractor.
- B. Historic items, relics, antiques, and similar objects including, but not limited to, cornerstones and their contents, commemorative plaques and tablets, and other items of interest or value to Owner that may be uncovered during demolition remain the property of Owner.
 - 1. Carefully salvage in a manner to prevent damage and promptly return to Owner.

1.5 PREINSTALLATION MEETINGS

- A. Predemolition Conference: Conduct conference at Project site.
 - 1. Inspect and discuss condition of construction to be selectively demolished.
 - 2. Review structural load limitations of existing structure.
 - 3. Review and finalize selective demolition schedule and verify availability of materials, demolition personnel, equipment, and facilities needed to make progress and avoid delays.
 - 4. Review requirements of work performed by other trades that rely on substrates exposed by selective demolition operations.
 - 5. Review areas where existing construction is to remain and requires protection.

1.6 INFORMATIONAL SUBMITTALS

- A. Proposed Protection Measures: Submit report, including Drawings, that indicates the measures proposed for protecting individuals and property, for environmental protection, for dust control and for noise control. Indicate proposed locations and construction of barriers.
- B. Schedule of Selective Demolition Activities: Indicate the following:
 - 1. Detailed sequence of selective demolition and removal work, with starting and ending dates for each activity. Ensure Owner's building manager's and other tenants' on-site operations are uninterrupted.
 - 2. Interruption of utility services. Indicate how long utility services will be interrupted.
 - 3. Coordination for shutoff, capping, and continuation of utility services.
 - 4. Coordination of Owner's continuing occupancy of portions of existing building and of Owner's partial occupancy of completed Work.
- C. Predemolition Photographs or Video: Show existing conditions of adjoining construction, including finish surfaces, that might be misconstrued as damage caused by demolition operations. Comply with Section 013233 "Photographic Documentation." Submit before Work begins.
- D. Warranties: Documentation indicating that existing warranties are still in effect after completion of selective demolition.

1.7 CLOSEOUT SUBMITTALS

- A. Inventory: Submit a list of items that have been removed and salvaged.

1.8 FIELD CONDITIONS

- A. Owner will occupy portions of building immediately adjacent to selective demolition area. Conduct selective demolition so Owner's operations will not be disrupted.
- B. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.
- C. Notify Architect of discrepancies between existing conditions and Drawings before proceeding with selective demolition.

- D. Hazardous Materials: It is not expected that hazardous materials will be encountered in the Work.
 - 1. Hazardous materials will be removed by Owner before start of the Work.
 - 2. If suspected hazardous materials are encountered, do not disturb; immediately notify Architect and Owner. Hazardous materials will be removed by Owner under a separate contract.
- E. Storage or sale of removed items or materials on-site is not permitted.
- F. Utility Service: Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.
 - 1. Maintain fire-protection facilities in service during selective demolition operations.

1.9 COORDINATION

- A. Arrange selective demolition schedule so as not to interfere with Owner's operations.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Regulatory Requirements: Comply with governing EPA notification regulations before beginning selective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.
- B. Standards: Comply with ASSE A10.6 and NFPA 241.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that utilities have been disconnected and capped before starting selective demolition operations.
- B. Review Project Record Documents of existing construction or other existing condition and hazardous material information provided by Owner. Owner does not guarantee that existing conditions are same as those indicated in Project Record Documents.
- C. Survey of Existing Conditions: Record existing conditions by use of measured drawings and preconstruction photographs or video.
 - 1. Comply with requirements specified in Section 013233 "Photographic Documentation."
 - 2. Inventory and record the condition of items to be removed and salvaged. Provide photographs or video of conditions that might be misconstrued as damage caused by salvage operations.

3.2 UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS

- A. Existing Services/Systems to Remain: Maintain services/systems indicated to remain and protect them against damage.
- B. Existing Services/Systems to Be Removed, Relocated, or Abandoned: Locate, identify, disconnect, and seal or cap off utility services and mechanical/electrical systems serving areas to be selectively demolished.
 - 1. Owner will arrange to shut off indicated services/systems when requested by Contractor.
 - 2. Arrange to shut off utilities with utility companies.
 - 3. If services/systems are required to be removed, relocated, or abandoned, provide temporary services/systems that bypass area of selective demolition and that maintain continuity of services/systems to other parts of building.
 - 4. Disconnect, demolish, and remove fire-suppression systems, plumbing, and HVAC systems, equipment, and components indicated on Drawings to be removed.
 - a. Piping to Be Removed: Remove portion of piping indicated to be removed and cap or plug remaining piping with same or compatible piping material.
 - b. Piping to Be Abandoned in Place: Drain piping and cap or plug piping with same or compatible piping material and leave in place.
 - c. Equipment to Be Removed: Disconnect and cap services and remove equipment.
 - d. Equipment to Be Removed and Reinstalled: Disconnect and cap services and remove, clean, and store equipment; when appropriate, reinstall, reconnect, and make equipment operational.
 - e. Equipment to Be Removed and Salvaged: Disconnect and cap services and remove equipment and deliver to Owner.
 - f. Ducts to Be Removed: Remove portion of ducts indicated to be removed and plug remaining ducts with same or compatible ductwork material.
 - g. Ducts to Be Abandoned in Place: Cap or plug ducts with same or compatible ductwork material and leave in place.

3.3 PROTECTION

- A. Temporary Protection: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.
 - 1. Provide protection to ensure safe passage of people around selective demolition area and to and from occupied portions of building.
 - 2. Provide temporary weather protection, during interval between selective demolition of existing construction on exterior surfaces and new construction, to prevent water leakage and damage to structure and interior areas.
 - 3. Protect walls, ceilings, floors, and other existing finish work that are to remain or that are exposed during selective demolition operations.
 - 4. Cover and protect furniture, furnishings, and equipment that have not been removed.
 - 5. Comply with requirements for temporary enclosures, dust control, heating, and cooling specified in Section 015000 "Temporary Facilities and Controls."
- B. Remove temporary barricades and protections where hazards no longer exist.

3.4 SELECTIVE DEMOLITION, GENERAL

- A. General: Demolish and remove existing construction only to the extent required by new construction and as indicated. Use methods required to complete the Work within limitations of governing regulations and as follows:
1. Proceed with selective demolition systematically, from higher to lower level. Complete selective demolition operations above each floor or tier before disturbing supporting members on the next lower level.
 2. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping. Temporarily cover openings to remain.
 3. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
 4. Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame-cutting operations. Maintain portable fire-suppression devices during flame-cutting operations.
 5. Maintain adequate ventilation when using cutting torches.
 6. Remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials and promptly dispose of off-site.
 7. Remove structural framing members and lower to ground by method suitable to avoid free fall and to prevent ground impact or dust generation.
 8. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
 9. Dispose of demolished items and materials promptly.
- B. Site Access and Temporary Controls: Conduct selective demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
- C. Removed and Salvaged Items:
1. Clean salvaged items.
 2. Pack or crate items after cleaning. Identify contents of containers.
 3. Store items in a secure area until delivery to Owner.
 4. Transport items to Owner's storage area designated by Owner.
 5. Protect items from damage during transport and storage.
- D. Removed and Reinstalled Items:
1. Clean and repair items to functional condition adequate for intended reuse.
 2. Pack or crate items after cleaning and repairing. Identify contents of containers.
 3. Protect items from damage during transport and storage.
 4. Reinstall items in locations indicated. Comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make item functional for use indicated.
- E. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during selective demolition. When permitted by Architect, items may be removed to a suitable,

protected storage location during selective demolition and cleaned and reinstalled in their original locations after selective demolition operations are complete.

3.5 SELECTIVE DEMOLITION PROCEDURES FOR SPECIFIC MATERIALS

- A. Resilient Floor Coverings: Remove floor coverings and adhesive according to recommendations in RFCI's "Recommended Work Practices for the Removal of Resilient Floor Coverings".

3.6 DISPOSAL OF DEMOLISHED MATERIALS

- A. Remove demolition waste materials from Project site and dispose of them in an EPA-approved construction and demolition waste landfill acceptable to authorities having jurisdiction.
 - 1. Do not allow demolished materials to accumulate on-site.
 - 2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
- B. Burning: Do not burn demolished materials.

3.7 CLEANING

- A. Clean adjacent structures and improvements of dust, dirt, and debris caused by selective demolition operations. Return adjacent areas to condition existing before selective demolition operations began.

END OF SECTION 024119

SECTION 035413 - GYPSUM CEMENT UNDERLAYMENT

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 gypsum-cement-based, self-leveling underlayment for application below interior floor coverings.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: Include plans indicating substrates, locations, and average depths of underlayment based on survey of substrate conditions.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified Installer.
- B. Product Certificates: Signed by manufacturers of underlayment and floor-covering systems certifying that products are compatible.
- C. Minutes of preinstallation conference.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: Installer who is approved by manufacturer for application of underlayment products required for this Project.
- B. Product Compatibility: Manufacturers of underlayment and floor-covering systems certify in writing that products are compatible.
- C. Fire-Resistance Ratings: Where indicated, provide gypsum-cement underlayment systems identical to those of assemblies tested for fire resistance per ASTM E 119 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - 1. Indicate design designations from UL's "Fire Resistance Directory" or from the listings of another qualified testing agency.
- D. Sound Transmission Characteristics: Where indicated, provide gypsum-cement underlayment systems identical to those of assemblies tested for STC and IIC ratings per ASTM E 90 and ASTM E 492 by a qualified testing agency.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Store materials to comply with manufacturer's written instructions to prevent deterioration from moisture or other detrimental effects.

1.7 PROJECT CONDITIONS

- A. Environmental Limitations: Comply with manufacturer's written instructions for substrate temperature, ventilation, ambient temperature and humidity, and other conditions affecting underlayment performance.

- 1. Place gypsum-cement-based underlayments only when ambient temperature and temperature of substrates are between 50 and 80 deg F (10 and 27 deg C).

1.8 COORDINATION

- A. Coordinate application of underlayment with requirements of floor-covering products and adhesives, to ensure compatibility of products.

PART 2 - PRODUCTS

2.1 GYPSUM-CEMENT-BASED UNDERLAYMENTS

- A. Underlayment: Gypsum-cement-based, self-leveling product that can be applied in minimum uniform thickness of 1/8 inch and that can be feathered at edges to match adjacent floor elevations.

- 1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

- a. Ardex; LU-100 Self-Leveling Flooring Underlayment
- b. Euclid Chemical Company (The); Flo-Top
- c. USG Corporation; Levelrock Quik-Top
- d. Substitutions: Under provisions of Section 012500 "Substitution Procedures".

- 2. Cement Binder: Gypsum or blended gypsum cement as defined by ASTM C 219.
- 3. Compressive Strength: Not less than 4000 psi at twenty-eight (28) days when tested according to ASTM C 109.
- 4. Underlayment Additive: Resilient-emulsion product of underlayment manufacturer, formulated for use with underlayment when applied to substrate and conditions indicated.

- B. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch; or coarse sand as recommended by underlayment manufacturer.

- 1. Provide aggregate when recommended in writing by underlayment manufacturer for underlayment thickness required.

- C. Water: Potable and at a temperature of not more than 70 deg F (21 deg C).

- D. Reinforcement: For underlayment applied to wood substrates, provide galvanized metal lath or other corrosion-resistant reinforcement recommended in writing by underlayment manufacturer.
- E. Primer: Product of underlayment manufacturer recommended in writing for substrate, conditions, and application indicated.
 - 1. Primer shall have a VOC content of 200 g/L or less when calculated according to 40 CFR 59, Subpart D.
- F. Corrosion-Resistant Coating: Recommended in writing by underlayment manufacturer for metal substrates.
 - 1. Coating shall have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D.

PART 3 - EXECUTION

3.1 COMMISSIONING OF COMPONENTS AND SYSTEMS

- A. Engage a manufacturer authorized representative who is familiar with this project, to participate and assist as necessary, in the functional performance testing of the components and systems included in this Division with the Commissioning Authority.

3.2 EXAMINATION

- A. Examine substrates, with Installer present, for conditions affecting performance.
 - 1. Proceed with application only after unsatisfactory conditions have been corrected.

3.3 PREPARATION

- A. General: Prepare and clean substrate according to manufacturer's written instructions.
 - 1. Treat nonmoving substrate cracks according to manufacturer's written instructions to prevent cracks from telegraphing (reflecting) through underlayment.
 - 2. Fill substrate voids to prevent underlayment from leaking.
- B. Concrete Substrates: Mechanically remove, according to manufacturer's written instructions, laitance, glaze, efflorescence, curing compounds, form-release agents, dust, dirt, grease, oil, and other contaminants that might impair underlayment bond.
 - 1. Moisture Testing: Perform anhydrous calcium chloride test, ASTM F 1869. Proceed with installation only after substrates do not exceed a maximum moisture-vapor-emission rate of **3 lb of water/1000 sq. ft.** in twenty-four (24) hours.
- C. Wood Substrates: Mechanically fasten loose boards and panels to eliminate substrate movement and squeaks. Sand to remove coatings that might impair underlayment bond and remove sanding dust.
 - 1. Install underlayment reinforcement recommended in writing by manufacturer.

- D. Metal Substrates: Mechanically remove, according to manufacturer's written instructions, rust, foreign matter, and other contaminants that might impair underlayment bond. Apply corrosion-resistant coating compatible with underlayment if recommended in writing by underlayment manufacturer.
- E. Nonporous Substrates: For ceramic tile, quarry tile, and terrazzo substrates, remove waxes, sealants, and other contaminants that might impair underlayment bond, and prepare surfaces according to manufacturer's written instructions.
- F. Adhesion Tests: After substrate preparation, test substrate for adhesion with underlayment according to manufacturer's written instructions.

3.4 APPLICATION

- A. General: Mix and apply underlayment components according to manufacturer's written instructions.
 - 1. Close areas to traffic during underlayment application and for time period after application recommended in writing by manufacturer.
 - 2. Coordinate application of components to provide optimum underlayment-to-substrate and intercoat adhesion.
 - 3. At substrate expansion, isolation, and other moving joints, allow joint of same width to continue through underlayment.
 - 4.
- B. Apply primer over prepared substrate at manufacturer's recommended spreading rate.
- C. Apply underlayment to produce uniform, level surface.
 - 1. Apply a final layer without aggregate to product surface.
 - 2. Feather edges to match adjacent floor elevations.
- D. Cure underlayment according to manufacturer's written instructions. Prevent contamination during application and curing processes.
- E. Do not install floor coverings over underlayment until after time period recommended in writing by underlayment manufacturer.
- F. Remove and replace underlayment areas that evidence lack of bond with substrate, including areas that emit a "hollow" sound when tapped.

3.5 PROTECTION

- A. Protect underlayment from concentrated and rolling loads for remainder of construction period.

END OF SECTION 035413

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. Concrete masonry units.
2. Face brick.
3. Mortar and grout.
4. Steel reinforcing bars.
5. Masonry joint reinforcement.
6. Ties and anchors.
7. Embedded flashing.
8. Miscellaneous masonry accessories.

B. Related Sections:

1. Section 079200 "Joint Sealants" for acoustic joint sealants.

1.3 DEFINITIONS

- A. CMU(s): Concrete masonry unit(s).

- B. Reinforced Masonry: Masonry containing reinforcing steel in grouted cells.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.

B. Shop Drawings: For the following:

1. Masonry Units: Show sizes, profiles, coursing, and locations of special shapes.
2. Reinforcing Steel: Detail bending and placement of unit masonry reinforcing bars. Comply with ACI 315, "Details and Detailing of Concrete Reinforcement." Show elevations of reinforced walls.
3. Fabricated Flashing: Detail corner units, end-dam units, and other special applications.

C. Samples: For each type and color of the following:

1. Face brick, in the form of straps of five or more bricks.
2. Special brick shapes.
3. Pigmented mortar. Make Samples using same sand and mortar ingredients to be used on Project.
4. Accessories embedded in masonry.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For testing agency.
- B. Material Certificates: For each type and size of the following:
 - 1. Masonry units.
 - a. Include material test reports substantiating compliance with requirements.
 - b. For brick, include size-variation data verifying that actual range of sizes falls within specified tolerances.
 - c. For exposed brick, include test report for efflorescence according to ASTM C 67.
 - 2. Cementitious materials. Include brand, type, and name of manufacturer.
 - 3. Preblended, dry mortar mixes. Include description of type and proportions of ingredients.
 - 4. Grout mixes. Include description of type and proportions of ingredients.
 - 5. Reinforcing bars.
 - 6. Joint reinforcement.
 - 7. Anchors, ties, and metal accessories.
- C. Mix Designs: For each type of mortar and grout. Include description of type and proportions of ingredients.
 - 1. Include test reports for mortar mixes required to comply with property specification. Test according to ASTM C 109 for compressive strength, ASTM C 1506 for water retention, and ASTM C 91 for air content.
 - 2. Include test reports, according to ASTM C 1019, for grout mixes required to comply with compressive strength requirement.
- D. Cold-Weather and Hot-Weather Procedures: Detailed description of methods, materials, and equipment to be used to comply with requirements.

1.6 QUALITY ASSURANCE

- A. Testing Agency Qualifications: Qualified according to ASTM C 1093 for testing indicated.
- B. Source Limitations for Masonry Units: Obtain exposed masonry units of a uniform texture and color, or a uniform blend within the ranges accepted for these characteristics, from single source from single manufacturer for each product required.
- C. Source Limitations for Mortar Materials: Obtain mortar ingredients of a uniform quality, including color for exposed masonry, from single manufacturer for each cementitious component and from single source or producer for each aggregate.
- D. Masonry Standard: Comply with ACI 530.1/ASCE 6/TMS 602 unless modified by requirements in the Contract Documents.
- E. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
 - 1. Build mockup of typical wall area as shown on Drawings.

- a. Include a sealant-filled joint at least 16 inches long in mockup.
 - b. Include lower corner of window opening framed with stone trim at upper corner of exterior wall mockup. Make opening approximately 12 inches wide by 16 inches high.
 - c. Include through-wall flashing installed for a 24-inch length in corner of exterior wall mockup approximately 16 inches down from top of mockup, with a 12-inch length of flashing left exposed to view (omit masonry above half of flashing).
2. Where masonry is to match existing, erect mockups adjacent and parallel to existing surface.
 3. Clean one-half of exposed faces of mockups with masonry cleaner as indicated.
 4. Protect accepted mockups from the elements with weather-resistant membrane.
 5. Approval of mockups is for color, texture, and blending of masonry units; relationship of mortar and sealant colors to masonry unit colors; tooling of joints; and aesthetic qualities of workmanship.
 - a. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless such deviations are specifically approved by Architect in writing.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Store masonry units on elevated platforms in a dry location. If units are not stored in an enclosed location, cover tops and sides of stacks with waterproof sheeting, securely tied. If units become wet, do not install until they are dry.
- B. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.
- C. Store aggregates where grading and other required characteristics can be maintained and contamination avoided.
- D. Deliver preblended, dry mortar mix in moisture-resistant containers designed for use with dispensing silos. Store preblended, dry mortar mix in delivery containers on elevated platforms, under cover, and in a dry location or in covered weatherproof dispensing silos.
- E. Store masonry accessories, including metal items, to prevent corrosion and accumulation of dirt and oil.

1.8 PROJECT CONDITIONS

- A. Protection of Masonry: During construction, cover tops of walls, projections, and sills with waterproof sheeting at end of each day's work. Cover partially completed masonry when construction is not in progress.
 1. Extend cover a minimum of 24 inches down both sides of walls and hold cover securely in place.
 2. Where one (1) wythe of multi-wythe masonry walls is completed in advance of other wythes, secure cover a minimum of 24 inches down face next to unconstructed wythe and hold cover in place.

- B. Do not apply uniform floor or roof loads for at least twelve (12) hours and concentrated loads for at least three (3) days after building masonry walls or columns.
- C. Stain Prevention: Prevent grout, mortar, and soil from staining the face of masonry to be left exposed or painted. Immediately remove grout, mortar, and soil that come in contact with such masonry.
 - 1. Protect base of walls from rain-splashed mud and from mortar splatter by spreading coverings on ground and over wall surface.
 - 2. Protect sills, ledges, and projections from mortar droppings.
 - 3. Protect surfaces of window and door frames, as well as similar products with painted and integral finishes, from mortar droppings.
 - 4. Turn scaffold boards near the wall on edge at the end of each day to prevent rain from splashing mortar and dirt onto completed masonry.
- D. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Remove and replace unit masonry damaged by frost or by freezing conditions. Comply with cold-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.
 - 1. Cold-Weather Cleaning: Use liquid cleaning methods only when air temperature is 40 deg F (4 deg C) and higher and will remain so until masonry has dried, but not less than seven (7) days after completing cleaning.
- E. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.

PART 2 - PRODUCTS

2.1 MASONRY UNITS, GENERAL

- A. Defective Units: Referenced masonry unit standards may allow a certain percentage of units to contain chips, cracks, or other defects exceeding limits stated in the standard. Do not use units where such defects will be exposed in the completed Work.
- B. Fire-Resistance Ratings: Where indicated, provide units that comply with requirements for fire-resistance ratings indicated as determined by testing according to ASTM E 119, by equivalent masonry thickness, or by other means, as acceptable to authorities having jurisdiction.

2.2 CONCRETE MASONRY UNITS

- A. Regional Materials: CMUs shall be manufactured within five hundred (500) miles of Project site from aggregates and cement that have been extracted, harvested, or recovered, as well as manufactured, within five hundred (500) miles of Project site.
- B. Shapes: Provide shapes indicated and as follows, with exposed surfaces matching exposed faces of adjacent units unless otherwise indicated.

1. Provide special shapes for lintels, corners, jambs, sashes, movement joints, headers, bonding, and other special conditions.
2. Provide bullnose units for outside corners unless otherwise indicated.

C. CMUs: ASTM C 90.

1. Density Classification: Lightweight.
2. Size (Width): Manufactured to dimensions 3/8 inch less than nominal dimensions.

2.3 BRICK

A. Regional Materials: Brick shall be manufactured within five hundred (500) miles of Project site from materials that have been extracted, harvested, or recovered, as well as manufactured, within five hundred (500) miles of Project site.

B. General: Provide shapes indicated and as follows, with exposed surfaces matching finish and color of exposed faces of adjacent units:

1. For ends of sills and caps and for similar applications that would otherwise expose unfinished brick surfaces, provide units without cores or frogs and with exposed surfaces finished.
2. Provide special shapes for applications where stretcher units cannot accommodate special conditions, including those at corners, movement joints, bond beams, sashes, and lintels.
3. Provide special shapes for applications requiring brick of size, form, color, and texture on exposed surfaces that cannot be produced by sawing.
4. Provide special shapes for applications where shapes produced by sawing would result in sawed surfaces being exposed to view.

C. Face Brick: Facing brick complying with ASTM C 216.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. The Belden Brick Company, distributed by The Homer C. Godfrey Company.
 - b. Watertown Brick, Watertown, PA (800.538.2040)
 - c. Mack Brick Company, Enfield, CT (860.627.6625)
 - d. Substitutions: Under provisions of Section 012500 "Substitution Procedures".
2. Grade: SW.
3. Type: FBX.
4. Initial Rate of Absorption: Less than 30 g/30 sq. in. per minute when tested per ASTM C 67.
5. Efflorescence: Provide brick that has been tested according to ASTM C 67 and is rated "not effloresced."
6. Size (Actual Dimensions): 3-5/8 inches wide by 2¼ inches high by 7-5/8 inches long.
7. Application: Use where brick is exposed unless otherwise indicated.
8. Color and Texture: New material to match existing color and texture, as selected by Architect and Owner from manufacturer's full color and texture range.

2.4 MORTAR AND GROUT MATERIALS

- A. Regional Materials: Aggregate for mortar and grout, cement, and lime shall be extracted, harvested, or recovered, as well as manufactured, within five hundred (500) miles of Project site.
- B. Portland Cement: ASTM C 150, Type I or II, except Type III may be used for cold-weather construction. Provide natural color or white cement as required to produce mortar color indicated.
- C. Hydrated Lime: ASTM C 207, Type S.
- D. Mortar Pigments: Natural and synthetic iron oxides and chromium oxides, compounded for use in mortar mixes and complying with ASTM C 979. Use only pigments with a record of satisfactory performance in masonry mortar.
 - 1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Davis Colors; True Tone Mortar Colors
 - b. Lanxess Corporation; Bayferrox Iron Oxide Pigments
 - c. Solomon Colors, Inc.; SGS Mortar Colors
 - d. Substitutions: Under provisions of Section 012500 "Substitution Procedures".
- E. Colored Cement Product: Packaged blend made from Portland cement and hydrated lime and mortar pigments, all complying with specified requirements, and containing no other ingredients.
 - 1. Colored Portland Cement-Lime Mix:
 - a. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - 1) Capital Materials Corporation; Riverton Portland Cement Lime Custom Color
 - 2) Holcim (US) Inc.; Rainbow Mortamix Custom Color Cement/Lime
 - 3) Lafarge North America Inc.; Eaglebond Portland & Lime
 - 4) Lehigh Cement Company; Lehigh Custom Color Portland/Lime Cement
 - 5) Substitutions: Under provisions of Section 012500 "Substitution Procedures".
 - 2. Formulate blend as required to produce color indicated or, if not indicated, as selected from manufacturer's standard colors.
 - 3. Pigments shall not exceed ten percent (10%) of Portland cement by weight.
- F. Aggregate for Mortar: ASTM C 144.
 - 1. For mortar that is exposed to view, use washed aggregate consisting of natural sand or crushed stone.

2. For joints less than ¼ inch thick, use aggregate graded with one hundred percent (100%) passing the No. 16 sieve.
3. White-Mortar Aggregates: Natural white sand or crushed white stone.

G. Aggregate for Grout: ASTM C 404.

H. Water: Potable.

2.5 REINFORCEMENT

A. Uncoated Steel Reinforcing Bars: ASTM A 615 or ASTM A 996, Grade 60.

B. Masonry Joint Reinforcement, General: ASTM A 951.

1. Interior Walls: Hot-dip galvanized, carbon steel.
2. Exterior Walls: Stainless steel.
3. Wire Size for Side Rods: 0.148-inch diameter.
4. Wire Size for Cross Rods: 0.148-inch diameter.
5. Wire Size for Veneer Ties: 0.187-inch diameter.
6. Spacing of Cross Rods, Tabs, and Cross Ties: Not more than 16 inches o.c.
7. Provide in lengths of not less than 10 feet, with prefabricated corner and tee units.

C. Masonry Joint Reinforcement for Single-Wythe Masonry: Either ladder or truss type with single pair of side rods.

D. Masonry Joint Reinforcement for Multi-Wythe Masonry:

1. Adjustable (two-piece) type, either ladder or truss design, with one (1) side rod at each face shell of backing wythe and with separate adjustable ties with pintle-and-eye connections having a maximum adjustment of 1¼ inches. Size ties to extend at least halfway through facing wythe but with at least 5/8-inch cover on outside face.

E. Masonry Joint Reinforcement for Veneers Anchored with Seismic Masonry-Veneer Anchors: Single 0.187-inch-diameter, stainless-steel continuous wire.

2.6 TIES AND ANCHORS

A. Materials: Provide ties and anchors specified in this article that are made from materials that comply with the following unless otherwise indicated.

1. Stainless-Steel Wire: ASTM A 580, Type 304.
2. Stainless-Steel Sheet: ASTM A 666, Type 304.

B. Corrugated Metal Ties: Metal strips not less than 7/8 inch wide with corrugations having a wavelength of 0.3 to 0.5 inch and an amplitude of 0.06 to 0.10 inch made from 0.031-inch-thick, stainless-steel sheet.

C. Wire Ties, General: Unless otherwise indicated, size wire ties to extend at least halfway through veneer but with at least 5/8-inch cover on outside face. Outer ends of wires are bent 90 degrees and extend 2 inches parallel to face of veneer.

- D. Individual Wire Ties: Rectangular units with closed ends and not less than 4 inches wide.
1. Z-shaped ties with ends bent 90 degrees to provide hooks not less than 2 inches long may be used for masonry constructed from solid units.
 2. Where wythes are of different materials, use adjustable ties with pintle-and-eye connections having a maximum adjustment of 1¼ inches.
 3. Wire: Fabricate from 3/16-inch-diameter, stainless-steel wire.
- E. Adjustable Anchors for Connecting to Structural Steel Framing: Provide anchors that allow vertical or horizontal adjustment but resist tension and compression forces perpendicular to plane of wall.
1. Anchor Section for Welding to Steel Frame: Crimped ¼-inch-diameter, stainless-steel wire.
 2. Tie Section: Triangular-shaped wire tie, sized to extend within 1 inch of masonry face, made from 0.25-inch-diameter, stainless-steel wire.
- F. Adjustable Anchors for Connecting to Concrete: Provide anchors that allow vertical or horizontal adjustment but resist tension and compression forces perpendicular to plane of wall.
1. Corrugated Metal Ties: Metal strips not less than 7/8 inch wide with corrugations having a wavelength of 0.3 to 0.5 inch and an amplitude of 0.06 to 0.10 inch made from 0.062-inch-thick, stainless-steel sheet with dovetail tabs for inserting into dovetail slots in concrete and sized to extend to within 1 inch of masonry face.
- G. Partition Top Anchors: 0.105-inch-thick metal plate with 3/8-inch-diameter metal rod 6 inches long welded to plate and with closed-end plastic tube fitted over rod that allows rod to move in and out of tube. Fabricate from stainless steel.

2.7 MISCELLANEOUS ANCHORS

- A. Anchor Bolts: Headed or L-shaped steel bolts complying with ASTM A 307, Grade A; with ASTM A 563 hex nuts and, where indicated, flat washers; hot-dip galvanized to comply with ASTM A 153, Class C; of dimensions indicated.

2.8 EMBEDDED FLASHING MATERIALS

- A. Metal Flashing: Provide metal flashing complying with Section 076200 "Sheet Metal Flashing and Trim".
- B. Flexible Flashing: Use the following unless otherwise indicated:
1. Copper-Laminated Flashing: 5-oz./sq. ft. copper sheet bonded between two (2) layers of glass-fiber cloth. Use only where flashing is fully concealed in masonry.
 - a. Basis of Design:
 - 1) York Manufacturing, Inc.; Multi-Flash 500
 - b. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

- 1) Advanced Building Products Inc.; Copper Fabric Flashing
- 2) Sandell Manufacturing Co., Inc.; Copper Fabric Flashing
- 3) Substitutions: Under provisions of Section 012500 "Substitution Procedures".

C. Application: Unless otherwise indicated, use the following:

1. Where flashing is indicated to receive counterflashing, use metal flashing.
2. Where flashing is indicated to be turned down at or beyond the wall face, use metal flashing.
3. Where flashing is partly exposed and is indicated to terminate at the wall face, use metal flashing or flexible flashing with a metal drip edge.
4. Where flashing is fully concealed, use flexible flashing.

D. Solder and Sealants for Sheet Metal Flashings: As specified in Section 076200 "Sheet Metal Flashing and Trim."

E. Adhesives, Primers, and Seam Tapes for Flashings: Flashing manufacturer's standard products or products recommended by flashing manufacturer for bonding flashing sheets to each other and to substrates.

2.9 MISCELLANEOUS MASONRY ACCESSORIES

A. Compressible Filler: Premolded filler strips complying with ASTM D 1056, Grade 2A1; compressible up to thirty-five percent (35%); of width and thickness indicated; formulated from closed cell neoprene.

1. Basis of Design:

a. Williams Products

- 1) At new masonry: Everlastic NN-1 1040 Series
- 2) At existing masonry: Will Seal 600

2. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. Meadows, W.R., Inc.

b. Substitutions: Under provisions of Section 012500 "Substitution Procedures".

B. Preformed Control-Joint Gaskets: Made from styrene-butadiene-rubber compound, complying with ASTM D 2000, Designation M2AA-805 or PVC, complying with ASTM D 2287, Type PVC-65406 and designed to fit standard sash block and to maintain lateral stability in masonry wall; size and configuration as indicated.

C. Bond-Breaker Strips: Asphalt-saturated, organic roofing felt complying with ASTM D 226, Type I (No. 15 asphalt felt).

D. Cavity Drainage Material: Free-draining mesh, made from polymer strands that will not degrade within the wall cavity.

1. Basis of Design:
 - a. Mortar Net USA, Ltd.; Mortar Net
2. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Advanced Building Products Inc.; Mortar Break II
 - b. Archovations, Inc.; CavClear Masonry Mat
 - c. Substitutions: Under provisions of Section 012500 "Substitution Procedures".
3. Provide one (1) of the following configurations:
 - a. Strips, full-depth of cavity and 10 inches high, with dovetail shaped notches 7 inches deep that prevent clogging with mortar droppings.
 - b. Strips, not less than 1½ inches thick and 10 inches high, with dimpled surface designed to catch mortar droppings.

2.10 MASONRY CLEANERS

- A. Proprietary Acidic Cleaner: Manufacturer's standard-strength cleaner designed for removing mortar/grout stains, efflorescence, and other new construction stains from new masonry without discoloring or damaging masonry surfaces. Use product expressly approved for intended use by cleaner manufacturer and manufacturer of masonry units being cleaned.
 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Diedrich Technologies, Inc.
 - b. EaCo Chem, Inc.
 - c. ProSoCo, Inc.
 - d. Substitutions: Under provisions of Section 012500 "Substitution Procedures".

2.11 MORTAR AND GROUT MIXES

- A. General: Do not use admixtures, including pigments, air-entraining agents, accelerators, retarders, water-repellent agents, antifreeze compounds, or other admixtures, unless otherwise indicated.
 1. Do not use calcium chloride in mortar or grout.
 2. Use Portland cement-lime mortar unless otherwise indicated.
- B. Preblended, Dry Mortar Mix: Furnish dry mortar ingredients in form of a preblended mix. Measure quantities by weight to ensure accurate proportions, and thoroughly blend ingredients before delivering to Project site.
- C. Mortar for Unit Masonry: Comply with ASTM C 270, Property Specification. Provide the following types of mortar for applications stated unless another type is indicated.
 1. For masonry below grade or in contact with earth, use Type S.

2. For reinforced masonry, use Type S.
 3. For exterior, above-grade, load-bearing and non-load-bearing walls and parapet walls; for interior load-bearing walls; for interior non-load-bearing partitions; and for other applications where another type is not indicated, use Type N.
 4. For interior non-load-bearing partitions, Type O may be used instead of Type N.
- D. Pigmented Mortar: Use colored cement product.
1. Application: Use pigmented mortar for exposed mortar joints with the following units:
 - a. Face brick.
- E. Grout for Unit Masonry: Comply with ASTM C 476.
1. Use grout of type indicated or, if not otherwise indicated, of type (fine or coarse) that will comply with Table 1.15.1 in ACI 530.1/ASCE 6/TMS 602 for dimensions of grout spaces and pour height.
 2. Proportion grout in accordance with ASTM C 476, Table 1.
 3. Provide grout with a slump of 8 to 11 inches as measured according to ASTM C 143.

PART 3 - EXECUTION

3.1 COMMISSIONING OF COMPONENTS AND SYSTEMS

- A. Engage a manufacturer authorized representative who is familiar with this project to participate and assist, if necessary, in the functional performance testing of the components and systems included in this Division with the Commissioning Agent.

3.2 EXAMINATION

- A. Examine conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
 1. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of work.
 2. Verify that foundations are within tolerances specified.
 3. Verify that reinforcing dowels are properly placed.
- B. Before installation, examine rough-in and built-in construction for piping systems to verify actual locations of piping connections.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 INSTALLATION, GENERAL

- A. Thickness: Build cavity and composite walls and other masonry construction to full thickness shown. Build single-wythe walls to actual widths of masonry units, using units of widths indicated.
- B. Build chases and recesses to accommodate items specified in this and other Sections.

- C. Leave openings for equipment to be installed before completing masonry. After installing equipment, complete masonry to match the construction immediately adjacent to opening.
- D. Use full-size units without cutting if possible. If cutting is required to provide a continuous pattern or to fit adjoining construction, cut units with motor-driven saws; provide clean, sharp, unchipped edges. Allow units to dry before laying unless wetting of units is specified. Install cut units with cut surfaces and, where possible, cut edges concealed.
- E. Select and arrange units for exposed unit masonry to produce a uniform blend of colors and textures.
 - 1. Mix units from several pallets or cubes as they are placed.
- F. Matching Existing Masonry: Match coursing, bonding, color, and texture of existing masonry.

3.4 TOLERANCES

A. Dimensions and Locations of Elements:

- 1. For dimensions in cross section or elevation do not vary by more than plus $\frac{1}{2}$ inch or minus $\frac{1}{4}$ inch.
- 2. For location of elements in plan do not vary from that indicated by more than plus or minus $\frac{1}{2}$ inch.
- 3. For location of elements in elevation do not vary from that indicated by more than plus or minus $\frac{1}{4}$ inch in a story height or $\frac{1}{2}$ inch total.

B. Lines and Levels:

- 1. For bed joints and top surfaces of bearing walls do not vary from level by more than $\frac{1}{4}$ inch in 10 feet, or $\frac{1}{2}$ inch maximum.
- 2. For conspicuous horizontal lines, such as lintels, sills, parapets, and reveals, do not vary from level by more than $\frac{1}{8}$ inch in 10 feet, $\frac{1}{4}$ inch in 20 feet, or $\frac{1}{2}$ inch maximum.
- 3. For vertical lines and surfaces do not vary from plumb by more than $\frac{1}{4}$ inch in 10 feet, $\frac{3}{8}$ inch in 20 feet, or $\frac{1}{2}$ inch maximum.
- 4. For conspicuous vertical lines, such as external corners, door jambs, reveals, and expansion and control joints, do not vary from plumb by more than $\frac{1}{8}$ inch in 10 feet, $\frac{1}{4}$ inch in 20 feet, or $\frac{1}{2}$ inch maximum.
- 5. For lines and surfaces do not vary from straight by more than $\frac{1}{4}$ inch in 10 feet, $\frac{3}{8}$ inch in 20 feet, or $\frac{1}{2}$ inch maximum.
- 6. For vertical alignment of exposed head joints, do not vary from plumb by more than $\frac{1}{4}$ inch in 10 feet, or $\frac{1}{2}$ inch maximum.
- 7. For faces of adjacent exposed masonry units, do not vary from flush alignment by more than $\frac{1}{16}$ inch except due to warpage of masonry units within tolerances specified for warpage of units.

C. Joints:

- 1. For bed joints, do not vary from thickness indicated by more than plus or minus $\frac{1}{8}$ inch, with a maximum thickness limited to $\frac{1}{2}$ inch.

2. For exposed bed joints, do not vary from bed-joint thickness of adjacent courses by more than 1/8 inch.
3. For head and collar joints, do not vary from thickness indicated by more than plus 3/8 inch or minus 1/4 inch.
4. For exposed head joints, do not vary from thickness indicated by more than plus or minus 1/8 inch. Do not vary from adjacent bed-joint and head-joint thicknesses by more than 1/8 inch.
5. For exposed bed joints and head joints of stacked bond, do not vary from a straight line by more than 1/16 inch from one (1) masonry unit to the next.

3.5 LAYING MASONRY WALLS

- A. Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint thicknesses and for accurate location of openings, movement-type joints, returns, and offsets. Avoid using less-than-half-size units, particularly at corners, jambs, and, where possible, at other locations.
- B. Bond Pattern for Exposed Masonry: Unless otherwise indicated, lay exposed masonry in running bond; do not use units with less than nominal 4-inch horizontal face dimensions at corners or jambs. Provide soldier course where indicated in Drawings.
- C. Lay concealed masonry with all units in a wythe in running bond or bonded by lapping not less than 4-inches. Bond and interlock each course of each wythe at corners. Do not use units with less than nominal 4-inch horizontal face dimensions at corners or jambs.
- D. Stopping and Resuming Work: Stop work by racking back units in each course from those in course below; do not tooth. When resuming work, clean masonry surfaces that are to receive mortar, remove loose masonry units and mortar, and wet brick if required before laying fresh masonry.
- E. Built-in Work: As construction progresses, build in items specified in this and other Sections. Fill in solidly with masonry around built-in items.
- F. Fill space between steel frames and masonry solidly with mortar unless otherwise indicated.
- G. Where built-in items are to be embedded in cores of hollow masonry units, place a layer of metal lath, wire mesh, or plastic mesh in the joint below and rod mortar or grout into core.
- H. Fill cores in hollow CMUs with grout 24 inches under bearing plates, beams, lintels, posts, and similar items unless otherwise indicated.
- I. Build non-load-bearing interior partitions full height of story to underside of solid floor or roof structure above unless otherwise indicated.
 1. Install compressible filler in joint between top of partition and underside of structure above.
 2. Fasten partition top anchors to structure above and build into top of partition. Grout cells of CMUs solidly around plastic tubes of anchors and push tubes down into grout to provide 1/2-inch clearance between end of anchor rod and end of tube. Space anchors 48 inches o.c. unless otherwise indicated.

3. Wedge non-load-bearing partitions against structure above with small pieces of tile, slate, or metal. Fill joint with mortar after dead-load deflection of structure above approaches final position.
4. At fire-rated partitions, treat joint between top of partition and underside of structure.

3.6 MORTAR BEDDING AND JOINTING

A. Lay hollow brick and CMUs as follows:

1. With face shells fully bedded in mortar and with head joints of depth equal to bed joints.
2. With webs fully bedded in mortar in all courses of piers, columns, and pilasters.
3. With webs fully bedded in mortar in grouted masonry, including starting course on footings.
4. With entire units, including areas under cells, fully bedded in mortar at starting course on footings where cells are not grouted.

B. Lay solid masonry units with completely filled bed and head joints; butter ends with sufficient mortar to fill head joints and shove into place. Do not deeply furrow bed joints or slush head joints.

C. Set stone trim units in full bed of mortar with full vertical joints. Fill dowel, anchor, and similar holes.

1. Clean soiled surfaces with fiber brush and soap powder and rinse thoroughly with clear water.
2. Wet joint surfaces thoroughly before applying mortar.

D. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than joint thickness unless otherwise indicated.

3.7 CAVITY WALLS

A. Bond wythes of cavity walls together using one (1) of the following methods:

1. Individual Metal Ties: Provide ties as shown installed in horizontal joints, but not less than one (1) metal tie for 1.77 sq. ft. of wall area spaced not to exceed 16 inches o.c. horizontally and 16 inches o.c. vertically. Stagger ties in alternate courses. Provide additional ties within 12 inches of openings and space not more than 36 inches apart around perimeter of openings. At intersecting and abutting walls, provide ties at no more than 24 inches o.c. vertically.
 - a. Where bed joints of wythes do not align, use adjustable (two-piece) type ties.
 - b. Where one (1) wythe is of clay masonry and the other of concrete masonry, use adjustable (two-piece) type ties to allow for differential movement regardless of whether bed joints align.
2. Masonry Joint Reinforcement: Installed in horizontal mortar joints.
 - a. Where bed joints of both wythes align, use ladder-type reinforcement extending across both wythes.

- b. Where bed joints of wythes do not align, use adjustable (two-piece) type reinforcement.
- 3. Header Bonding: Provide masonry unit headers extending not less than 3 inches into each wythe. Space headers not over 8 inches clear horizontally and 16 inches clear vertically.
- B. Keep cavities clean of mortar droppings and other materials during construction. Bevel beds away from cavity, to minimize mortar protrusions into cavity. Do not attempt to trowel or remove mortar fins protruding into cavity.
- C. Joints on face of masonry backup wythe shall be smooth and flush. Leave surface clean and free of cavities, protrusions and droppings to allow proper application of vapor barrier.
- D. Apply vapor barrier to face of backup wythe to comply with Section 072600 "Vapor Barriers."

3.8 MASONRY JOINT REINFORCEMENT

- A. General: Install entire length of longitudinal side rods in mortar with a minimum cover of 5/8 inch on exterior side of walls, 1/2 inch elsewhere. Lap reinforcement a minimum of 6 inches.
 - 1. Space reinforcement not more than 16 inches o.c.
 - 2. Space reinforcement not more than 8 inches o.c. in foundation walls and parapet walls.
 - 3. Provide reinforcement not more than 8 inches above and below wall openings and extending 12 inches beyond openings in addition to continuous reinforcement.
- B. Interrupt joint reinforcement at control and expansion joints unless otherwise indicated.
- C. Provide continuity at wall intersections by using prefabricated T-shaped units.
- D. Provide continuity at corners by using prefabricated L-shaped units.
- E. Cut and bend reinforcing units as directed by manufacturer for continuity at returns, offsets, column fireproofing, pipe enclosures, and other special conditions.

3.9 ANCHORING MASONRY TO STRUCTURAL STEEL AND CONCRETE

- A. Anchor masonry to structural steel and concrete where masonry abuts or faces structural steel or concrete to comply with the following:
 - 1. Provide an open space not less than 1/2 inch wide between masonry and structural steel or concrete unless otherwise indicated. Keep open space free of mortar and other rigid materials.
 - 2. Anchor masonry with anchors embedded in masonry joints and attached to structure.
 - 3. Space anchors as indicated, but not more than 24 inches o.c. vertically and 36 inches o.c. horizontally.

3.10 CONTROL AND EXPANSION JOINTS

- A. General: Install control and expansion joint materials in unit masonry as masonry progresses. Do not allow materials to span control and expansion joints without provision to allow for in-plane wall or partition movement.

- B. Form control joints in concrete masonry as follows:
 - 1. Install preformed control-joint gaskets designed to fit standard sash block.
- C. Form expansion joints in brick as follows:
 - 1. Build flanges of factory-fabricated, expansion-joint units into masonry.
 - 2. Build in compressible joint fillers where indicated.
 - 3. Form open joint full depth of brick wythe and of width indicated, but not less than 3/8 inch for installation of sealant and backer rod specified in Section 079200 "Joint Sealants."
- D. Provide horizontal, pressure-relieving joints by either leaving an air space or inserting a compressible filler of width required for installing sealant and backer rod specified in Section 079200 "Joint Sealants," but not less than 3/8 inch.
 - 1. Locate horizontal, pressure-relieving joints beneath shelf angles supporting masonry.

3.11 LINTELS

- A. Install steel lintels where indicated.
- B. Provide minimum bearing of 8 inches at each jamb unless otherwise indicated.

3.12 FLASHING, CAVITY DRAINAGE, AND VENTS

- A. General: Install embedded flashing in masonry at shelf angles, lintels, ledges, other obstructions to downward flow of water in wall, and where indicated.
- B. Install flashing as follows unless otherwise indicated:
 - 1. Prepare masonry surfaces so they are smooth and free from projections that could puncture flashing. Where flashing is within mortar joint, place through-wall flashing on sloping bed of mortar and cover with mortar. Before covering with mortar, seal penetrations in flashing with adhesive, sealant, or tape as recommended by flashing manufacturer.
 - 2. At multi-wythe masonry walls, including cavity walls, extend flashing through outer wythe, turned up a minimum of 8 inches, and 1½ inches into the inner wythe.
 - 3. At masonry-veneer walls, extend flashing through veneer, across air space behind veneer, and up face of sheathing at least 8 inches; with upper edge tucked under building paper or building wrap, lapping at least 4 inches.
 - 4. At lintels and shelf angles, extend flashing a minimum of 6 inches into masonry at each end. At heads and sills, extend flashing 6 inches at ends and turn up not less than 2 inches to form end dams.
 - 5. Install metal drip edges beneath flexible flashing at exterior face of wall. Stop flexible flashing ½ inch back from outside face of wall and adhere flexible flashing to top of metal drip edge.
 - 6. Cut flexible flashing off flush with face of wall after masonry wall construction is completed.

- C. Install reglets and nailers for flashing and other related construction where they are shown to be built into masonry.
- D. Place cavity drainage material in cavities to comply with configuration requirements for cavity drainage material in "Miscellaneous Masonry Accessories" Article.

3.13 REINFORCED UNIT MASONRY INSTALLATION

- A. Placing Reinforcement: Comply with requirements in ACI 530.1/ASCE 6/TMS 602.
- B. Grouting: Do not place grout until entire height of masonry to be grouted has attained enough strength to resist grout pressure.
 - 1. Comply with requirements in ACI 530.1/ASCE 6/TMS 602 for cleanouts and for grout placement, including minimum grout space and maximum pour height.
 - 2. Limit height of vertical grout pours to not more than 60 inches.

3.14 FIELD QUALITY CONTROL

- A. Testing and Inspecting: Owner will engage special inspectors to perform tests and inspections and prepare reports. Allow inspectors access to scaffolding and work areas, as needed to perform tests and inspections. Retesting of materials that fail to comply with specified requirements shall be done at Contractor's expense.
- B. Inspections: Level 2 special inspections according to the "International Building Code."
 - 1. Begin masonry construction only after inspectors have verified proportions of site-prepared mortar.
 - 2. Place grout only after inspectors have verified compliance of grout spaces and of grades, sizes, and locations of reinforcement.
 - 3. Place grout only after inspectors have verified proportions of site-prepared grout.
- C. Testing Prior to Construction: One (1) set of tests.
- D. Clay Masonry Unit Test: For each type of unit provided, according to ASTM C 67 for compressive strength.
- E. Concrete Masonry Unit Test: For each type of unit provided, according to ASTM C 140 for compressive strength.
- F. Mortar Aggregate Ratio Test (Proportion Specification): For each mix provided, according to ASTM C 780.
- G. Mortar Test (Property Specification): For each mix provided, according to ASTM C 780. Test mortar for mortar air content and compressive strength.
- H. Grout Test (Compressive Strength): For each mix provided, according to ASTM C 1019.

3.15 REPAIRING, POINTING, AND CLEANING

- A. Remove and replace masonry units that are loose, chipped, broken, stained, or otherwise damaged or that do not match adjoining units. Install new units to match adjoining units; install in fresh mortar, pointed to eliminate evidence of replacement.
- B. Pointing: During the tooling of joints, enlarge voids and holes, and completely fill with mortar. Point up joints, including corners, openings, and adjacent construction, to provide a neat, uniform appearance. Prepare joints for sealant application, where indicated.
- C. In-Progress Cleaning: Clean unit masonry as work progresses by dry brushing to remove mortar fins and smears before tooling joints.
- D. Final Cleaning: After mortar is thoroughly set and cured, clean exposed masonry as follows:
 - 1. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.
 - 2. Test cleaning methods on sample wall panel; leave one-half of panel uncleaned for comparison purposes. Obtain Architect's approval of sample cleaning before proceeding with cleaning of masonry.
 - 3. Protect adjacent stone and nonmasonry surfaces from contact with cleaner by covering them with liquid strippable masking agent or polyethylene film and waterproof masking tape.
 - 4. Wet wall surfaces with water before applying cleaners; remove cleaners promptly by rinsing surfaces thoroughly with clear water.
 - 5. Clean masonry with a proprietary acidic cleaner applied according to manufacturer's written instructions.
 - 6. Clean concrete masonry by cleaning method indicated in NCMA TEK 8-2A applicable to type of stain on exposed surfaces.
 - 7. Clean stone trim to comply with stone supplier's written instructions.

3.16 MASONRY WASTE DISPOSAL

- A. Salvageable Materials: Unless otherwise indicated, excess masonry materials are Contractor's property. At completion of unit masonry work, remove from Project site.
- B. Excess Masonry Waste: Remove excess clean masonry waste that cannot be used as fill, as described above, and other masonry waste, and legally dispose of off Owner's property.

END OF SECTION 042000

SECTION 061000 - ROUGH CARPENTRY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Wood blocking, cants, and nailers.
 - 2. Wood furring and grounds.
 - 3. Plywood backing panels.

1.3 DEFINITIONS

- A. Exposed Framing: Framing not concealed by other construction.
- B. Dimension Lumber: Lumber of 2 inches nominal or greater but less than 5 inches nominal in least dimension.
- C. Lumber grading agencies, and the abbreviations used to reference them, include the following:
 - 1. NeLMA: Northeastern Lumber Manufacturers' Association.
 - 2. NLGA: National Lumber Grades Authority.
 - 3. RIS: Redwood Inspection Service.
 - 4. SPIB: The Southern Pine Inspection Bureau.
 - 5. WCLIB: West Coast Lumber Inspection Bureau.
 - 6. WWPA: Western Wood Products Association.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.
 - 1. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Indicate type of preservative used and net amount of preservative retained.
 - 2. Include data for fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Include physical properties of treated materials based on testing by a qualified independent testing agency.
 - 3. For fire-retardant treatments, include physical properties of treated lumber both before and after exposure to elevated temperatures, based on testing by a qualified independent testing agency according to ASTM D 5664.
 - 4. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.

5. Include copies of warranties from chemical treatment manufacturers for each type of treatment.

1.5 INFORMATIONAL SUBMITTALS

- A. Material Certificates: For dimension lumber specified to comply with minimum allowable unit stresses. Indicate species and grade selected for each use and design values approved by the ALSC Board of Review.
- B. Evaluation Reports: For the following, from ICC-ES:
 1. Wood-preservative-treated wood.
 2. Power-driven fasteners.
 3. Powder-actuated fasteners.
 4. Expansion anchors.
 5. Metal framing anchors.

1.6 QUALITY ASSURANCE

- A. Testing Agency Qualifications: For testing agency providing classification marking for fire-retardant treated material, an inspection agency acceptable to authorities having jurisdiction that periodically performs inspections to verify that the material bearing the classification marking is representative of the material tested.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Stack lumber flat with spacers beneath and between each bundle to provide air circulation. Protect lumber from weather by covering with waterproof sheeting, securely anchored. Provide for air circulation around stacks and under coverings.

PART 2 - PRODUCTS

2.1 WOOD PRODUCTS, GENERAL

- A. Lumber: DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, provide lumber that complies with the applicable rules of any rules-writing agency certified by the ALSC Board of Review. Provide lumber graded by an agency certified by the ALSC Board of Review to inspect and grade lumber under the rules indicated.
 1. Factory mark each piece of lumber with grade stamp of grading agency.
 2. Where nominal sizes are indicated, provide actual sizes required by DOC PS 20 for moisture content specified. Where actual sizes are indicated, they are minimum dressed sizes for dry lumber.
 3. Provide dressed lumber, S4S, unless otherwise indicated.
- B. Maximum Moisture Content of Lumber: Nineteen percent (19%) unless otherwise indicated.
- C. Engineered Wood Products: Provide engineered wood products acceptable to authorities having jurisdiction and for which current model code research or evaluation reports exist that show compliance with building code in effect for Project.

1. Allowable Design Stresses: Provide engineered wood products with allowable design stresses, as published by manufacturer, that meet or exceed those indicated. Manufacturer's published values shall be determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency.

2.2 WOOD-PRESERVATIVE-TREATED LUMBER

- A. Preservative Treatment by Pressure Process: AWWPA U1; Use Category UC2 for interior construction not in contact with the ground, Use Category UC3b for exterior construction not in contact with the ground, and Use Category UC4a for items in contact with the ground.
 1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium.
 2. For exposed items indicated to receive a stained or natural finish, use chemical formulations that do not require incising, contain colorants, bleed through, or otherwise adversely affect finishes.
- B. Kiln-dry lumber after treatment to a maximum moisture content of nineteen percent (19%). Do not use material that is warped or that does not comply with requirements for untreated material.
- C. Mark lumber with treatment quality mark of an inspection agency approved by the ALSC Board of Review.
- D. Application: Treat items indicated on Drawings, and the following:
 1. Wood cants, nailers, curbs, equipment support bases, blocking, stripping, and similar members in connection with roofing, flashing, vapor barriers, and waterproofing.
 2. Wood sills, sleepers, blocking, furring, stripping and similar concealed members in contact with masonry or concrete.
 3. Wood framing and furring attached directly to the interior of below-grade exterior masonry or concrete walls.
 4. Wood framing members that are less than 18 inches above the ground in crawlspaces or unexcavated areas.
 5. Wood floor plates that are installed over concrete slabs-on-grade.

2.3 FIRE-RETARDANT-TREATED MATERIALS

- A. General: Where fire-retardant-treated materials are indicated, materials shall comply with requirements in this article, that are acceptable to authorities having jurisdiction, and with fire-test-response characteristics specified as determined by testing identical products per test method indicated by a qualified testing agency.
- B. Fire-Retardant-Treated Lumber and Plywood by Pressure Process: Products with a flame-spread index of 25 or less when tested according to ASTM E 84, and with no evidence of significant progressive combustion when the test is extended an additional 20 minutes, and with the flame front not extending more than 10.5 feet (3.2 m) beyond the centerline of the burners at any time during the test.
 1. Treatment shall not promote corrosion of metal fasteners.

2. Exterior Type: Treated materials shall comply with requirements specified above for fire-retardant-treated lumber and plywood by pressure process after being subjected to accelerated weathering according to ASTM D 2898. Use for exterior locations and where indicated.
 3. Interior Type A: Treated materials shall have a moisture content of 28 percent or less when tested according to ASTM D 3201 at 92 percent relative humidity. Use where exterior type is not indicated.
 4. Design Value Adjustment Factors: Treated lumber shall be tested according to ASTM D 5664 and design value adjustment factors shall be calculated according to ASTM D 6841. For enclosed roof framing, framing in attic spaces, and where high temperature fire-retardant treatment is indicated, provide material with adjustment factors of not less than 0.85 modulus of elasticity and 0.75 for extreme fiber in bending for Project's climatological zone.
- C. Kiln-dry lumber after treatment to maximum moisture content of 19 percent. Kiln-dry plywood after treatment to maximum moisture content of 15 percent.
- D. Identify fire-retardant-treated wood with appropriate classification marking of qualified testing agency.
1. For exposed lumber indicated to receive a stained or natural finish, mark end or back of each piece or omit marking and provide certificates of treatment compliance issued by testing agency.
- E. For exposed items indicated to receive a stained or natural finish, chemical formulations shall not bleed through, contain colorants, or otherwise adversely affect finishes.
- F. Application: Treat **ALL** rough carpentry unless otherwise indicated.

2.4 DIMENSION LUMBER FRAMING

- A. Joists, Rafters, and Other Framing Not Listed Above: No. 2 grade.
1. Species:
 - a. Hem-fir (north); NLGA.
 - b. Southern pine; SPIB.
 - c. Douglas fir-larch; WCLIB or WWPA.
 - d. Mixed southern pine; SPIB.
 - e. Spruce-pine-fir; NLGA.
 - f. Douglas fir-south; WWPA.
 - g. Hem-fir; WCLIB or WWPA.
 - h. Douglas fir-larch (north); NLGA.
 - i. Spruce-pine-fir (south); NeLMA, WCLIB, or WWPA.
- B. Joists, Rafters, and Other Framing Not Listed Above: Any species and grade with a modulus of elasticity of at least 1,500,000 psi thickness and 12-inch nominal width for single-member use.

2.5 PLYWOOD BACKING PANELS

- A. Equipment Backing Panels: Plywood, DOC PS 1, Exposure 1, C-D Plugged, fire-retardant treated, in thickness indicated or, if not indicated, not less than ¾-inch nominal thickness.

2.6 FASTENERS

- A. General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.
 - 1. Where rough carpentry is exposed to weather, in ground contact, pressure-preservative treated, or in area of high relative humidity, provide fasteners with hot-dip zinc coating complying with ASTM A 153.
- B. Nails, Brads, and Staples: ASTM F 1667.
- C. Power-Driven Fasteners: NES NER-272.
- D. Wood Screws: ASME B18.6.1.
- E. Lag Bolts: ASME B18.2.1
- F. Bolts: Steel bolts complying with ASTM A 307, Grade A; with ASTM A 563 hex nuts and, where indicated, flat washers.
- G. Expansion Anchors: Anchor bolt and sleeve assembly of material indicated below with capability to sustain, without failure, a load equal to six times (6x) the load imposed when installed in unit masonry assemblies and equal to four times the load imposed when installed in concrete as determined by testing per ASTM E 488 conducted by a qualified independent testing and inspecting agency.
 - 1. Material: Carbon-steel components, zinc plated to comply with ASTM B 633, Class Fe/Zn 5.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Set rough carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit rough carpentry to other construction; scribe and cope as needed for accurate fit. Locate nailers, blocking and similar supports to comply with requirements for attaching other construction.
- B. Framing Standard: Comply with AF&PA's WCD 1, "Details for Conventional Wood Frame Construction," unless otherwise indicated.
- C. Framing with Engineered Wood Products: Install engineered wood products to comply with manufacturer's written instructions.

- D. Install plywood backing panels by fastening to studs; coordinate locations with utilities requiring backing panels. Install fire-retardant-treated plywood backing panels with classification marking of testing agency exposed to view.
- E. Do not splice structural members between supports unless otherwise indicated.
- F. Provide blocking and framing as indicated and as required to support facing materials, fixtures, specialty items, and trim.
 - 1. Provide metal clips for fastening gypsum board or lath at corners and intersections where framing or blocking does not provide a surface for fastening edges of panels. Space clips not more than 16 inches o.c.
- G. Sort and select lumber so that natural characteristics will not interfere with installation or with fastening other materials to lumber. Do not use materials with defects that interfere with function of member or pieces that are too small to use with minimum number of joints or optimum joint arrangement.
- H. Comply with AWWA M4 for applying field treatment to cut surfaces of preservative-treated lumber.
 - 1. Use inorganic boron for items that are continuously protected from liquid water.
 - 2. Use copper naphthenate for items not continuously protected from liquid water.
- I. Securely attach rough carpentry work to substrate by anchoring and fastening as indicated, complying with the following:
 - 1. NES NER-272 for power-driven fasteners.
 - 2. Table 2304.9.1, "Fastening Schedule," in ICC's International Building Code.
- J. Use steel common nails unless otherwise indicated. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections between members. Install fasteners without splitting wood. Drive nails snug but do not countersink nail heads unless otherwise indicated.

3.2 WOOD BLOCKING AND NAILER INSTALLATION

- A. Install where indicated and where required for attaching other work. Form to shapes indicated and cut as required for true line and level of attached work. Coordinate locations with other work involved.
- B. Attach items to substrates to support applied loading. Recess bolts and nuts flush with surfaces unless otherwise indicated.

END OF SECTION 061000

SECTION 064116 - PLASTIC-LAMINATE-FACED ARCHITECTURAL CABINETS AND CASEWORK

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. Plastic-laminate-faced architectural cabinets and casework.
- 2. Wood furring, blocking, shims, and hanging strips for installing plastic-laminate-faced architectural cabinets unless concealed within other construction before cabinet installation.

B. Related Requirements:

- 1. Section 061000 "Rough Carpentry" for wood furring, blocking, shims, and hanging strips required for installing cabinets and concealed within other construction before cabinet installation.

1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product, including high-pressure decorative laminate, adhesive for bonding plastic laminate and cabinet hardware and accessories.

- B. Shop Drawings: Show location of each item, dimensioned plans and elevations, large-scale details, attachment devices, and other components.

- 1. Show details full size.
- 2. Show locations and sizes of furring, blocking, and hanging strips, including concealed blocking and reinforcement specified in other Sections.
- 3. Show locations and sizes of cutouts and holes for electrical switches and outlets and other items installed in architectural plastic-laminate cabinets.

C. Samples for Verification:

- 1. Plastic laminates, 12 by 12 inches, for each type, color, pattern, and surface finish, with one (1) sample applied to core material and specified edge material applied to one (1) edge.

2. Corner pieces as follows:
 - a. Cabinet-front frame joints between stiles and rails, as well as exposed end pieces, 18 inches high by 18 inches wide by 6 inches deep.
 - b. Miter joints for standing trim.
3. Exposed cabinet hardware and accessories, one (1) unit for each type and finish.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For fabricator.
- B. Product Certificates: For the following:
 1. Composite wood and agrifiber products.
 2. High-pressure decorative laminate.
 3. Adhesives.

1.6 QUALITY ASSURANCE

- A. Fabricator Qualifications: Shop that employs skilled workers who custom fabricate products similar to those required for this Project and whose products have a record of successful in-service performance.
- B. Installer Qualifications: Fabricator of products.
- C. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for materials and execution.
 1. Build mockups of typical architectural cabinets as shown on Drawings.
 2. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Do not deliver cabinets until painting and similar operations that could damage woodwork have been completed in installation areas. If cabinets must be stored in other than installation areas, store only in areas where environmental conditions comply with requirements specified in "Field Conditions" Article.

1.8 FIELD CONDITIONS

- A. Environmental Limitations: Do not deliver or install cabinets until building is enclosed, wet work is complete, and HVAC system is operating and maintaining temperature and relative humidity at occupancy levels during the remainder of the construction period.
- B. Field Measurements: Where cabinets are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication, and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

PLASTIC-LAMINATE-FACED ARCHITECTURAL CABINETS AND CASEWORK

1. Locate concealed framing, blocking, and reinforcements that support cabinets by field measurements before being enclosed, and indicate measurements on Shop Drawings.
- C. Established Dimensions: Where cabinets are indicated to fit to other construction, establish dimensions for areas where cabinets are to fit. Provide allowance for trimming at site, and coordinate construction to ensure that actual dimensions correspond to established dimensions.

1.9 COORDINATION

- A. Coordinate sizes and locations of framing, blocking, furring, reinforcements, and other related units of Work specified in other Sections to ensure that cabinets can be supported and installed as indicated.

PART 2 - PRODUCTS

2.1 CABINETS, GENERAL

- A. Quality Standard: Unless otherwise indicated, comply with the "Architectural Woodwork Standards" for grades of architectural cabinets indicated for construction, finishes, installation, and other requirements. It is **not** necessary to provide AWS labels.

2.2 PLASTIC-LAMINATE-FACED ARCHITECTURAL CABINETS AND CASEWORK

- A. Quality Standard: Unless otherwise indicated, comply with the "Architectural Woodwork Standards" for grades of architectural plastic-laminate cabinets indicated for construction, finishes, installation, and other requirements.
- B. Grade: **Custom**.
 1. Fabricator: Plastic laminate casework fabricator that fabricates custom plastic laminate casework.
- C. Plastic-laminate cabinets shall be fabricated within five hundred (500) miles of Project site.
- D. Type of Construction: Frameless.
- E. Cabinet, Door, and Drawer Front Interface Style: Flush overlay.
- F. High-Pressure Decorative Laminate: NEMA LD 3, grades as indicated or if not indicated, as required by woodwork quality standard.
 1. Basis-of-Design Manufacturer: Wilsonart.
 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. Abet Laminati, Inc.
 - b. Formica Corporation.
 - c. Lamin-Art, Inc.
 - d. Wilsonart International; Div. of Premark International, Inc.

PLASTIC-LAMINATE-FACED ARCHITECTURAL CABINETS AND CASEWORK

- e. Substitutions: Under provisions of Section 012500 "Substitution Procedures".

 - G. Laminate Cladding for Exposed Surfaces:
 - 1. Horizontal Surfaces: Grade HGS.
 - 2. Postformed Surfaces: Grade HGP.
 - 3. Vertical Surfaces: Grade HGS.
 - 4. Edges: Grade HGS.
 - 5. Pattern Direction: Vertically for drawer fronts, doors, and fixed panels.

 - H. Materials for Semiexposed Surfaces:
 - 1. Surfaces Other Than Drawer Bodies: High-pressure decorative laminate, NEMA LD 3, Grade VGS.
 - a. Edges of Plastic-Laminate Shelves: PVC T-mold edge banding, 0.12-inch thick, matching laminate in color, pattern, and finish.
 - b. For semiexposed backs of panels with exposed plastic-laminate surfaces, provide surface of high-pressure decorative laminate, NEMA LD 3, Grade VGS.
 - 2. Drawer Sides and Backs: Solid-hardwood lumber.
 - 3. Drawer Bottoms: Hardwood plywood.

 - I. Drawer Construction: Fabricate with exposed fronts fastened to subfront with mounting screws from interior of body.
 - 1. Join subfronts, backs, and sides with glued dovetail joints.

 - J. Colors, Patterns, and Finishes: Provide materials and products that result in colors and textures of exposed laminate surfaces complying with the following requirements:
 - 1. As selected by Architect and Owner from manufacturer's full range of standard colors.
- 2.3 WOOD MATERIALS
- A. Wood Products: Provide materials that comply with requirements of referenced quality standard for each type of woodwork and quality grade specified unless otherwise indicated.
 - 1. Wood Moisture Content: Five to ten percent (5-10%).

 - B. MDF: ANSI A208.2, Grade 130; made with binder containing no urea formaldehyde.
 - 1. Recycled Content: Preconsumer recycled content not less than 25 percent.

 - C. Composite Wood and Agrifiber Products: Provide materials that comply with requirements of referenced quality standard for each type of woodwork and quality grade specified unless otherwise indicated.
 - 1. Softwood Plywood: DOC PS 1.

2. Veneer-Faced Panel Products (Hardwood Plywood): HPVA HP-1, made with adhesive containing no urea formaldehyde.

2.4 CABINET HARDWARE AND ACCESSORIES

- A. Butt Hinges: 2-3/4-inch (70-mm), five-knuckle steel hinges made from 0.095-inch- (2.4-mm-) thick metal, and as follows:
 1. Semiconcealed Hinges for Flush Doors: BHMA A156.9, B01361.
 2. Semiconcealed Hinges for Overlay Doors: BHMA A156.9, B01521.
- B. Back-Mounted Pulls: BHMA A156.9, B02011.
- C. Wire Pulls: Back mounted, solid metal, 4 inches long, 5/16 inch in diameter.
- D. Adjustable Shelf Standards and Supports: BHMA A156.9, B04102; with shelf brackets, B04112.
- E. Shelf Rests: BHMA A156.9, B04013; plastic, two-pin type with shelf hold-down clip.
- F. Drawer Slides: BHMA A156.9.
 1. Grade 1 and Grade 2: Side mounted; full-extension type; zinc-plated steel with polymer rollers.
 2. Grade 1HD-100 and Grade 1HD-200: Side mounted; full-overtravel-extension type; zinc-plated-steel ball-bearing slides.
 3. For drawers not more than 3 inches high and not more than 24 inches wide, provide Grade 1.
 4. For drawers more than 3 inches high but not more than 6 inches high and not more than 24 inches wide, provide Grade 1HD-100.
 5. For drawers more than 6 inches high or more than 24 inches wide, provide Grade 1HD-200.
 6. For computer keyboard shelves, provide Grade 1.
- G. Door Locks: BHMA A156.11, E07121.
 1. Sized for cabinet thickness on the active leaf as indicated in the documents, with two (2) keys master keyed all alike, with manufacturer's standard finger operated sash lock on the adjacent inactive leaf (in double door applications). For bidding purposes, the Contractor shall assume that one hundred percent (100%) of all cabinet operating door leaves or pairs of doors shall be locked.
- H. Drawer Locks: BHMA A156.11, E07041.
 1. Sized for drawer thickness, with two (2) keys master keyed all alike. For bidding purposes, the Contractor shall assume that one hundred percent (100%) of all drawers shall be locked.
- I. Door and Drawer Silencers: BHMA A156.16, L03011.

PLASTIC-LAMINATE-FACED ARCHITECTURAL CABINETS AND CASEWORK

- J. Exposed Hardware Finishes: For exposed hardware, provide finish that complies with BHMA A156.18 for BHMA finish number indicated.
 - 1. Satin Chromium Plated: BHMA 626 for brass or bronze base; BHMA 652 for steel base.
 - 2. Satin Stainless Steel: BHMA 630.
- K. For concealed hardware, provide manufacturer's standard finish that complies with product class requirements in BHMA A156.9.
- L. Cabinet-door mounted, clear acrylic literature rack.
 - 1. Rack mounting hardware: Manufacturer's standard.
 - 2. Rack size and mounting heights as indicated on Drawings.

2.5 MISCELLANEOUS MATERIALS

- A. Furring, Blocking, Shims, and Hanging Strips: Softwood or hardwood lumber, kiln dried to less than 15 percent moisture content.
- B. Anchors: Select material, type, size, and finish required for each substrate for secure anchorage. Provide metal expansion sleeves or expansion bolts for post-installed anchors. Use nonferrous-metal or hot-dip galvanized anchors and inserts at inside face of exterior walls and at floors.
- C. Adhesives: Do not use adhesives that contain urea formaldehyde.
 - 1. Adhesive for Bonding Plastic Laminate: Contact cement, water based.
 - a. Adhesive for Bonding Edges: Hot-melt adhesive or adhesive specified above for faces.

2.6 FABRICATION

- A. Fabricate cabinets to dimensions, profiles, and details indicated.
- B. Complete fabrication, including assembly and hardware application, to maximum extent possible before shipment to Project site. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.
 - 1. Trial fit assemblies at fabrication shop that cannot be shipped completely assembled. Install dowels, screws, bolted connectors, and other fastening devices that can be removed after trial fitting. Verify that various parts fit as intended and check measurements of assemblies against field measurements before disassembling for shipment.
- C. Shop-cut openings to maximum extent possible to receive hardware, appliances, electrical work, and similar items. Locate openings accurately and use templates or roughing-in diagrams to produce accurately sized and shaped openings. Sand edges of cutouts to remove splinters and burrs.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Before installation, condition cabinets to average prevailing humidity conditions in installation areas.
- B. Before installing cabinets, examine shop-fabricated work for completion and complete work as required.

3.2 INSTALLATION

- A. Grade: Install cabinets to comply with same grade as item to be installed.
- B. Assemble cabinets and complete fabrication at Project site to the extent that it was not completed in the shop.
- C. Install cabinets level, plumb, true, and straight. Shim as required with concealed shims. Install level and plumb to a tolerance of 1/8 inch in 96 inches.
- D. Scribe and cut cabinets to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.
- E. Anchor cabinets to anchors or blocking built in or directly attached to substrates. Secure with countersunk, concealed fasteners and blind nailing. Use fine finishing nails or finishing screws for exposed fastening, countersunk and filled flush with woodwork.
 - 1. Use filler matching finish of items being installed.
- F. Cabinets: Install without distortion so doors and drawers fit openings properly and are accurately aligned. Adjust hardware to center doors and drawers in openings and to provide unencumbered operation. Complete installation of hardware and accessory items as indicated.
 - 1. Install cabinets with no more than 1/8 inch in 96-inch sag, bow, or other variation from a straight line.
 - 2. Fasten wall cabinets through back, near top and bottom, and at ends not more than 16 inches o.c. with No. 10 wafer-head screws sized for not less than 1½-inch penetration into wood framing, blocking, or hanging strips or No. 10 wafer-head sheet metal screws through metal backing or metal framing behind wall finish.
- G. Cabinet-door mounted, clear acrylic literature rack: Install level and plumb, located on cabinet doors as indicated on Drawings.

3.3 ADJUSTING AND CLEANING

- A. Repair damaged and defective cabinets, where possible, to eliminate functional and visual defects; where not possible to repair, replace woodwork. Adjust joinery for uniform appearance.
- B. Clean, lubricate, and adjust hardware.

PLASTIC-LAMINATE-FACED ARCHITECTURAL CABINETS AND CASEWORK

- C. Clean cabinets on exposed and semiexposed surfaces.

END OF SECTION 064116

SECTION 078413 - PENETRATION FIRESTOPPING

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. Firestopping materials and accessories.

1.3 PERFORMANCE REQUIREMENTS

- A. Provide and install complete penetration firestopping systems that have been tested and approved by nationally accepted testing agencies per ASTM E 814, UL 1479 or ASTM E 119 fire tests in a configuration that is representative of field conditions.
- B. Surface Burning: ASTM E 84 with a flame spread/fuel contributed/smoke developed rating of 5/0/0.

1.4 SUBMITTALS

- A. Product Data: For each type of product indicated provide characteristics, performance and limitation criteria.
- B. Manufacturer's Installation Instructions: Indicate preparation and installation instructions.
- C. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

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 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):
 - 1. Duct Penetrations: C-AJ-7027

2. Pipe Penetrations: C-AJ-1079
3. Cable Penetrations: C-AJ-1079
4. Conduit Penetrations: C-AJ-1079

1.7 MOCK-UP

- A. Provide mock-up of applied firestopping material.
- B. Apply 1 linear foot to a representative substrate surface.
- C. If accepted, mock-up will demonstrate minimum standard for the Work.

1.8 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.

1.9 SEQUENCING

- A. Sequence Work to permit firestopping materials to be installed after adjacent and surrounding work is complete.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Thermal Ceramics; **Firemaster Putty, Bulk and Blankets.**
- B. Tremco Incorporated; **Fyre-shield and Cerablanket FS Hilti, Inc.**
- C. United States Gypsum; **Thermafiber Safing Insulation and FIRECODE compound.**
- D. Substitutions: Under provisions of Section 012500 "Substitution Procedures".

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.

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.

PART 3 - EXECUTION

3.1 COMMISSIONING OF COMPONENTS AND SYSTEMS

A. Engage a manufacturer authorized representative who is familiar with this project, to participate and assist as necessary, in the functional performance testing of the components and systems included in this Division with the Commissioning Authority.

3.2 EXAMINATION

A. Examine substrates and conditions, with Installer present, for compliance with requirements for opening configurations, penetrating items, substrates, and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 PREPARATION

A. Surface Cleaning: Clean out openings immediately before installing penetration firestopping to comply with manufacturer's written instructions and with the following requirements:

1. Remove from surfaces of opening substrates and from penetrating items foreign materials that could interfere with adhesion of penetration firestopping.
2. Clean opening substrates and penetrating items to produce clean, sound surfaces capable of developing optimum bond with penetration firestopping. Remove loose particles remaining from cleaning operation.
3. Remove laitance and form-release agents from concrete.

B. Install backing materials to arrest liquid material leakage.

3.4 INSTALLATION

- A. General: Install penetration firestopping to comply with manufacturer's written installation instructions and published drawings for products and applications indicated.
- B. 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.
- C. Apply primer and materials in accordance with manufacturer's instructions.
- D. Apply firestopping material in sufficient thickness to achieve rating to a density of fifty percent (50%) to uniform density and texture.
- E. Install material at walls or partition openings which contain penetrating sleeves, piping, ductwork, conduit and other items requiring firestopping.
- F. Remove dam material after firestopping material has cured.

3.5 CLEANING AND PROTECTION

- A. Clean off excess materials adjacent to openings as the Work progresses by methods and with cleaning materials that are approved in writing by penetration firestopping manufacturers and that do not damage materials in which openings occur.
- B. Provide final protection and maintain conditions during and after installation that ensure that penetration firestopping is without damage or deterioration at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, immediately cut out and remove damaged or deteriorated penetration firestopping and install new materials to produce systems complying with specified requirements.

3.6 SCHEDULE

- 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 078413

SECTION 079200 - JOINT SEALANTS

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. Silicone joint sealants.
 - 2. Urethane joint sealants.
 - 3. Polysulfide joint sealants.
 - 4. Latex joint sealants.
 - 5. Solvent-release-curing joint sealants.
 - 6. Preformed joint sealants.
 - 7. Acoustical joint sealants.
- B. Related Sections:
 - 1. Section 088000 "Glazing" for glazing sealants.

1.3 ACTION SUBMITTALS

- A. Product Data: For each joint-sealant product indicated.
- B. Samples: Manufacturer's color charts consisting of strips of cured sealants showing the full range of colors available for each product exposed to view.
- C. Joint-Sealant Schedule: Include the following information:
 - 1. Joint-sealant application, joint location, and designation.
 - 2. Joint-sealant manufacturer and product name.
 - 3. Joint-sealant formulation.
 - 4. Joint-sealant color.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified Installer.
- B. Product Certificates: For each kind of joint sealant and accessory, from manufacturer.
- C. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, indicating that sealants comply with requirements.
- D. Warranties: Sample of special warranties.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation of units required for this Project.
- B. Source Limitations: Obtain each kind of joint sealant from single source from single manufacturer.
- C. Product Testing: Test joint sealants using a qualified testing agency.
 - 1. Testing Agency Qualifications: An independent testing agency qualified according to ASTM C 1021 to conduct the testing indicated.

1.6 PROJECT CONDITIONS

- A. Do not proceed with installation of joint sealants under the following conditions:
 - 1. When ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer or are below 40 deg F (5 deg C).
 - 2. When joint substrates are wet.
 - 3. Where joint widths are less than those allowed by joint-sealant manufacturer for applications indicated.
 - 4. Where contaminants capable of interfering with adhesion have not yet been removed from joint substrates.

1.7 WARRANTY

- A. Special Installer's Warranty: Manufacturer's standard form in which Installer agrees to repair or replace joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.
 - 1. Warranty Period: Two (2) years from date of Substantial Completion.
- B. Special warranties specified in this article exclude deterioration or failure of joint sealants from the following:
 - 1. Movement of the structure caused by structural settlement or errors attributable to design or construction resulting in stresses on the sealant exceeding sealant manufacturer's written specifications for sealant elongation and compression.
 - 2. Disintegration of joint substrates from natural causes exceeding design specifications.
 - 3. Mechanical damage caused by individuals, tools, or other outside agents.
 - 4. Changes in sealant appearance caused by accumulation of dirt or other atmospheric contaminants.

PART 2 - PRODUCTS**2.1 MATERIALS, GENERAL**

- A. Compatibility: Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by joint-sealant manufacturer, based on testing and field experience.
- B. VOC Content of Interior Sealants: Sealants and sealant primers used inside the weatherproofing system shall comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):
 - 1. Architectural Sealants: 250 g/L.
 - 2. Sealant Primers for Nonporous Substrates: 250 g/L.
 - 3. Sealant Primers for Porous Substrates: 775 g/L.
- C. Liquid-Applied Joint Sealants: Comply with ASTM C 920 and other requirements indicated for each liquid-applied joint sealant specified, including those referencing ASTM C 920 classifications for type, grade, class, and uses related to exposure and joint substrates.
- D. Stain-Test-Response Characteristics: Where sealants are specified to be nonstaining to porous substrates, provide products that have undergone testing according to ASTM C 1248 and have not stained porous joint substrates indicated for Project.
- E. Suitability for Contact with Food: Where sealants are indicated for joints that will come in repeated contact with food, provide products that comply with 21 CFR 177.2600.
- F. Colors of Exposed Joint Sealants: As selected by Architect and Owner from manufacturer's full range.

2.2 SILICONE JOINT SEALANTS

- A. Mildew-Resistant, Single-Component, Nonsag, Neutral-Curing Silicone Joint Sealant: ASTM C 920, Type S, Grade NS, Class 25, for Use NT.
 - 1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Pecora Corporation; **898**
 - b. Substitutions: Under provisions of Section 012500 "Substitution Procedures".

2.3 POLYSULFIDE JOINT SEALANTS

- A. Multicomponent, Nonsag, Polysulfide Joint Sealant: ASTM C 920, Type M, Grade NS, Class 25, for Use NT.
 - 1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. BASF Building Systems; **Sonolastic Polysulfide Sealant**
 - b. Pecora Corporation; **Synthacalk GC-2+**

- c. W. R. Meadows, Inc.; **Deck-O-Seal Gun Grade**
- d. Substitutions: Under provisions of Section 012500 "Substitution Procedures".

2.4 LATEX JOINT SEALANTS

- A. Latex Joint Sealant: Acrylic latex or siliconized acrylic latex, ASTM C 834, Type OP, Grade NF.
 - 1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. BASF Building Systems; **Sonolac**
 - b. Bostik, Inc.; **Chem-Calk 600**
 - c. Pecora Corporation; **AC-20+**
 - d. Tremco Incorporated; **Tremflex 834**
 - e. Substitutions: Under provisions of Section 012500 "Substitution Procedures".

2.5 ACOUSTICAL JOINT SEALANTS

- A. Acoustical Joint Sealant: Manufacturer's standard nonsag, paintable, nonstaining latex sealant complying with ASTM C 834. Product effectively reduces airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E 90.
 - 1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Pecora Corporation; **AC-20 FTR**
 - b. USG Corporation; **SHEETROCK Acoustical Sealant**
 - c. Substitutions: Under provisions of Section 012500 "Substitution Procedures".

2.6 JOINT SEALANT BACKING

- A. General: Provide sealant backings of material that are nonstaining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.
- B. Cylindrical Sealant Backings: ASTM C 1330, Type B (bicellular material with a surface skin), and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance.
- C. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint-filler materials or joint surfaces at back of joint. Provide self-adhesive tape where applicable.

2.7 MISCELLANEOUS MATERIALS

- A. Primer: Material recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.

- B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces in any way, and formulated to promote optimum adhesion of sealants to joint substrates.
- C. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting joint-sealant performance.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions and the following requirements:
 - 1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, paints (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer), old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.
 - 2. Clean porous joint substrate surfaces by brushing, grinding, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining after cleaning operations above by vacuuming or blowing out joints with oil-free compressed air. Porous joint substrates include the following:
 - a. Concrete.
 - b. Masonry.
 - 3. Remove laitance and form-release agents from concrete.
 - 4. Clean nonporous joint substrate surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants. Nonporous joint substrates include the following:
 - a. Metal.
 - b. Glass.
 - c. Porcelain enamel.
 - d. Glazed surfaces of ceramic tile.
- B. Joint Priming: Prime joint substrates where recommended by joint-sealant manufacturer or prior experience. Apply primer to comply with joint-sealant manufacturer's written instructions.

Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.

- C. Masking Tape: Use masking tape where required to prevent contact of sealant or primer with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

3.3 INSTALLATION OF JOINT SEALANTS

- A. General: Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.
- B. Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.
- C. Install sealant backings of kind indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.
 - 1. Do not leave gaps between ends of sealant backings.
 - 2. Do not stretch, twist, puncture, or tear sealant backings.
 - 3. Remove absorbent sealant backings that have become wet before sealant application and replace them with dry materials.
- D. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.
- E. Install sealants using proven techniques that comply with the following and at the same time backings are installed:
 - 1. Place sealants so they directly contact and fully wet joint substrates.
 - 2. Completely fill recesses in each joint configuration.
 - 3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.
- F. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified in subparagraphs below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.
 - 1. Remove excess sealant from surfaces adjacent to joints.
 - 2. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
 - 3. Provide concave joint profile per Figure 8A in ASTM C 1193, unless otherwise indicated.
 - 4. Provide flush joint profile where indicated per Figure 8B in ASTM C 1193.
 - 5. Provide recessed joint configuration of recess depth and at locations indicated per Figure 8C in ASTM C 1193.

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- a. Use masking tape to protect surfaces adjacent to recessed tooled joints.
- G. Acoustical Sealant Installation: At sound-rated assemblies and elsewhere as indicated, seal construction at perimeters, behind control joints, and at openings and penetrations with a continuous bead of acoustical sealant. Install acoustical sealant at both faces of partitions at perimeters and through penetrations. Comply with ASTM C 919 and with manufacturer's written recommendations.
- 3.4 CLEANING
- A. Clean off excess sealant or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.
- 3.5 PROTECTION
- A. Protect joint sealants during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealants immediately so installations with repaired areas are indistinguishable from original work.
- 3.6 JOINT-SEALANT SCHEDULE
- A. Joint-Sealant Application: Exterior joints in vertical surfaces and horizontal nontraffic surfaces.
- 1. Joint Locations:
 - a. Construction joints in cast-in-place concrete.
 - b. Control and expansion joints in unit masonry.
 - c. Joints between metal panels.
 - d. Joints between different materials listed above.
 - e. Perimeter joints between materials listed above and frames of doors, windows and louvers.
 - f. Control and expansion joints in ceilings and other overhead surfaces.
 - g. Other joints as indicated.
 - 2. Polysulfide Joint Sealant: Multicomponent, nonsag.
- B. Joint-Sealant Application: Interior joints in vertical surfaces and horizontal nontraffic surfaces.
- 1. Joint Locations:
 - a. Control and expansion joints on exposed interior surfaces of exterior walls.
 - b. Perimeter joints of exterior openings where indicated.
 - c. Tile control and expansion joints.
 - d. Vertical joints on exposed surfaces of interior unit masonry and concrete walls and partitions.
 - e. Perimeter joints between interior wall surfaces and frames of interior doors, windows and elevator entrances.

- f. Other joints as indicated.
 - 2. Joint Sealant: Latex.
 - C. Joint-Sealant Application: Mildew-resistant interior joints in vertical surfaces and horizontal nontraffic surfaces.
 - 1. Joint Sealant Location:
 - a. Joints between plumbing fixtures and adjoining walls, floors, and counters.
 - b. Tile control and expansion joints where indicated.
 - c. Other joints as indicated.
 - 2. Joint Sealant: Mildew resistant, single component, nonsag, neutral curing, silicone.
 - D. Joint-Sealant Application: Interior acoustical joints in vertical surfaces and horizontal nontraffic surfaces.
 - 1. Joint Location:
 - a. Acoustical joints where indicated.
 - b. Other joints as indicated.
 - 2. Joint Sealant: Acoustical.

END OF SECTION 079200

SECTION 083113 - ACCESS DOORS AND FRAMES

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. Access doors and frames for walls and ceilings.

B. Related Requirements:

- 1. Section 092900 "Gypsum Board" for gypsum board assemblies receiving access panels.
- 2. Section 061000 "Rough Carpentry" for framed drywall partitions receiving access panels.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

- 1. Include construction details, fire ratings, materials, individual components and profiles, and finishes.

B. Shop Drawings:

- 1. Include plans, elevations, sections, details, and attachments to other work.
- 2. Detail fabrication and installation of access doors and frames for each type of substrate.

C. Samples: For each door face material, at least 3 by 5 inches in size, in specified finish.

D. Product Schedule: Provide complete access door and frame schedule, including types, locations, sizes, latching or locking provisions, and other data pertinent to installation.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Rated Access Doors and Frames: Units complying with NFPA 80 that are identical to access door and frame assemblies tested for fire-test-response characteristics according to the following test method and that are listed and labeled by UL or another testing and inspecting agency acceptable to authorities having jurisdiction:

- 1. NFPA 252 or UL 10B for fire-rated access door assemblies installed vertically.
- 2. NFPA 288 for fire-rated access door assemblies installed horizontally.

2.2 ACCESS DOORS AND FRAMES FOR WALLS AND CEILINGS

A. Basis-of-Design Product:

1. J. L. Industries, Inc.; Div. of Activar Construction Products Group

B. 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. Babcock-Davis
2. Larsen's Manufacturing Company
3. Milcor Inc.
4. Substitutions: Under provisions of Section 012500 "Substitution Procedures".

C. Source Limitations: Obtain each type of access door and frame from single source from single manufacturer.

D. Flush Access Doors with Exposed Flanges:

1. Basis-of-Design Product: **Model TM.**
2. Assembly Description: Fabricate door to fit flush to frame. Provide manufacturer's standard-width exposed flange, proportional to door size.
3. Locations: Wall and ceiling.
4. Size: As indicated on Drawings.
5. Uncoated Steel Sheet for Door: Nominal 0.060 inch, 16 gage.
 - a. Finish: Factory prime.
6. Frame Material: Same material, thickness, and finish as door.
7. Hinges: Continuous piano.
8. Hardware: Latch.

E. Fire-Rated, Insulated Flush Access Doors with Exposed Flanges:

1. Basis-of-Design Product: **Model FD Series.**
2. Assembly Description: Fabricate door to fit flush to frame, with a core of mineral-fiber insulation enclosed in sheet metal. Provide self-latching door with automatic closer and interior latch release. Provide manufacturer's standard-width exposed flange, proportional to door size.
3. Locations: Wall and ceiling, as indicated on Drawings.
4. Size: As indicated on Drawings.
5. Fire-Resistance Rating: Two hour rating.
6. Uncoated Steel Sheet for Door: Nominal 0.036 inch, 20 gage.
 - a. Finish: Factory prime.
7. Frame Material: Same material and finish as door, 16 gage thickness.
8. Hinges: Manufacturer's standard.
9. Hardware: Latch.

- F. Hardware:
 - 1. Latch:
 - a. Cam latch operated by screwdriver for non-rated doors.
 - b. Slam latch operated by ring turn with interior release.

2.3 MATERIALS

- A. Steel Plates, Shapes, and Bars: ASTM A 36.
- B. Steel Sheet: Uncoated or electrolytic zinc coated, ASTM A 879, with cold-rolled steel sheet substrate complying with ASTM A 1008, Commercial Steel (CS), exposed.
- C. Frame Anchors: Same type as door face.
- D. Inserts, Bolts, and Anchor Fasteners: Hot-dip galvanized steel according to ASTM A 153 or ASTM F 2329.

2.4 FABRICATION

- A. General: Provide access door and frame assemblies manufactured as integral units ready for installation.
- B. Metal Surfaces: For metal surfaces exposed to view in the completed Work, provide materials with smooth, flat surfaces without blemishes. Do not use materials with exposed pitting, seam marks, roller marks, rolled trade names, or roughness.
- C. Doors and Frames: Grind exposed welds smooth and flush with adjacent surfaces. Furnish attachment devices and fasteners of type required to secure access doors to types of supports indicated.
 - 1. Provide mounting holes in frames for attachment of units to metal or wood framing.
 - 2. Provide mounting holes in frame for attachment of masonry anchors.
- D. Latching Mechanisms: Furnish number required to hold doors in flush, smooth plane when closed.
 - 1. For cylinder locks, furnish two keys per lock and key all locks alike.

2.5 FINISHES

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- C. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

D. Steel and Metallic-Coated-Steel Finishes:

1. Factory Prime: Apply manufacturer's standard, fast-curing, lead- and chromate-free, universal primer immediately after surface preparation and pretreatment.

PART 3 - EXECUTION

3.1 COMMISSIONING OF COMPONENTS AND SYSTEMS

- A. Engage a manufacturer authorized representative who is familiar with this project to participate and assist, if necessary, in the functional performance testing of the components and systems included in this Division with the Commissioning Agent.

3.2 EXAMINATION

- A. Examine substrates for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 INSTALLATION

- A. Comply with manufacturer's written instructions for installing access doors and frames.
- B. Install doors flush with adjacent finish surfaces or recessed to receive finish material.

3.4 ADJUSTING

- A. Adjust doors and hardware, after installation, for proper operation.
- B. Remove and replace doors and frames that are warped, bowed, or otherwise damaged.

END OF SECTION 083113

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. Non-load-bearing steel framing systems for interior gypsum board assemblies.
 - 2. Suspension systems for interior gypsum soffits, and grid systems.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.

1.4 INFORMATIONAL SUBMITTALS

- A. Evaluation Reports: For firestop tracks, from ICC-ES.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Test-Response Characteristics: For fire-resistance-rated assemblies that incorporate non-load-bearing steel framing, provide materials and construction identical to those tested in assembly indicated, according to ASTM E 119 by an independent testing agency.
- B. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated, according to ASTM E 90 and classified according to ASTM E 413 by an independent testing agency.

2.2 FRAMING SYSTEMS

- A. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than twenty-five percent (25%).
- B. Framing Members, General: Comply with ASTM C 754 for conditions indicated.
 - 1. Steel Sheet Components: Comply with ASTM C 645 requirements for metal unless otherwise indicated.
 - 2. Protective Coating: ASTM A 653, G60, hot-dip galvanized unless otherwise indicated.
- C. Studs and Runners: ASTM C 645.
 - 1. Embossed Steel Studs and Runners:

- a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1) ClarkDietrich Building Systems.
 - 2) Marino\WARE.
 - 3) Steel Network, Inc. (The).
 - 4) Substitutions: Under provisions of Section 012500 “Substitution Procedures”.
 - b. Minimum Base-Metal Thickness: As required by horizontal deflection performance requirements.
 - c. Depth: As indicated on Drawings.
- D. Slip-Type Head Joints: Where indicated, provide the following:
- 1. Deflection Track: Steel sheet top runner manufactured to prevent cracking of finishes applied to interior partition framing resulting from deflection of structure above; in thickness not less than indicated for studs and in width to accommodate depth of studs.
 - a. Products: Subject to compliance with requirements, provide products by one of the following:
 - 1) Dietrich Metal Framing; SLP-TRK Slotted Deflection Track
 - 2) MBA Building Supplies; Slotted Deflecto Track.
 - 3) Superior Metal Trim; Superior Flex Track System (SFT)
 - 4) Substitutions: Under provisions of Section 012500 “Substitution Procedures”.
- E. Firestop Tracks: Top runner manufactured to allow partition heads to expand and contract with movement of the structure while maintaining continuity of fire-resistance-rated assembly indicated; in thickness not less than indicated for studs and in width to accommodate depth of studs.
- 1. Products: Subject to compliance with requirements, provide products by one of the following:
 - a. Fire Trak Corp.; Fire Trak System
 - b. Grace Construction Products; FlameSafe FlowTrak System
 - c. Metal-Lite, Inc.; The System
 - d. Substitutions: Under provisions of Section 012500 “Substitution Procedures”.
- F. Flat Strap and Backing Plate: Steel sheet for blocking and bracing in length and width indicated.
- 1. Minimum Base-Metal Thickness: 0.018 inch.
- G. Cold-Rolled Channel Bridging: Steel, 0.053-inch minimum base-metal thickness, with minimum ½-inch-wide flanges.
- 1. Depth: 1½ inches.

2. Clip Angle: Not less than 1½ by 1½ inches, 0.068-inch-thick, galvanized steel.

H. Hat-Shaped, Rigid Furring Channels: ASTM C 645.

1. Minimum Base-Metal Thickness: 0.018 inch.
2. Depth: 7/8 inch.

I. Z-Shaped Furring: With slotted or nonslotted web, face flange of 1¼ inches, wall attachment flange of 7/8 inch, minimum uncoated-metal thickness of 0.018 inch, and depth required to fit insulation thickness indicated.

2.3 SUSPENSION SYSTEMS

A. Tie Wire: ASTM A 641, Class 1 zinc coating, soft temper, 0.062-inch-diameter wire, or double strand of 0.048-inch-diameter wire.

B. Wire Hangers: ASTM A 641, Class 1 zinc coating, soft temper, 0.16 inch in diameter.

C. Carrying Channels: Cold-rolled, commercial-steel sheet with a base-metal thickness of 0.053 inch and minimum ½-inch-wide flanges.

1. Depth: As indicated on Drawings.

D. Furring Channels (Furring Members):

1. Steel Studs and Runners: ASTM C 645.

- a. Minimum Base-Metal Thickness: 20 gauge.
- b. Depth: As indicated on Drawings.

2. Hat-Shaped, Rigid Furring Channels: ASTM C 645, 7/8 inch deep.

- a. Minimum Base-Metal Thickness: 0.018 inch.

E. Grid Suspension System for Gypsum Board Soffits: ASTM C 645, direct-hung system composed of main beams and cross-furring members that interlock.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Armstrong World Industries, Inc.; Drywall Grid Systems
 - b. Chicago Metallic Corporation; Drywall Grid System
 - c. USG Corporation; Drywall Suspension System
 - d. Substitutions: Under provisions of Section 012500 “Substitution Procedures”.

2.4 AUXILIARY MATERIALS

A. General: Provide auxiliary materials that comply with referenced installation standards.

1. Fasteners for Metal Framing: Of type, material, size, corrosion resistance, holding power, and other properties required to fasten steel members to substrates.

- B. Isolation Strip at Exterior Walls: Provide one of the following:
 - 1. Asphalt-Saturated Organic Felt: ASTM D 226, Type I (No. 15 asphalt felt), nonperforated.
 - 2. Foam Gasket: Adhesive-backed, closed-cell vinyl foam strips that allow fastener penetration without foam displacement, 1/8 inch thick, in width to suit steel stud size.
- C. Rigid Connections: Universal framing clip to attach and support rigid framing conditions including shear, tension and two-axis loading.
 - 1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Dietrich Metal Framing; Uni-Clip.
 - b. Substitutions: Under provisions of Section 012500 "Substitution Procedures".

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas and substrates, with Installer present, and including welded hollow-metal frames, cast-in anchors, and structural framing, for compliance with requirements and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Suspended Assemblies: Coordinate installation of suspension systems with installation of overhead structure to ensure that inserts and other provisions for anchorages to building structure have been installed to receive hangers at spacing required to support the Work and that hangers will develop their full strength.
- B. Coordination with Sprayed Fire-Resistive Materials:
 - 1. Before sprayed fire-resistive materials are applied, attach offset anchor plates or ceiling runners (tracks) to surfaces indicated to receive sprayed fire-resistive materials. Where offset anchor plates are required, provide continuous plates fastened to building structure not more than 24 inches o.c.
 - 2. After sprayed fire-resistive materials are applied, remove them only to extent necessary for installation of non-load-bearing steel framing. Do not reduce thickness of fire-resistive materials below that required for fire-resistance ratings indicated. Protect adjacent fire-resistive materials from damage.

3.3 INSTALLATION, GENERAL

- A. Installation Standard: ASTM C 754.
 - 1. Gypsum Board Assemblies: Also comply with requirements in ASTM C 840 that apply to framing installation.

- B. Install supplementary framing, and blocking to support fixtures, equipment services, heavy trim, grab bars, toilet accessories, furnishings, or similar construction.
- C. Install bracing at terminations in assemblies.
- D. Do not bridge building control and expansion joints with non-load-bearing steel framing members. Frame both sides of joints independently.

3.4 INSTALLING FRAMED ASSEMBLIES

- A. Install framing system components according to spacings indicated, but not greater than spacings required by referenced installation standards for assembly types.
- B. Where studs are installed directly against exterior masonry walls or dissimilar metals at exterior walls, install isolation strip between studs and exterior wall.
- C. Install studs so flanges within framing system point in same direction.
- D. Install tracks (runners) at floors and overhead supports. Extend framing full height to structural supports or substrates above suspended ceilings except where partitions are indicated to terminate at suspended ceilings. Continue framing around ducts penetrating partitions above ceiling.
 - 1. Slip-Type Head Joints: Where framing extends to overhead structural supports, install to produce joints at tops of framing systems that prevent axial loading of finished assemblies.
 - 2. Door Openings: Screw vertical studs at jambs to jamb anchor clips on door frames.
 - a. Install two studs at each jamb unless otherwise indicated.
 - b. Extend jamb studs through suspended ceilings and attach to underside of overhead structure.
 - 3. Other Framed Openings: Frame openings other than door openings the same as required for door openings unless otherwise indicated. Install framing below sills of openings to match framing required above door heads.
 - 4. Fire-Resistance-Rated Partitions: Install framing to comply with fire-resistance-rated assembly indicated and support closures and to make partitions continuous from floor to underside of solid structure.
 - a. Firestop Track: Where indicated, install to maintain continuity of fire-resistance-rated assembly indicated.
 - 5. Sound-Rated Partitions: Install framing to comply with sound-rated assembly indicated.
- E. Direct Furring:
 - 1. Attach to concrete or masonry with stub nails, screws designed for masonry attachment, or powder-driven fasteners spaced 24 inches o.c.
- F. Z-Furring Members:

1. Erect insulation, specified in Section 072100 "Thermal Insulation," vertically and hold in place with Z-furring members spaced 24 inches o.c.
2. Except at exterior corners, securely attach narrow flanges of furring members to wall with concrete stub nails, screws designed for masonry attachment, or powder-driven fasteners spaced 24 inches o.c.
3. At exterior corners, attach wide flange of furring members to wall with short flange extending beyond corner; on adjacent wall surface, screw-attach short flange of furring channel to web of attached channel. At interior corners, space second member no more than 12 inches from corner and cut insulation to fit.

G. Installation Tolerance: Install each framing member so fastening surfaces vary not more than 1/8 inch from the plane formed by faces of adjacent framing.

3.5 INSTALLING SUSPENSION SYSTEMS

- A. Install suspension system components according to spacings indicated, but not greater than spacings required by referenced installation standards for assembly types.
- B. Isolate suspension systems from building structure where they abut or are penetrated by building structure to prevent transfer of loading imposed by structural movement.
- C. Suspend hangers from building structure as follows:
 1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structural or suspension system.
 - a. Splay hangers only where required to miss obstructions and offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
 2. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with locations of hangers required to support standard suspension system members, install supplemental suspension members and hangers in the form of trapezes or equivalent devices.
 - a. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced installation standards.
 3. Wire Hangers: Secure by looping and wire tying, either directly to structures or to inserts, eye screws, or other devices and fasteners that are secure and appropriate for substrate, and in a manner that will not cause hangers to deteriorate or otherwise fail.
 4. Do not connect or suspend steel framing from ducts, pipes, or conduit.
- D. Fire-Resistance-Rated Assemblies: Wire tie furring channels to supports.
- E. Seismic Bracing: Sway-brace suspension systems with hangers used for support.
- F. Grid Suspension Systems: Attach perimeter wall track or angle where grid suspension systems meet vertical surfaces. Mechanically join main beam and cross-furring members to each other and butt-cut to fit into wall track.

- G. Installation Tolerances: Install suspension systems that are level to within 1/8 inch in 12 feet measured lengthwise on each member that will receive finishes and transversely between parallel members that will receive finishes.

END OF SECTION 092216

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. Interior gypsum board.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Samples: For the following products:
 - 1. Trim Accessories: Full-size Sample in 12-inch-long length for each trim accessory indicated.

1.4 DELIVERY, STORAGE AND HANDLING

- A. Store materials inside under cover and keep them dry and protected against weather, condensation, direct sunlight, construction traffic, and other potential causes of damage. Stack panels flat and supported on risers on a flat platform to prevent sagging.

1.5 FIELD CONDITIONS

- A. Environmental Limitations: Comply with ASTM C 840 requirements or gypsum board manufacturer's written recommendations, whichever are more stringent.
- B. Do not install paper-faced gypsum panels until installation areas are enclosed and conditioned.
- C. Do not install panels that are wet, those that are moisture damaged, and those that are mold damaged.
 - 1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
 - 2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

PART 2 - PRODUCTS**2.1 PERFORMANCE REQUIREMENTS**

- A. Fire-Resistance-Rated Assemblies: For fire-resistance-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 119 by an independent testing agency.
- B. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 90 and classified according to ASTM E 413 by an independent testing agency.

2.2 GYPSUM BOARD, GENERAL

- A. Recycled Content of Gypsum Panel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than thirty-five percent (35%).
- B. Size: Provide maximum lengths and widths available that will minimize joints in each area and that correspond with support system indicated.

2.3 ABUSE AND MOLD RESISTANT INTERIOR GYPSUM BOARD

- A. Abuse Resistant Gypsum Board ASTM C1629: Standard Classification for Abuse-Resistant Non-decorated Interior Gypsum Panel Products and Fiber-Reinforced Cement Panels.
 - 1. Basis of Design: USG Corporation, Sheetrock® Brand MoldTough® Abuse Resistant VHI Firecode® X₂
 - a. Abrasion Resistance; Level 2.
 - b. Indentation Resistance; Level 1.
 - c. Soft Body Impact Resistance; Level 3.
 - d. Hard Body Impact Resistance; Level 3.
 - 2. UL Type Designation "AR".
 - 3. Thickness: 5/8 inch.
 - 4. Length: 8'-0" (2438mm).
 - 5. Widths: 48" (1219mm).
 - 6. Weight: 2.8 lb./ft².
 - 7. Long Edges: Tapered.
 - 8. Mold-Resistant Gypsum Board: ASTM C 1396/C 1396M. With moisture- and mold-resistant core and paper surfaces.
- B. 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. Georgia-Pacific Gypsum LLC.
 - 2. National Gypsum Company.
 - 3. Substitutions: Under provisions of Section 012500 "Substitution Procedures".

2.4 FLEXIBLE GYPSUM BOARD

- 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. Georgia-Pacific Gypsum LLC.
 - 2. National Gypsum Company.
 - 3. USG Corporation.
 - 4. Substitutions: Under provisions of Section 012500 “Substitution Procedures”.
- B. Performance Requirements: ASTM C 1396. Manufactured to bend to fit radii and to be more flexible than standard regular-type gypsum board of same thickness.
- C. Thickness: ¼ inch.
- D. Long Edges: Tapered.

2.5 TRIM ACCESSORIES

- A. Interior Trim: ASTM C 1047.
 - 1. Material: Galvanized or aluminum-coated steel sheet or rolled zinc.
 - 2. Shapes:
 - a. Cornerbead.
 - b. Bullnose bead.
 - c. LC-Bead: J-shaped; exposed long flange receives joint compound.
 - d. L-Bead: L-shaped; exposed long flange receives joint compound.
 - e. U-Bead: J-shaped; exposed short flange does not receive joint compound.
 - f. Expansion (control) joint.
- B. Aluminum Trim: Extruded accessories of profiles and dimensions indicated.
 - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Fry Reglet Corp.
 - b. Gordon, Inc.
 - c. Pittcon Industries
 - d. Substitutions: Under provisions of Section 012500 “Substitution Procedures”.
 - 2. Aluminum: Alloy and temper with not less than the strength and durability properties of ASTM B 221, Alloy 6063-T5.
 - 3. Finish: Mill.

2.6 JOINT TREATMENT MATERIALS

- A. General: Comply with ASTM C 475.
- B. Joint Tape:

1. Interior Gypsum Board: Paper.
- C. Joint Compound for Interior Gypsum Board: For each coat use formulation that is compatible with other compounds applied on previous or for successive coats.
1. Prefilling: At open joints, rounded or beveled panel edges, and damaged surface areas, use setting-type taping compound.
 2. Embedding and First Coat: For embedding tape and first coat on joints, fasteners, and trim flanges, use drying-type, all-purpose compound.
 3. Fill Coat: For second coat, use drying-type, all-purpose compound.
 4. Finish Coat: For third coat, use drying-type, all-purpose compound.
 5. Skim Coat: For final coat of Level 5 finish, use drying-type, all-purpose compound.

2.7 AUXILIARY MATERIALS

- A. General: Provide auxiliary materials that comply with referenced installation standards and manufacturer's written recommendations.
- B. Steel Drill Screws: ASTM C 1002, unless otherwise indicated.
- C. Sound Attenuation Blankets: ASTM C 665, Type I (blankets without membrane facing) produced by combining thermosetting resins with mineral fibers manufactured from glass, slag wool, or rock wool.
1. Fire-Resistance-Rated Assemblies: Comply with mineral-fiber requirements of assembly.
 2. Recycled Content of Blankets: Postconsumer recycled content plus one-half of preconsumer recycled content not less than twenty-five percent (25%).
- D. Acoustical Joint Sealant: Manufacturer's standard nonsag, paintable, nonstaining latex sealant complying with ASTM C 834. Product effectively reduces airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E 90.
1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Pecora Corporation; AC-20 FTR
 - b. Specified Technologies, Inc.; Smoke N Sound Acoustical Sealant
 - c. USG Corporation; SHEETROCK Acoustical Sealant
 - d. Substitutions: Under provisions of Section 012500 "Substitution Procedures".
 2. Acoustical joint sealant shall have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- E. Thermal Insulation: As specified in Section 072100 "Thermal Insulation."

PART 3 - EXECUTION**3.1 EXAMINATION**

- A. Examine areas and substrates including welded hollow-metal frames and framing, with Installer present, for compliance with requirements and other conditions affecting performance.
- B. Examine panels before installation. Reject panels that are wet, moisture damaged, and mold damaged.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 APPLYING AND FINISHING PANELS, GENERAL

- A. Comply with ASTM C 840.
- B. Install ceiling panels across framing to minimize the number of abutting end joints and to avoid abutting end joints in central area of each ceiling. Stagger abutting end joints of adjacent panels not less than one framing member.
- C. Install panels with face side out. Butt panels together for a light contact at edges and ends with not more than 1/16 inch of open space between panels. Do not force into place.
- D. Locate edge and end joints over supports, except in ceiling applications where intermediate supports or gypsum board back-blocking is provided behind end joints. Do not place tapered edges against cut edges or ends. Stagger vertical joints on opposite sides of partitions. Do not make joints other than control joints at corners of framed openings.
- E. Form control and expansion joints with space between edges of adjoining gypsum panels.
- F. Cover both faces of support framing with gypsum panels in concealed spaces (above ceilings, etc.), except in chases braced internally.
 - 1. Unless concealed application is indicated or required for sound, fire, air, or smoke ratings, coverage may be accomplished with scraps of not less than 8 sq. ft. in area.
 - 2. Fit gypsum panels around ducts, pipes, and conduits.
 - 3. Where partitions intersect structural members projecting below underside of floor/roof slabs and decks, cut gypsum panels to fit profile formed by structural members; allow ¼ to 3/8-inch-wide joints to install sealant.
- G. Isolate perimeter of gypsum board applied to non-load-bearing partitions at structural abutments, except floors. Provide ¼ to ½ inch-wide spaces at these locations and trim edges with edge trim where edges of panels are exposed. Seal joints between edges and abutting structural surfaces with acoustical sealant.
- H. Attachment to Steel Framing: Attach panels so leading edge or end of each panel is attached to open (unsupported) edges of stud flanges first.
- I. STC-Rated Assemblies: Seal construction at perimeters, behind control joints, and at openings and penetrations with a continuous bead of acoustical sealant. Install acoustical sealant at both faces of partitions at perimeters and through penetrations. Comply with ASTM C 919 and with

manufacturer's written recommendations for locating edge trim and closing off sound-flanking paths around or through assemblies, including sealing partitions above acoustical ceilings.

- J. Install sound attenuation blankets before installing gypsum panels unless blankets are readily installed after panels have been installed on one side.

3.3 APPLYING INTERIOR GYPSUM BOARD

- A. Install interior gypsum board where indicated on Drawings.

- B. Single-Layer Application:

1. On ceilings, apply gypsum panels before wall/partition board application to greatest extent possible and at right angles to framing unless otherwise indicated.
2. On partitions/walls, apply gypsum panels in most economical direction, with ends and edges occurring over firm bearing unless otherwise indicated or required by fire-resistance-rated assembly, and minimize end joints.
 - a. Stagger abutting end joints not less than one framing member in alternate courses of panels.
 - b. At stairwells and other high walls, install panels horizontally unless otherwise indicated or required by fire-resistance-rated assembly.
3. Fastening Methods: Apply gypsum panels to supports with steel drill screws.

- C. Multilayer Application:

1. On ceilings, apply gypsum board indicated for base layers before applying face layers on walls/partitions; apply face layers in same sequence. Apply base layers at right angles to framing members and offset face-layer joints one framing member, 16 inches minimum, from parallel base-layer joints, unless otherwise indicated or required by fire-resistance-rated assembly.
2. On partitions/walls, apply gypsum board indicated for base layers horizontally (perpendicular to framing) and face layers vertically (parallel to framing) with joints of base layers located over stud or furring member and face-layer joints offset at least one (1) stud or furring member with base-layer joints, unless otherwise indicated or required by fire-resistance-rated assembly. Stagger joints on opposite sides of partitions.
3. Fastening Methods: Fasten base layers and face layers separately to supports with screws.

- D. Curved Surfaces:

1. Install panels horizontally (perpendicular to supports) and unbroken, to extent possible, across curved surface plus 12-inch-long straight sections at ends of curves and tangent to them.
2. For double-layer construction, fasten base layer to studs with screws 16 inches o.c. Center gypsum board face layer over joints in base layer, and fasten to studs with screws spaced 12 inches o.c.

3.4 INSTALLING TRIM ACCESSORIES

- A. General: For trim with back flanges intended for fasteners, attach to framing with same fasteners used for panels. Otherwise, attach trim according to manufacturer's written instructions.
- B. Control Joints: Install control joints according to ASTM C 840 and in specific locations approved by Architect for visual effect.
- C. Interior Trim: Install in the following locations:
 - 1. Cornerbead: Use at outside corners, unless otherwise indicated.
 - 2. Bullnose Bead: Use at outside corners.
 - 3. LC-Bead: Use at exposed panel edges.
 - 4. L-Bead: Use where indicated.
 - 5. U-Bead: Use at exposed panel edges.
- D. Aluminum Trim: Install in locations indicated on Drawings.

3.5 FINISHING GYPSUM BOARD

- A. General: Treat gypsum board joints, interior angles, edge trim, control joints, penetrations, fastener heads, surface defects, and elsewhere as required to prepare gypsum board surfaces for decoration. Promptly remove residual joint compound from adjacent surfaces.
- B. Prefill open joints, rounded or beveled edges, and damaged surface areas.
- C. Apply joint tape over gypsum board joints, except for trim products specifically indicated as not intended to receive tape.
- D. Gypsum Board Finish Levels: Finish panels to levels indicated below and according to ASTM C 840:
 - 1. Level 1: Ceiling plenum areas, concealed areas, and where indicated.
 - 2. Level 4: At panel surfaces that will be exposed to view, receiving wallcoverings and flat paints.
 - a. Primer and its application to surfaces are specified in Section 099123 "Interior Painting."
 - 3. Level 5: At panel surfaces that will be exposed to view, receiving gloss and semi-gloss enamels.
 - a. Primer and its application to surfaces are specified in Section 099123 "Interior Painting."

3.6 PROTECTION

- A. Protect adjacent surfaces from drywall compound and promptly remove from floors and other non-drywall surfaces. Repair surfaces stained, marred, or otherwise damaged during drywall application.

- B. Protect installed products from damage from weather, condensation, direct sunlight, construction, and other causes during remainder of the construction period.
- C. Remove and replace panels that are wet, moisture damaged, and mold damaged.
 - 1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
 - 2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

END OF SECTION 092900

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. Ceramic mosaic tile.
2. Glazed wall tile.
3. Crack isolation membrane.
4. Metal edge strips.
5. Stone thresholds.
6. Tile backing panels.

B. Related Requirements:

1. Section 035413 "Gypsum Cement Underlayment" for floor leveling compound.
2. Section 079200 "Joint Sealants" for sealing of expansion, contraction, control, and isolation joints in tile surfaces.

1.3 DEFINITIONS

- A. General: Definitions in the ANSI A108 series of tile installation standards and in ANSI A137.1 apply to Work of this Section unless otherwise specified.

- B. ANSI A108 Series: ANSI A108.01, ANSI A108.02, ANSI A108.1A, ANSI A108.1B, ANSI A108.1C, ANSI A108.4, ANSI A108.5, ANSI A108.6, ANSI A108.8, ANSI A108.9, ANSI A108.10, ANSI A108.11, ANSI A108.12, ANSI A108.13, ANSI A108.14, ANSI A108.15, ANSI A108.16, and ANSI A108.17, which are contained in its "Specifications for Installation of Ceramic Tile."

1.4 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

1. Review requirements in ANSI A108.01 for substrates and for preparation by other trades.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product.

- B. Shop Drawings: Show locations of each type of tile and tile pattern. Show widths, details, and locations of expansion, contraction, control, and isolation joints in tile substrates and finished tile surfaces.

- C. Samples for Verification:

1. Full-size units of each type and composition of tile and for each color and finish required. For ceramic mosaic tile in color blend patterns, provide full sheets of each color blend.
2. Full-size units of each type of trim and accessory for each color and finish required.
3. Metal edge strips in 6-inch lengths.

1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Product Test Reports: For tile-setting and -grouting products and certified porcelain tile.

1.7 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match and are from same production runs as products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 1. Tile and Trim Units: Furnish quantity of full-size units equal to three percent (3%) of amount installed for each type, composition, color, pattern, and size indicated.
 2. Grout: Furnish quantity of grout equal to three percent (3%) of amount installed for each type, composition, and color indicated.

1.8 QUALITY ASSURANCE

- A. Installer Qualifications:
 1. Installer employs installers recognized by the U.S. Department of Labor as Journeyman Tile Layers.
- B. Mockups: Build mockups to verify selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
 1. Build mockup of each type of floor tile installation.
 2. Build mockup of each type of wall tile installation.
 3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Deliver and store packaged materials in original containers with seals unbroken and labels intact until time of use. Comply with requirements in ANSI A137.1 for labeling tile packages.
- B. Store tile and cementitious materials on elevated platforms, under cover, and in a dry location.
- C. Store aggregates where grading and other required characteristics can be maintained and contamination can be avoided.
- D. Store liquid materials in unopened containers and protected from freezing.

1.10 FIELD CONDITIONS

- A. Environmental Limitations: Do not install tile until construction in spaces is complete and ambient temperature and humidity conditions are maintained at the levels indicated in referenced standards and manufacturer's written instructions.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations for Tile: Obtain tile of each type and color or finish from single source or producer.
 - 1. Obtain tile of each type and color or finish from same production run and of consistent quality in appearance and physical properties for each contiguous area.
- B. Source Limitations for Setting and Grouting Materials: Obtain ingredients of a uniform quality for each mortar, adhesive, and grout component from single manufacturer and each aggregate from single source or producer.
 - 1. Obtain setting and grouting materials, except for unmodified Portland cement and aggregate, from single manufacturer.
 - 2. Obtain crack isolation membrane, except for sheet products, from manufacturer of setting and grouting materials.
- C. Source Limitations for Other Products: Obtain each of the following products specified in this Section from a single manufacturer:
 - 1. Stone thresholds.
 - 2. Crack isolation membrane.
 - 3. Cementitious backer units.
 - 4. Metal edge strips.

2.2 PRODUCTS, GENERAL

- A. ANSI Ceramic Tile Standard: Provide tile that complies with ANSI A137.1 for types, compositions, and other characteristics indicated.
 - 1. Provide tile complying with Standard grade requirements.
- B. ANSI Standards for Tile Installation Materials: Provide materials complying with ANSI A108.02, ANSI standards referenced in other Part 2 articles, ANSI standards referenced by TCNA installation methods specified in tile installation schedules, and other requirements specified.
- C. Factory Blending: For tile exhibiting color variations within ranges, blend tile in factory and package so tile units taken from one package show same range in colors as those taken from other packages and match approved Samples.

-
- D. Mounting: For factory-mounted tile, provide back- or edge-mounted tile assemblies as standard with manufacturer unless otherwise indicated.

2.3 TILE PRODUCTS

- A. Ceramic Tile Type, Factory-mounted unglazed, blended ceramic mosaic tile.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

- a. American Olean Corporation
- b. Crossville, Inc.
- c. Daltile.
- d. Substitutions: Under provisions of Section 012500 "Substitution Procedures".

2. Composition: Porcelain.

3. Certification: Porcelain tile certified by the Porcelain Tile Certification Agency.

4. Surface: Nonabrasive, smooth.

5. Coefficient of Friction: ASTM C 1028.

- a. Wet: Not less than 0.60.

- b. Dry: Not less than 0.70.

6. Module Size, Thickness, Tile Color and Pattern and Grout Color: New materials to match existing – colors to be selected by Architect from manufacturer's full range of standard colors.

7. Trim Units: Coordinated with sizes and coursing of adjoining flat tile where applicable and matching characteristics of adjoining flat tile. Provide shapes as follows, selected from manufacturer's standard shapes:

- a. Base Cove: Cove, style, color, and module size to match existing, color as selected by Architect from Manufacturer's full range of standard colors.

- b. Internal and External Corners: Units as required.

- B. Ceramic Tile Type: Glazed wall tile.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

- a. American Olean Corporation
- b. Crossville, Inc.
- c. Daltile.
- d. Substitutions: Under provisions of Section 012500 "Substitution Procedures".

2. Module Size, Thickness, Finish, Tile Color and Pattern, and Grout Color: New materials to match existing – colors to be selected by Architect from manufacturer's full range of standard colors.

3. Trim Units: Coordinated with sizes and coursing of adjoining flat tile where applicable and matching characteristics of adjoining flat tile. Provide shapes as follows, selected from manufacturer's standard shapes:
 - a. Wainscot Cap for Thinset Mortar Installations: Surface bullnose, module size and model to match existing.
 - b. External Corners for Thinset Mortar Installations: Surface bullnose, same size as adjoining flat tile.
 - c. Internal Corners: Field-buttet square corners. For coved base and cap use angle pieces designed to fit with stretcher shapes.
 - d. Standard Cement Grout: ANSI A118.6, new materials to match existing colors, as selected by Architect from manufacturer's full range of standard colors.

2.4 CRACK ISOLATION MEMBRANE

- A. General: Manufacturer's standard product that complies with ANSI A118.12 for high performance and is recommended by the manufacturer for the application indicated. Include reinforcement and accessories recommended by manufacturer.
- B. Chlorinated Polyethylene Sheet: Nonplasticized, chlorinated polyethylene faced on both sides with nonwoven polyester fabric; **0.030-inch** nominal thickness.
 1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Noble Company (The); **Nobleseal CIS**
 - b. Substitutions: Under provisions of Section 012500 "Substitution Procedures".

2.5 SETTING MATERIALS

- A. Latex-Portland Cement Mortar (Thinset): ANSI A118.4.
 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Bostik, Inc.
 - b. Custom Building Products
 - c. Laticrete International, Inc.
 - d. MAPEI Corporation
 - e. Substitutions: Under provisions of Section 012500 "Substitution Procedures".
 2. Provide prepackaged, dry-mortar mix containing dry, redispersible, vinyl acetate or acrylic additive to which only water must be added at Project site.
 3. For wall applications, provide mortar that complies with requirements for nonsagging mortar in addition to the other requirements in ANSI A118.4.

2.6 GROUT MATERIALS

- A. Standard Cement Grout: ANSI A118.6.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Bostik, Inc.
 - b. Custom Building Products
 - c. MAPEI Corporation
 - d. Substitutions: Under provisions of Section 012500 "Substitution Procedures".

2.7 THRESHOLDS

- A. General: Fabricate to sizes and profiles indicated or required to provide transition between adjacent floor finishes.
 1. Bevel edges at 1:2 slope, with lower edge of bevel aligned with or up to **1/16 inch (1.5 mm)** above adjacent floor surface. Finish bevel to match top surface of threshold. Limit height of threshold to **1/2 inch (12.7 mm)** or less above adjacent floor surface.
- B. Marble Thresholds: ASTM C 503/C 503M, with a minimum abrasion resistance of **10** according to ASTM C 1353 or ASTM C 241/C 241M and with honed finish.
 1. Description: Uniform, fine- to medium-grained white stone with gray veining, Architect selected and Owner approved colors.

2.8 TILE BACKING PANELS

- A. Cementitious Backer Units: ANSI A118.9 or ASTM C 1325, Type A, in maximum lengths available to minimize end-to-end butt joints.
 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Custom Building Products.
 - b. Georgia-Pacific Building Products.
 - c. United States Gypsum Company.
 2. Thickness: **1/2 inch (12.7 mm)**.

2.9 MISCELLANEOUS MATERIALS

- A. Trowelable Underlayments and Patching Compounds: Latex-modified, Portland cement-based formulation provided or approved by manufacturer of tile-setting materials for installations indicated.
- B. Metal Edge Strips: Angle or L-shaped, height to match tile and setting-bed thickness, metallic or combination of metal and PVC or neoprene base, designed specifically for flooring applications; satin anodized aluminum exposed-edge material.
 1. Basis-of-Design Product:

-
- a. Schluter Systems L.P.; **Schiene AE60, Reno-U AEU125**
 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. Blanke Corporation
 - b. Ceramic Tool Company, Inc.
 - c. Substitutions: Under provisions of Section 012500 "Substitution Procedures".
 - C. Tile Cleaner: A neutral cleaner capable of removing soil and residue without harming tile and grout surfaces, specifically approved for materials and installations indicated by tile and grout manufacturers.
 - D. Grout Sealer: Manufacturer's standard product for sealing grout joints and that does not change color or appearance of grout.
 1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Bonsal American, an Oldcastle company; **Grout Sealer**
 - b. Custom Building Products; **Grout Sealer**
 - c. TEC, H. B. Fuller Construction Products Inc.; **Guard All Invisible Penetrating Sealer**
 - d. Substitutions: Under provisions of Section 012500 "Substitution Procedures".
- 2.10 MIXING MORTARS AND GROUT
- A. Mix mortars and grouts to comply with referenced standards and mortar and grout manufacturers' written instructions.
 - B. Add materials, water, and additives in accurate proportions.
 - C. Obtain and use type of mixing equipment, mixer speeds, mixing containers, mixing time, and other procedures to produce mortars and grouts of uniform quality with optimum performance characteristics for installations indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions where tile will be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
 1. Verify that substrates for setting tile are firm; dry; clean; free of coatings that are incompatible with tile-setting materials, including curing compounds and other substances that contain soap, wax, oil, or silicone; and comply with flatness tolerances required by ANSI A108.01 for installations indicated.

2. Verify that concrete substrates for tile floors installed with thinset mortar comply with surface finish requirements in ANSI A108.01 for installations indicated.
 - a. Verify that surfaces that received a steel trowel finish have been mechanically scarified.
 - b. Verify that protrusions, bumps, and ridges have been removed by sanding or grinding.
3. Verify that installation of grounds, anchors, recessed frames, electrical and mechanical units of work, and similar items located in or behind tile has been completed.
4. Verify that joints and cracks in tile substrates are coordinated with tile joint locations; if not coordinated, adjust joint locations in consultation with Architect.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Fill cracks, holes, and depressions in concrete substrates for tile floors installed with thinset mortar with trowelable leveling and patching compound specifically recommended by tile-setting material manufacturer.
- B. Blending: For tile exhibiting color variations, verify that tile has been factory blended and packaged so tile units taken from one package show same range of colors as those taken from other packages and match approved Samples. If not factory blended, either return to manufacturer or blend tiles at Project site before installing.

3.3 CERAMIC TILE INSTALLATION

- A. Comply with TCNA's "Handbook for Ceramic, Glass, and Stone Tile Installation" for TCNA installation methods specified in tile installation schedules. Comply with parts of the ANSI A108 series "Specifications for Installation of Ceramic Tile" that are referenced in TCNA installation methods, specified in tile installation schedules, and apply to types of setting and grouting materials used.
- B. Extend tile work into recesses and under or behind equipment and fixtures to form complete covering without interruptions unless otherwise indicated. Terminate work neatly at obstructions, edges, and corners without disrupting pattern or joint alignments.
- C. Accurately form intersections and returns. Perform cutting and drilling of tile without marring visible surfaces. Carefully grind cut edges of tile abutting trim, finish, or built-in items for straight aligned joints. Fit tile closely to electrical outlets, piping, fixtures, and other penetrations so plates, collars, or covers overlap tile.
- D. Provide manufacturer's standard trim shapes where necessary to eliminate exposed tile edges.
- E. Jointing Pattern: Lay tile in grid pattern unless otherwise indicated. Lay out tile work and center tile fields in both directions in each space or on each wall area. Lay out tile work to minimize the use of pieces that are less than half of a tile. Provide uniform joint widths unless otherwise indicated.

1. For tile mounted in sheets, make joints between tile sheets same width as joints within tile sheets so joints between sheets are not apparent in finished work.
 2. Where adjoining tiles on floor, base, walls, or trim are specified or indicated to be same size, align joints.
 3. Where tiles are specified or indicated to be whole integer multiples of adjoining tiles on floor, base, walls, or trim, align joints unless otherwise indicated.
- F. Joint Widths: Unless otherwise indicated, install tile with the following joint widths:
1. Ceramic Mosaic Tile: **1/8 inch.**
 2. Quarry Tile: **3/8 inch.**
 3. Glazed Wall Tile: **1/16 inch.**
- G. Lay out tile wainscots to dimensions indicated or to next full tile beyond dimensions indicated.
- H. Expansion Joints: Provide expansion joints and other sealant-filled joints, including control, contraction, and isolation joints, where indicated. Form joints during installation of setting materials, mortar beds, and tile. Do not saw-cut joints after installing tiles.
1. Where joints occur in concrete substrates, locate joints in tile surfaces directly above them.
- I. Stone Thresholds: Install stone thresholds in same type of setting bed as adjacent floor unless otherwise indicated.
1. At locations where mortar bed (thickset) would otherwise be exposed above adjacent floor finishes, set thresholds in latex-portland cement mortar (thinset).
 2. Do not extend cleavage membrane, waterproofing or crack isolation membrane under thresholds set in dry-set portland cement or latex-portland cement mortar. Fill joints between such thresholds and adjoining tile set on cleavage membrane, waterproofing or crack isolation membrane with elastomeric sealant.
- J. Metal Edge Strips: Install where exposed edge of tile flooring meets carpet, wood, or other flooring that finishes flush with or below top of tile and no threshold is indicated.
- K. Grout Sealer: Apply grout sealer to grout joints according to grout-sealer manufacturer's written instructions. As soon as grout sealer has penetrated grout joints, remove excess sealer and sealer from tile faces by wiping with soft cloth.
- 3.4 TILE BACKING PANEL INSTALLATION
- A. Install panels and treat joints according to ANSI A108.11 and manufacturer's written instructions for type of application indicated. Use latex-portland cement mortar for bonding material unless otherwise directed in manufacturer's written instructions.
- 3.5 CRACK ISOLATION MEMBRANE INSTALLATION
- A. Install crack isolation membrane to comply with ANSI A108.17 and manufacturer's written instructions to produce membrane of uniform thickness that is bonded securely to substrate.

- B. Allow crack isolation membrane to cure before installing tile or setting materials over it.

3.6 ADJUSTING AND CLEANING

- A. Remove and replace tile that is damaged or that does not match adjoining tile. Provide new matching units, installed as specified and in a manner to eliminate evidence of replacement.
- B. Cleaning: On completion of placement and grouting, clean all ceramic tile surfaces so they are free of foreign matter.
 - 1. Remove grout residue from tile as soon as possible.
 - 2. Clean grout smears and haze from tile according to tile and grout manufacturer's written instructions but no sooner than ten (10) days after installation. Use only cleaners recommended by tile and grout manufacturers and only after determining that cleaners are safe to use by testing on samples of tile and other surfaces to be cleaned. Protect metal surfaces and plumbing fixtures from effects of cleaning. Flush surfaces with clean water before and after cleaning.

3.7 PROTECTION

- A. Protect installed tile work with Kraft paper or other heavy covering during construction period to prevent staining, damage, and wear. If recommended by tile manufacturer, apply coat of neutral protective cleaner to completed tile walls and floors.
- B. Prohibit foot and wheel traffic from tiled floors for at least seven (7) days after grouting is completed.
- C. Before final inspection, remove protective coverings and rinse neutral protective cleaner from tile surfaces.

3.8 INTERIOR CERAMIC TILE INSTALLATION SCHEDULE

- A. Interior Floor Installations, Concrete Subfloor:
 - 1. Ceramic Tile Installation: TCNA F125; thinset mortar on crack isolation membrane, where required.
 - a. Ceramic Tile Type: Match existing.
 - b. Thinset Mortar: Latex-Portland cement mortar.
 - c. Grout: Standard unsanded cement grout, color to match existing as selected by Architect from Manufacturer's full range.
- B. Interior Wall Installations, Tile Backer Panels or Concrete:
 - 1. Ceramic Tile Installation: TCNA W202; thinset mortar.
 - a. Ceramic Tile Type: As indicated on Drawings.
 - b. Thinset Mortar: Latex-Portland cement mortar.
 - c. Grout: Standard unsanded cement grout.

END OF SECTION 093000

SECTION 095113 - ACOUSTICAL PANEL CEILINGS

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 acoustical panels and exposed suspension systems for ceilings.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Samples: For each exposed product and for each color and texture specified, 6 inches in size.

1.4 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Reflected ceiling plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:
 - 1. Suspended ceiling components.
 - 2. Structural members to which suspension systems will be attached.
 - 3. Size and location of initial access modules for acoustical panels.
 - 4. Items penetrating finished ceiling including the following:
 - a. Lighting fixtures.
 - b. Air outlets and inlets.
 - c. Speakers.
 - d. Access panels.
 - 5. Perimeter moldings.
- B. Product Test Reports: For each acoustical panel ceiling, for tests performed by a qualified testing agency.
- C. Evaluation Reports: For each acoustical panel ceiling suspension system and anchor and fastener type, from ICC-ES.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For finishes to include in maintenance manuals.

1.6 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Acoustical Ceiling Panels: Full-size panels equal to two percent (2%) of quantity installed.
 - 2. Suspension-System Components: Quantity of each exposed component equal to two percent (2%) of quantity installed.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver acoustical panels, suspension-system components, and accessories to Project site in original, unopened packages and store them in a fully enclosed, conditioned space where they will be protected against damage from moisture, humidity, temperature extremes, direct sunlight, surface contamination, and other causes.
- B. Before installing acoustical panels, permit them to reach room temperature and a stabilized moisture content.
- C. Handle acoustical panels carefully to avoid chipping edges or damaging units in any way.

1.8 FIELD CONDITIONS

- A. Environmental Limitations: Do not install acoustical panel ceilings until spaces are enclosed and weatherproof, wet work in spaces is complete and dry, work above ceilings is complete, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.
 - 1. Pressurized Plenums: Operate ventilation system for not less than forty-eight (48) hours before beginning acoustical panel ceiling installation.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Seismic Performance: Acoustical ceiling shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.
- B. Surface-Burning Characteristics: Comply with ASTM E 84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - 1. Flame-Spread Index: Comply with ASTM E 1264 for Class A materials.
 - 2. Smoke-Developed Index: 50 or less.
- C. Fire-Resistance Ratings: Comply with ASTM E 119; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - 1. Indicate design designations from UL's "Fire Resistance Directory" or from the listings of another qualified testing agency.

2.2 ACOUSTICAL PANELS, GENERAL

- A. Source Limitations: Obtain each type of acoustical ceiling panel and supporting suspension system from single source from single manufacturer.
- B. Acoustical Panel Standard: Provide manufacturer's standard panels of configuration indicated that comply with ASTM E 1264 classifications as designated by types, patterns, acoustical ratings, and light reflectances unless otherwise indicated.
 - 1. Mounting Method for Measuring NRC: Type E-400; plenum mounting in which face of test specimen is 15¾ inches away from test surface according to ASTM E 795.
- C. Acoustical Panel Colors and Patterns: Match appearance characteristics indicated for each product type.
 - 1. Where appearance characteristics of acoustical panels are indicated by referencing pattern designations in ASTM E 1264 and not manufacturers' proprietary product designations, provide products selected by Architect from each manufacturer's full range that comply with requirements indicated for type, pattern, color, light reflectance, acoustical performance, edge detail, and size.

2.3 ACOUSTICAL PANELS

- 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. Armstrong World Industries, Inc.
 - 2. CertainTeed Corp.
 - 3. USG Interiors, Inc.; Subsidiary of USG Corporation.
 - 4. Substitutions: Under provisions of Section 012500 "Substitution Procedures".
- B. Basis-of-Design Product:
 - 1. Armstrong World Industries, Inc.; New materials to match existing.
 - 2. Classification: Provide panels complying with ASTM E 1264 for type, form, and pattern as follows:
 - a. Type and Form: Type IV, mineral base with membrane-faced overlay; Form 2, water felted; with vinyl overlay on face, back, and sealed edges.
 - b. Pattern: E (lightly textured).
 - 3. Color: White.
 - 4. LR: Not less than 0.90.
 - 5. NRC: Not less than 0.80.
 - 6. Edge/Joint Detail: Match existing.
 - 7. Thickness: 15/16 inch.
 - 8. Style: Match existing.
 - 9. Modular Size: Match existing.

- C. Broad Spectrum Antimicrobial Fungicide and Bactericide Treatment: Provide acoustical panels treated with manufacturer's standard antimicrobial formulation that inhibits fungus, mold, mildew, and gram-positive and gram-negative bacteria and showing no mold, mildew, or bacterial growth when tested according to ASTM D 3273 and evaluated according to ASTM D 3274 or ASTM G 21.

2.4 METAL SUSPENSION SYSTEMS, GENERAL

- A. Metal Suspension-System Standard: Provide manufacturer's standard direct-hung metal suspension systems of types, structural classifications, and finishes indicated that comply with applicable requirements in ASTM C 635.
 - 1. High-Humidity Finish: Comply with ASTM C 635 requirements for "Coating Classification for Severe Environment Performance" where high-humidity finishes are indicated.
- B. Attachment Devices: Size for five (5) times the design load indicated in ASTM C 635, Table 1, "Direct Hung," unless otherwise indicated. Comply with seismic design requirements.
- C. Wire Hangers, Braces, and Ties: Provide wires complying with the following requirements:
 - 1. Zinc-Coated, Carbon-Steel Wire: ASTM A 641, Class 1 zinc coating, soft temper.
 - 2. Size: Select wire diameter so its stress at three (3) times hanger design load (ASTM C 635, Table 1, "Direct Hung") will be less than yield stress of wire, but provide not less than 0.106-inch-diameter wire.
- D. Seismic Stabilizer Bars: Manufacturer's standard perimeter stabilizers designed to accommodate seismic forces.
- E. Seismic Struts: Manufacturer's standard compression struts designed to accommodate seismic forces.
- F. Seismic Clips: Manufacturer's standard seismic clips designed and spaced to secure acoustical panels in place.

2.5 METAL SUSPENSION SYSTEM

- 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. Armstrong World Industries, Inc.
 - 2. CertainTeed Corp.
 - 3. USG Interiors, Inc.; Subsidiary of USG Corporation.
 - 4. Substitutions: Under provisions of Section 012500 "Substitution Procedures".
- B. Wide-Face, Double-Web, Hot-Dip Galvanized, Steel Suspension System: Main and cross runners roll formed from cold-rolled steel sheet; hot-dip galvanized according to ASTM A 653; with prefinished, cold-rolled, 15/16-inch-wide flanges.
 - 1. Basis-of-Design Product:

- a. Armstrong World Industries, Inc.; **Prelude XL 15/16 Inch Exposed Tee System**
 2. Structural Classification: Heavy-duty system.
 3. Face Finish: Painted white.
- C. Wide-Face, Capped, Double-Web, Aluminum Suspension System: Main and cross runners formed from ASTM C 635 cold rolled aluminum; with prefinished **15/16-inch**-wide metal caps on flanges.
1. Basis-of-Design Product:
 - a. Armstrong World Industries, Inc.; **AL Prelude Plus XL 15/16 Inch Environmental Tee System**
 2. Structural Classification: Light-duty system.
 3. Face Finish: Painted white.

2.6 METAL EDGE MOLDINGS AND TRIM

- 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. Armstrong World Industries, Inc.
 2. CertainTeed Corp.
 3. USG Interiors, Inc.; Subsidiary of USG Corporation
 4. Substitutions: Under provisions of Section 012500 "Substitution Procedures".
- B. Roll-Formed, Sheet-Metal Edge Moldings and Trim: Type and profile indicated or, if not indicated, manufacturer's standard moldings for edges and penetrations that comply with seismic design requirements; formed from sheet metal of same material, finish, and color as that used for exposed flanges of suspension-system runners.
1. Provide manufacturer's standard edge moldings that fit acoustical panel edge details and suspension systems indicated and that match width and configuration of exposed runners unless otherwise indicated.
 2. For circular penetrations of ceiling, provide edge moldings fabricated to diameter required to fit penetration exactly.

2.7 ACOUSTICAL SEALANT

- A. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
1. Acoustical Sealant for Exposed and Concealed Joints:
 - a. Pecora Corporation; **AC-20 FTR Acoustical and Insulation Sealant**
 - b. USG Corporation; **SHEETROCK Acoustical Sealant**
 - c. Substitutions: Under provisions of Section 012500 "Substitution Procedures".
 2. Acoustical Sealant for Concealed Joints:

- a. Henkel Corporation; **OSI Pro-Series SC-175 Acoustical Sound Sealant**
 - b. Pecora Corporation; **AIS-919**
 - c. Tremco, Inc.; **Tremco Acoustical Sealant**
 - d. Substitutions: Under provisions of Section 012500 "Substitution Procedures".
- B. Acoustical Sealant: Manufacturer's standard sealant complying with ASTM C 834 and effective in reducing airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E 90.
1. Exposed and Concealed Joints: Nonsag, paintable, nonstaining latex sealant.
 2. Concealed Joints: Nondrying, nonhardening, nonskinning, nonstaining, gunnable, synthetic-rubber sealant.
 3. Acoustical sealant shall have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, including structural framing to which acoustical panel ceilings attach or abut, with Installer present, for compliance with requirements specified in this and other Sections that affect ceiling installation and anchorage and with requirements for installation tolerances and other conditions affecting performance of acoustical panel ceilings.
- B. Examine acoustical panels before installation. Reject acoustical panels that are wet, moisture damaged, or mold damaged.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Measure each ceiling area and establish layout of acoustical panels to balance border widths at opposite edges of each ceiling. Avoid using less-than-half-width panels at borders, and comply with layout shown on reflected ceiling plans.

3.3 INSTALLATION

- A. General: Install acoustical panel ceilings to comply with ASTM C 636 and seismic design requirements indicated, according to manufacturer's written instructions and CISCA's "Ceiling Systems Handbook."
 1. Fire-Rated Assembly: Install fire-rated ceiling systems according to tested fire-rated design.
- B. Suspend ceiling hangers from building's structural members and as follows:
 1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structure or of ceiling suspension system.

2. Splay hangers only where required to miss obstructions; offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
 3. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with location of hangers at spacings required to support standard suspension-system members, install supplemental suspension members and hangers in form of trapezes or equivalent devices.
 4. Secure wire hangers to ceiling-suspension members and to supports above with a minimum of three (3) tight turns. Connect hangers directly either to structures or to inserts, eye screws, or other devices that are secure and appropriate for substrate and that will not deteriorate or otherwise fail due to age, corrosion, or elevated temperatures.
 5. When steel framing does not permit installation of hanger wires at spacing required, install carrying channels or other supplemental support for attachment of hanger wires.
 6. Do not attach hangers to steel roof deck. Attach hangers to structural members.
 7. Space hangers not more than **48 inches** o.c. along each member supported directly from hangers unless otherwise indicated; provide hangers not more than **8 inches** from ends of each member.
 8. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards and publications.
- C. Install edge moldings and trim of type indicated at perimeter of acoustical ceiling area and where necessary to conceal edges of acoustical panels.
1. Apply acoustical sealant in a continuous ribbon concealed on back of vertical legs of moldings before they are installed.
 2. Screw attach moldings to substrate at intervals not more than **16 inches** o.c. and not more than **3 inches** from ends, leveling with ceiling suspension system to a tolerance of **1/8 inch in 12 feet**. Miter corners accurately and connect securely.
 3. Do not use exposed fasteners, including pop rivets, on moldings and trim.
- D. Install suspension-system runners so they are square and securely interlocked with one another. Remove and replace dented, bent, or kinked members.
- E. Install acoustical panels with undamaged edges and fit accurately into suspension-system runners and edge moldings. Scribe and cut panels at borders and penetrations to provide a neat, precise fit.
1. For square-edged panels, install panels with edges fully hidden from view by flanges of suspension-system runners and moldings.
 2. Protect lighting fixtures and air ducts to comply with requirements indicated for fire-resistance-rated assembly.

3.4 CLEANING

- A. Clean exposed surfaces of acoustical panel ceilings, including trim, edge moldings, and suspension-system members. Comply with manufacturer's written instructions for cleaning and touchup of minor finish damage. Remove and replace ceiling components that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

END OF SECTION 095113

SECTION 096513 - RESILIENT BASE AND ACCESSORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Resilient base.
 - 2. Resilient molding accessories.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Samples: For each exposed product and for each color and texture specified, not less than 12 inches long.
- C. Product Schedule: For resilient base and accessory products. Use same designations indicated on Drawings.

1.4 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Furnish not less than 10 linear feet for every 500 linear feet or fraction thereof, of each type, color, pattern, and size of resilient product installed.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Store resilient products and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than 50 deg F or more than 90 deg F.

1.6 FIELD CONDITIONS

- A. Maintain ambient temperatures within range recommended by manufacturer, but not less than 70 deg F or more than 95 deg F, in spaces to receive resilient products during the following time periods:
 - 1. Forty-eight (48) hours before installation.
 - 2. During installation.
 - 3. Forty-eight (48) hours after installation.

- B. After installation and until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer, but not less than 55 deg F or more than 95 deg F.
- C. Install resilient products after other finishing operations, including painting, have been completed.

1.7 WARRANTY

- A. Provide manufacturer's written limited warranties against defects in materials and against premature wear prior to warranty expiration for the materials as follows:
 - 1. Resilient Base: Two (2) years.

PART 2 - PRODUCTS

2.1 REGULATORY REQUIREMENTS

- A. Conform to Class I rating with a flame spread of 0 to 25 in accordance with the requirements of Class A material in accordance with ASTM E 84. Rubber products shall be Class I, 0.45 watts/sq. cm in accordance with ASTM E 648 and NFPA 255.

2.2 THERMOPLASTIC-RUBBER BASE

- A. Basis of Design:

- 1. Johnsonite; A Tarkett Company; Traditional Wall Base

- B. 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. Burke Mercer Flooring Products, Division of Burke Industries Inc.
 - 2. Roppe Corporation, USA.
 - 3. Substitutions: Under provisions of Section 012500 "Substitution Procedures".

- C. Product Standard: ASTM F 1861, Type TP (rubber, thermoplastic).

- 1. Group: I (solid, homogeneous).
 - 2. Style and Location:

- a. Style B, Cove: Provide in areas with resilient flooring.

- D. Thickness: 0.125 inch.

- E. Height: 4 inches.

- F. Lengths: Cut lengths 48 inches long or coils in manufacturer's standard length.

- G. Outside Corners: Preformed.

- H. Inside Corners: Preformed.

- I. Colors: New materials to match existing color, as selected by Architect from manufacturer's full range of standard colors.

2.3 RUBBER MOLDING ACCESSORY

A. Basis of Design:

- 1. Johnsonite; A Tarkett Company; SLT-XXX-A, CTA-XXX-J, SSR-XXX-B, and SCHIENE.

B. 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. Burke Mercer Flooring Products, Division of Burke Industries Inc.
- 2. Roppe Corporation, USA.
- 3. Substitutions: Under provisions of Section 012500 "Substitution Procedures".

C. Description: Rubber transitions strips, mouldings, edge guards and reducers.

D. Profile and Dimensions: New materials to match existing.

E. Locations: Provide rubber molding accessories in areas indicated on Drawings, and where required.

F. Colors and Patterns: New materials to match existing colors and patterns, as selected by Architect from manufacturer's full range of standard colors and patterns.

2.4 INSTALLATION MATERIALS

A. Trowelable Leveling and Patching Compounds: Latex-modified, Portland cement based or blended hydraulic-cement-based formulation provided or approved by resilient-product manufacturer for applications indicated.

B. Adhesives: Water-resistant type recommended by resilient-product manufacturer for resilient products and substrate conditions indicated.

- 1. Adhesives shall have a VOC content of 50 g/L or less except that adhesive for rubber stair treads shall have a VOC content of 60 g/L or less.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, with Installer present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.

- 1. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of resilient products.

- B. Proceed with installation only after unsatisfactory conditions have been corrected.
 - 1. Installation of resilient products indicates acceptance of surfaces and conditions.

3.2 PREPARATION

- A. Prepare substrates according to manufacturer's written instructions to ensure adhesion of resilient products.
- B. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound; remove bumps and ridges to produce a uniform and smooth substrate.
- C. Do not install resilient products until they are the same temperature as the space where they are to be installed.
 - 1. At least forty-eight (48) hours in advance of installation, move resilient products and installation materials into spaces where they will be installed.
- D. Immediately before installation, sweep and vacuum clean substrates to be covered by resilient products.

3.3 RESILIENT BASE INSTALLATION

- A. Comply with manufacturer's written instructions for installing resilient base.
- B. Apply resilient base to walls, columns, pilasters, casework and cabinets in toe spaces, and other permanent fixtures in rooms and areas where base is required.
- C. Install resilient base in lengths as long as practical without gaps at seams and with tops of adjacent pieces aligned.
- D. Tightly adhere resilient base to substrate throughout length of each piece, with base in continuous contact with horizontal and vertical substrates.
- E. Do not stretch resilient base during installation.
- F. On masonry surfaces or other similar irregular substrates, fill voids along top edge of resilient base with manufacturer's recommended adhesive filler material.
- G. Preformed Corners: Install preformed corners before installing straight pieces.

3.4 RESILIENT ACCESSORY INSTALLATION

- A. Comply with manufacturer's written instructions for installing resilient accessories.
- B. Resilient Molding Accessories: Butt to adjacent materials and tightly adhere to substrates throughout length of each piece. Install reducer strips at edges of floor covering that would otherwise be exposed.

3.5 CLEANING AND PROTECTION

- A. Comply with manufacturer's written instructions for cleaning and protecting resilient products.
- B. Perform the following operations immediately after completing resilient-product installation:
 - 1. Remove adhesive and other blemishes from exposed surfaces.
 - 2. Sweep and vacuum horizontal surfaces thoroughly.
 - 3. Damp-mop horizontal surfaces to remove marks and soil.
- C. Protect resilient products from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.
- D. Cover resilient products subject to wear and foot traffic until Substantial Completion.

END OF SECTION 096513

SECTION 099123 – INTERIOR PAINTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes surface preparation and the application of paint systems on the following interior substrates:
 - 1. Concrete Masonry Unit.
 - 2. Concrete.
 - 3. Steel.
 - 4. Wood.
 - 5. Gypsum board.
- B. Related Requirements:
 - 1. Section 042000 “Unit Masonry” for priming of and preparation of interior concrete masonry unit substrates to receive primers and paints specified in this Section.
 - 2. Section 092900 “Gypsum Board” for priming of and preparation of gypsum board substrates to receive primers and paints specified in this Section.
 - 3. Section 095113 “Acoustical Panel Ceilings” for priming and preparation of steel substrates to receive primers and paints specified in this Section.

1.3 DEFINITIONS

- A. Gloss Level 1: Not more than 5 units at 60 degrees and 10 units at 85 degrees, according to ASTM D 523.
- B. Gloss Level 3: 10 to 25 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D 523.
- C. Gloss Level 6: 70 to 85 units at 60 degrees, according to ASTM D 523.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product. Include preparation requirements and application instructions.
- B. Samples: For each type of paint system and in each color and gloss of topcoat.
 - 1. Submit Samples on rigid backing, 8 inches square.
 - 2. Step coats on Samples to show each coat required for system.
 - 3. Label each coat of each Sample.
 - 4. Label each Sample for location and application area.
- C. Product List: For each product indicated, include the following:

1. Cross-reference to paint system and locations of application areas. Use same designations indicated on Drawings and in schedules.
2. Printout of current "MPI Approved Products List" for each product category specified in Part 2, with the proposed product highlighted.
3. VOC content.

1.5 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 1. Paint: Five percent (5%), but not less than 1 gal. of each material and color applied.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F (7 deg C).
 1. Maintain containers in clean condition, free of foreign materials and residue.
 2. Remove rags and waste from storage areas daily.

1.7 FIELD CONDITIONS

- A. Apply paints according to manufacturer's written instructions.
- B. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg F (10 and 35 deg C).
- C. Do not apply paints when relative humidity exceeds eighty-five percent (85%); at temperatures less than 5 deg F (3 deg C) above the dew point; or to damp or wet surfaces.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Basis of Design Manufacturer: Sherwin Williams.
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 1. Behr.
 2. Benjamin Moore.
 3. Substitutions: In accordance with Section 012500.

2.2 PAINT, GENERAL

- A. MPI Standards: Provide products that comply with MPI standards indicated and that are listed in its "MPI Approved Products List."
- B. Material Compatibility:

1. Provide materials for use within each paint system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
 2. For each coat in a paint system, provide products recommended in writing by manufacturers of topcoat for use in paint system and on substrate indicated.
- C. VOC Content: Products shall comply with VOC limits of authorities having jurisdiction and, for interior paints and coatings applied at Project site, the following VOC limits, exclusive of colorants added to a tint base, when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
1. Flat Paints and Coatings: 50 g/L.
 2. Nonflat Paints and Coatings: 150 g/L.
 3. Dry-Fog Coatings: 400 g/L.
 4. Primers, Sealers, and Undercoaters: 200 g/L.
 5. Anticorrosive and Antirust Paints Applied to Ferrous Metals: 250 g/L.
 6. Zinc-Rich Industrial Maintenance Primers: 340 g/L.
 7. Pretreatment Wash Primers: 420 g/L.
 8. Floor Coatings: 100 g/L.
 9. Shellacs, Clear: 730 g/L.
 10. Shellacs, Pigmented: 550 g/L.
- D. Colors: New materials to match existing, as selected by Architect from manufacturer's full range of standard colors.

2.3 BLOCK FILLERS

- A. Block Filler, Latex, Interior/Exterior: **MPI #4.**

2.4 PRIMERS/SEALERS

- A. Primer Sealer, Latex, Interior: **MPI #50.**
- B. Primer Sealer, Alkyd, Interior: **MPI #45.**

2.5 METAL PRIMERS

- A. Primer, Rust-Inhibitive, Water Based: **MPI #107.**

2.6 WATER-BASED PAINTS

- A. Latex, Interior, Flat, (Gloss Level 1): **MPI #53.**
- B. Latex, Interior, (Gloss Level 3): **MPI #52.**
- C. Latex, Interior, Gloss, (Gloss Level 6, except minimum gloss of 65 units at 60 degrees): **MPI #114.**
- D. Latex, Interior, Institutional Low Odor/VOC, (Gloss Level 3): **MPI #145.**

2.7 FLOOR COATINGS

- A. Sealer, Water Based, for Concrete Floors: **MPI #99.**
- B. Floor Paint, Latex, Low Gloss (Maximum Gloss Level 3): **MPI #60.**

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
- B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:
 - 1. Concrete: Twelve percent (12%).
 - 2. Masonry (CMU): Twelve percent (12%).
 - 3. Wood: Fifteen percent (15%).
 - 4. Gypsum Board: Twelve percent (12%).
- C. Gypsum Board Substrates: Verify that finishing compound is sanded smooth.
- D. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.
- E. Proceed with coating application only after unsatisfactory conditions have been corrected.
 - 1. Application of coating indicates acceptance of surfaces and conditions.

3.2 PREPARATION

- A. Comply with manufacturer's written instructions and recommendations in "MPI Manual" applicable to substrates indicated.
- B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.
 - 1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.
- C. Clean substrates of substances that could impair bond of paints, including dust, dirt, oil, grease, and incompatible paints and encapsulants.
 - 1. Remove incompatible primers and reprime substrate with compatible primers or apply tie coat as required to produce paint systems indicated.
- D. Concrete Substrates: Remove release agents, curing compounds, efflorescence, and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces to be painted exceeds that permitted in manufacturer's written instructions.

- E. Masonry Substrates: Remove efflorescence and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces or mortar joints exceed that permitted in manufacturer's written instructions.
- F. Steel Substrates: Remove rust, loose mill scale, and shop primer, if any. Clean using methods recommended in writing by paint manufacturer but not less than the following:
 - 1. SSPC-SP 2, "Hand Tool Cleaning."
 - 2. SSPC-SP 3, "Power Tool Cleaning."
- G. Shop-Primed Steel Substrates: Clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with the same material as used for shop priming to comply with SSPC-PA 1 for touching up shop-primed surfaces.
- H. Wood Substrates:
 - 1. Scrape and clean knots, and apply coat of knot sealer before applying primer.
 - 2. Sand surfaces that will be exposed to view, and dust off.
 - 3. Prime edges, ends, faces, undersides, and backsides of wood.
 - 4. After priming, fill holes and imperfections in the finish surfaces with putty or plastic wood filler. Sand smooth when dried.

3.3 APPLICATION

- A. Apply paints according to manufacturer's written instructions and to recommendations in "MPI Manual."
 - 1. Use applicators and techniques suited for paint and substrate indicated.
 - 2. Paint surfaces behind movable equipment and furniture same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed equipment or furniture with prime coat only.
 - 3. Paint front and backsides of access panels, removable or hinged covers, and similar hinged items to match exposed surfaces.
 - 4. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
 - 5. Primers specified in painting schedules may be omitted on items that are factory primed or factory finished if acceptable to topcoat manufacturers.
- B. Tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of same material are to be applied. Tint undercoats to match color of topcoat, but provide sufficient difference in shade of undercoats to distinguish each separate coat.
- C. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.
- D. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.
- E. Painting Fire Suppression, Plumbing, HVAC, Electrical, Communication, and Electronic Safety and Security Work:

1. Paint the following work where exposed in equipment rooms:
 - a. Equipment, including panelboards.
 - b. Uninsulated metal piping.
 - c. Uninsulated plastic piping.
 - d. Pipe hangers and supports.
 - e. Metal conduit.
 - f. Plastic conduit.
 - g. Tanks that do not have factory-applied final finishes.
 - h. Duct, equipment, and pipe insulation having cotton or canvas insulation covering or other paintable jacket material.

2. Paint the following work where exposed in occupied spaces:
 - a. Equipment, including panelboards.
 - b. Uninsulated metal piping.
 - c. Uninsulated plastic piping.
 - d. Pipe hangers and supports.
 - e. Metal conduit.
 - f. Plastic conduit.
 - g. Duct, equipment, and pipe insulation having cotton or canvas insulation covering or other paintable jacket material.
 - h. Other items as directed by Architect.

3. Paint portions of internal surfaces of metal ducts, without liner, behind air inlets and outlets that are visible from occupied spaces.

3.4 FIELD QUALITY CONTROL

- A. Dry Film Thickness Testing: Owner may engage the services of a qualified testing and inspecting agency to inspect and test paint for dry film thickness.
 1. Contractor shall touch up and restore painted surfaces damaged by testing.
 2. If test results show that dry film thickness of applied paint does not comply with paint manufacturer's written recommendations, Contractor shall pay for testing and apply additional coats as needed to provide dry film thickness that complies with paint manufacturer's written recommendations.

3.5 CLEANING AND PROTECTION

- A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.
- B. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.
- C. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.

- D. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.6 INTERIOR PAINTING SCHEDULE

A. Concrete Masonry Unit Substrates:

- 1. Latex System:
 - a. Prime Coat: Primer sealer, latex, interior, **MPI #50**.
 - b. Prime Coat: Latex, interior, matching topcoat.
 - c. Intermediate Coat: Latex, interior, matching topcoat.
 - d. Topcoat: Latex, interior, (Gloss Level 3), **MPI #52**.
 - e. Colors: Match existing, as indicated in Finish Schedule on Drawings.

B. Concrete Substrates, Traffic Surfaces:

- 1. Water-Based Concrete Floor Sealer System **MPI INT 3.2G**:
 - a. First Coat: Sealer, water based, for concrete floors, matching topcoat.
 - b. Topcoat: Sealer, water based, for concrete floors, **MPI #99**.

E. Steel Substrates:

- 1. Institutional Low-Odor/VOC Latex System:
 - a. Prime Coat: Primer, rust-inhibitive, water based **MPI #107**.
 - b. Intermediate Coat: Latex, interior, institutional low odor/VOC, matching topcoat.
 - c. Topcoat: Latex, interior, institutional low odor/VOC, **MPI #145**.

F. Wood Substrates:

- 1. Institutional Low-Odor/VOC Latex System **MPI INT 6.1Q**:
 - a. Prime Coat: Primer, latex, for interior wood, **MPI #39**.
 - b. Intermediate Coat: Latex, interior, institutional low odor/VOC, matching topcoat.
 - c. Topcoat: Latex, interior, institutional low odor/VOC (MPI Gloss Level 3), **MPI #145**.
 - d. Topcoat: Latex, interior, institutional low odor/VOC, semi-gloss (MPI Gloss Level 5), **MPI #147**.

G. Gypsum Board Substrates:

- 1. Latex System:
 - a. Prime Coat: Primer sealer, latex, interior, **MPI #50**.
 - b. Prime Coat: Latex, interior, matching topcoat.
 - c. Intermediate Coat: Latex, interior, matching topcoat.
 - d. Topcoat: Latex, interior, flat, **MPI #53**, at ceilings.
 - e. Topcoat: Latex, interior, eggshell, **MPI #52**.
 - f. Topcoat: Latex, interior, semi-gloss, **MPI #54**.

END OF SECTION 099123

SECTION 102113.19 – PLASTIC TOILET COMPARTMENTS

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. Solid-polymer toilet compartments configured as toilet enclosures and urinal screens.

B. Related Sections:

- 1. Division 10 Section "Toilet, Bath, and Laundry Accessories" for toilet tissue dispensers, grab bars, purse shelves, and similar accessories.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.

- B. Shop Drawings: For toilet compartments. Include plans, elevations, sections, details, and attachments to other work.

- 1. Show locations of cutouts for compartment-mounted toilet accessories.
- 2. Show locations of centerlines of toilet fixtures.
- 3. Show overhead support or bracing locations.

- C. Samples for Initial Selection: For each type of unit indicated. Include Samples of hardware and accessories involving material and color selection.

1.4 INFORMATIONAL SUBMITTALS

- A. Product Certificates: For each type of toilet compartment, from manufacturer.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For toilet compartments to include in maintenance manuals.

1.6 QUALITY ASSURANCE

- A. Surface-Burning Characteristics: As determined by testing identical products according to ASTM E 84, or another standard acceptable to authorities having jurisdiction, by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - 1. Flame-Spread Index: Fifty (50) or less.
 - 2. Smoke-Developed Index: Four hundred fifty (450) or less.
- B. Regulatory Requirements: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disabilities Act (ADA) and Architectural Barriers Act (ABA) Accessibility Guidelines for Buildings and Facilities" and ICC/ANSI A117.1 for toilet compartments designated as accessible.

1.7 PROJECT CONDITIONS

- A. Field Measurements: Verify actual locations of toilet fixtures, walls, columns, ceilings, and other construction contiguous with toilet compartments by field measurements before fabrication.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Aluminum Castings: ASTM B 26/B 26M.
- B. Aluminum Extrusions: **ASTM B 221**.
- C. Stainless-Steel Sheet: ASTM A 666, Type 304, stretcher-leveled standard of flatness.
- D. Stainless-Steel Castings: ASTM A 743/A 743M.
- E. Zamac: ASTM B 86, commercial zinc-alloy die castings.

2.2 SOLID-POLYMER UNITS

- 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. Accurate Partitions Corporation.
 - 2. Bradley Corporation; Mills Partitions.
 - 3. Global Steel Products Corp.
 - 4. Substitutions: Under provisions of Division 01 Section "Substitution Procedures".
- B. Toilet-Enclosure Style: Floor mounted, overhead braced.
- C. Urinal-Screen Style: Wall hung.

- D. Door, Panel, Screen, and Pilaster Construction: Solid, high-density polyethylene (HDPE) panel material, not less than 1 inch thick, seamless, with eased edges, and with homogenous color and pattern throughout thickness of material.
 - 1. Integral Hinges: Configure doors and pilasters to receive integral hinges.
 - 2. Heat-Sink Strip: Manufacturer's standard continuous, stainless-steel strip fastened to exposed bottom edges of solid-polymer components to prevent burning.
 - 3. Color and Pattern: New materials to match existing color and pattern, as selected by Architect from manufacturer's full range of standard colors and patterns.
- E. Pilaster Shoes: Manufacturer's standard design; stainless steel.
- F. Brackets (Fittings):
 - 1. Full-Height (Continuous) Type: Manufacturer's standard design; extruded aluminum.

2.3 ACCESSORIES

- A. Hardware and Accessories: Manufacturer's standard design, heavy-duty operating hardware and accessories.
 - 1. Material: Chrome-plated zamac.
 - 2. Hinges: Manufacturer's standard continuous, cam type that swings to a closed or partially open position.
 - 3. Latch and Keeper: Manufacturer's standard surface-mounted latch unit designed for emergency access and with combination rubber-faced door strike and keeper. Provide units that comply with regulatory requirements for accessibility at compartments designated as accessible.
 - 4. Coat Hook: Manufacturer's standard combination hook and rubber-tipped bumper, sized to prevent in-swinging door from hitting compartment-mounted accessories.
 - 5. Door Bumper: Manufacturer's standard rubber-tipped bumper at out-swinging doors.
 - 6. Door Pull: Manufacturer's standard unit at out-swinging doors that complies with regulatory requirements for accessibility. Provide units on both sides of doors at compartments designated as accessible.
- B. Overhead Bracing: Manufacturer's standard continuous, extruded-aluminum head rail with antigrip profile and in manufacturer's standard finish.
- C. Anchorages and Fasteners: Manufacturer's standard exposed fasteners of stainless steel or chrome-plated steel or brass, finished to match the items they are securing, with theft-resistant-type heads. Provide sex-type bolts for through-bolt applications. For concealed anchors, use stainless steel, hot-dip galvanized steel, or other rust-resistant, protective-coated steel.

2.4 FABRICATION

- A. Overhead-Braced Units: Provide manufacturer's standard corrosion-resistant supports, leveling mechanism, and anchors at pilasters to suit floor conditions. Provide shoes at pilasters to conceal supports and leveling mechanism.

- B. Door Size and Swings: Unless otherwise indicated, provide 24-inch-wide, in-swinging doors for standard toilet compartments and 36-inch-wide, out-swinging doors with a minimum 32-inch-wide, clear opening for compartments designated as accessible.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. General: Comply with manufacturer's written installation instructions. Install units rigid, straight, level, and plumb. Secure units in position with manufacturer's recommended anchoring devices.
 - 1. Maximum Clearances:
 - a. Pilasters and Panels: 1/2 inch.
 - b. Panels and Walls: 1 inch.
 - B. Overhead-Braced Units: Secure pilasters to floor and level, plumb, and tighten. Set pilasters with anchors penetrating not less than 1-3/4 inches into structural floor unless otherwise indicated in manufacturer's written instructions. Secure continuous head rail to each pilaster with no fewer than two (2) fasteners. Hang doors to align tops of doors with tops of panels, and adjust so tops of doors are parallel with overhead brace when doors are in closed position.
 - C. Urinal Screens: Attach with anchoring devices to suit supporting structure. Set units level and plumb, rigid, and secured to resist lateral impact.

3.2 ADJUSTING

- A. Hardware Adjustment: Adjust and lubricate hardware according to hardware manufacturer's written instructions for proper operation. Set hinges on in-swinging doors to hold doors open approximately 30 degrees from closed position when unlatched. Set hinges on out-swinging doors to return doors to fully closed position.

END OF SECTION 102113.19

SECTION 102800 - TOILET, BATH, AND LAUNDRY ACCESSORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

- 1. Public-use washroom accessories.

B. Related Sections:

- 1. Section 093013 "Ceramic Tiling" for ceramic toilet and bath accessories.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated. Include the following:

- 1. Construction details and dimensions.
- 2. Anchoring and mounting requirements, including requirements for cutouts in other work and substrate preparation.
- 3. Material and finish descriptions.
- 4. Features that will be included for Project.
- 5. Manufacturer's warranty.

B. Samples: Full size, for each accessory item to verify design, operation, and finish requirements.

- 1. Approved full-size Samples will be returned and may be used in the Work.

C. Product Schedule: Indicating types, quantities, sizes, and installation locations by room of each accessory required.

- 1. Identify locations using room designations indicated.

1.4 INFORMATIONAL SUBMITTALS

- A. Warranty: Sample of special warranty.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For toilet and bath accessories to include in maintenance manuals.

1.6 QUALITY ASSURANCE

- A. Source Limitations: For products listed together in the same Part 2 articles, obtain products from single source from single manufacturer.

1.7 COORDINATION

- A. Coordinate accessory locations with other work to prevent interference with clearances required for access by people with disabilities, and for proper installation, adjustment, operation, cleaning, and servicing of accessories.
- B. Deliver inserts and anchoring devices set into concrete or masonry as required to prevent delaying the Work.

1.8 WARRANTY

- A. Special Mirror Warranty: Manufacturer's standard form in which manufacturer agrees to replace mirrors that develop visible silver spoilage defects and that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Period: Fifteen (15) years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PUBLIC-USE WASHROOM ACCESSORIES

- 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. A & J Washroom Accessories, Inc.
 - 2. American Specialties, Inc.
 - 3. Bobrick Washroom Equipment, Inc.
 - 4. Bradley Corporation
 - 5. Substitutions: Under provisions of Section 012500 "Substitution Procedures".
- B. Grab Bar:
 - 1. Basis-of-Design Product: **Bobrick #B-6806.99x18, B-6806.99x36 and #B-6806.99x42.**
 - 2. Mounting: Flanges with concealed fasteners.
 - 3. Material: Stainless steel, 0.05 inch thick.
 - a. Finish: Smooth, No. 4 finish (satin) on ends and slip-resistant texture in grip area.
 - 4. Outside Diameter: 1½ inches.
 - 5. Configuration and Length: Straight, in multiple lengths.
- C. Toilet Tissue (Roll) Dispenser:
 - 1. Basis-of-Design Product: **Bobrick #B-2888.**
 - 2. Description: Double roll dispenser.
 - 3. Mounting: Surface mounted.

TOILET, BATH AND LAUNDRY ACCESSORIES

4. Operation: Noncontrol delivery with theft-resistant spindle.
5. Capacity: Designed for 5¼ inch diameter tissue rolls.
6. Material and Finish: Stainless steel, No. 4 finish (satin) with plastic spindle.

D. Combination Towel (Folded) Dispenser/Waste Receptacle:

1. Basis-of-Design Product: **Bobrick #B-3942**
2. Description: Combination unit for dispensing C-fold or multifold towels, with removable waste receptacle, convertible.
3. Mounting: Semi-recessed with projecting receptacle.
 - a. Designed for nominal 6-inch wall depth.
4. Minimum Towel-Dispenser Capacity: 600 C-fold or 800 multifold paper towels.
5. Minimum Waste-Receptacle Capacity: 12 gal.
6. Material and Finish: Stainless steel, No. 4 finish (satin).
7. Liner: Reusable, vinyl waste-receptacle liner.
8. Lockset: Tumbler type for towel-dispenser compartment and waste receptacle.

E. Sanitary-Napkin Disposal Unit:

1. Basis-of-Design Product: **Bobrick #B-270.**
2. Mounting: Surface mounted.
3. Door or Cover: Self-closing, disposal-opening cover.
4. Receptacle: Removable.
5. Material and Finish: Stainless steel, No. 4 finish (satin).
6. Locations: As indicated on Drawings.

F. Liquid-Soap Dispenser (OWNER FURNISHED, CONTRACTOR INSTALLED):

1. Basis-of-Design Product: **Bobrick #B-2111.**
2. Description: Designed for dispensing soap in liquid or lotion form.
3. Mounting: Vertically oriented, surface mounted.
4. Capacity: 40 oz.
5. Materials: Stainless steel, No. 4 finish (satin) container and black molded plastic push button and spout.
6. Lockset: Special key provided.
7. Refill Indicator: Window type.

G. Mirror Unit:

1. Basis-of-Design Product: **Bobrick #B-290-2436.**
2. Frame: Stainless-steel angle, 0.05 inch thick.
 - a. Corners: Manufacturer's standard.
3. Hangers: Produce rigid, tamper- and theft-resistant installation, using one (1) of the methods indicated below.
 - a. One-piece, galvanized-steel, wall-hanger device with spring-action locking mechanism to hold mirror unit in position with no exposed screws or bolts.

- b. Wall bracket of galvanized steel, equipped with concealed locking devices requiring a special tool to remove.

4. Size: 24 by 36 inches.

2.2 MATERIALS

- A. Stainless Steel: ASTM A 666, Type 304, 0.031-inch minimum nominal thickness unless otherwise indicated.
- B. Galvanized-Steel Mounting Devices: ASTM A 153, hot-dip galvanized after fabrication.
- C. Fasteners: Screws, bolts, and other devices of same material as accessory unit and tamper-and-theft resistant where exposed, and of galvanized steel where concealed.
- D. Mirrors: ASTM C 1503, Mirror Glazing Quality, clear-glass mirrors, nominal 6.0 mm thick.
- E. ABS Plastic: Acrylonitrile-butadiene-styrene resin formulation.

2.3 FABRICATION

- A. General: Fabricate units with tight seams and joints, and exposed edges rolled. Hang doors and access panels with full-length, continuous hinges. Equip units for concealed anchorage and with corrosion-resistant backing plates.
- B. Keys: Provide universal keys for internal access to accessories for servicing and resupplying. Provide minimum of six (6) keys to Owner's representative.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install accessories according to manufacturers' written instructions, using fasteners appropriate to substrate indicated and recommended by unit manufacturer. Install units level, plumb, and firmly anchored in locations and at heights indicated.
- B. Grab Bars: Install to withstand a downward load of at least 250 lbf, when tested according to ASTM F 446.

3.2 ADJUSTING AND CLEANING

- A. Adjust accessories for unencumbered, smooth operation. Replace damaged or defective items.
- B. Remove temporary labels and protective coatings.
- C. Clean and polish exposed surfaces according to manufacturer's written recommendations.

END OF SECTION 102800

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. Solid surface material countertops.
 - 2. Solid surface material backsplashes.
 - 3. Solid surface material end splashes.

1.3 ACTION SUBMITTALS

- A. Product Data: For countertop materials.
- B. Shop Drawings: For countertops. Show materials, finishes, edge and backsplash profiles, methods of joining, and cutouts for plumbing fixtures.
 - 1. Show locations and details of joints.
 - 2. Show direction of directional pattern, if any.
- C. Samples for Initial Selection: For each type of material exposed to view.
- D. Samples for Verification: For the following products:
 - 1. Countertop material, 6 inches (150 mm) square.
 - 2. Wood trim, 8 inches (200 mm) long.
 - 3. One full-size solid surface material countertop, with front edge and backsplash, 8 by 10 inches (200 by 250 mm), of construction and in configuration specified.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For fabricator.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For solid surface material countertops to include in maintenance manuals. Include Product Data for care products used or recommended by Installer and names, addresses, and telephone numbers of local sources for products.

1.6 QUALITY ASSURANCE

- A. Fabricator Qualifications: Shop that employs skilled workers who custom-fabricate countertops similar to that required for this Project, and whose products have a record of successful in-service performance.
- B. Installer Qualifications: Fabricator of countertops.
- C. Mockups: Build mockups to demonstrate aesthetic effects and to set quality standards for fabrication and execution.
 - 1. Build mockup of typical countertop as shown on Drawings.
 - 2. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.7 FIELD CONDITIONS

- A. Field Measurements: Verify dimensions of countertops by field measurements after base cabinets are installed but before countertop fabrication is complete.

1.8 COORDINATION

- A. Coordinate locations of utilities that will penetrate countertops or backsplashes.

PART 2 - PRODUCTS

2.1 SOLID SURFACE COUNTERTOP MATERIALS

- A. Solid Surface Material: Homogeneous-filled plastic resin complying with ICPA SS-1.
 - 1. Basis-of-Design Manufacturer: Corian
 - 2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Formica Corporation.
 - b. Wilsonart LLC.
 - c. Substitutions: Under provisions of Section 012500 "Substitution Procedures".
 - 3. Type: Provide Standard type unless Special Purpose type is indicated.
 - 4. Colors, Styles and Patterns: As selected by Architect and Owner from manufacturer's full range of standard colors.
- B. Plywood: Exterior softwood plywood complying with DOC PS 1, Grade C-C Plugged, touch sanded.

2.2 COUNTERTOP FABRICATION

- A. Fabricate countertops according to solid surface material manufacturer's written instructions and to the AWI/AWMAC/WI's "Architectural Woodwork Standards."
 - 1. Grade: Custom.
- B. Configuration:
 - 1. Front: Straight, slightly eased at top
 - 2. Backsplash: Straight, slightly eased at corner.
 - 3. End Splash: Matching backsplash.
- C. Countertops: Solid surface material with beveled front edge built up with same material, thickness as indicated on Drawings.
- D. Backsplashes: Solid surface material, thickness as indicated on Drawings.
- E. Fabricate tops with shop-applied edges and backsplashes unless otherwise indicated. Comply with solid surface material manufacturer's written instructions for adhesives, sealers, fabrication, and finishing.
- F. Joints: Fabricate countertops in sections for joining in field, with joints at locations indicated.
 - 1. Joint Locations: Not within **18 inches (450 mm)** of a sink or cooktop and not where a countertop section less than **36 inches (900 mm)** long would result, unless unavoidable.
 - 2. Splined Joints: Accurately cut kerfs in edges at joints for insertion of metal splines to maintain alignment of surfaces at joints. Make width of cuts slightly more than thickness of splines to provide snug fit. Provide at least three splines in each joint.
- G. Cutouts and Holes:
 - 1. Undercounter Plumbing Fixtures: Make cutouts for fixtures in shop using template or pattern furnished by fixture manufacturer. Form cutouts to smooth, even curves.
 - a. Provide vertical edges, slightly eased at juncture of cutout edges with top and bottom surfaces of countertop and projecting **3/16 inch (5 mm)** into fixture opening.
 - 2. Counter-Mounted Plumbing Fixtures: Prepare countertops in shop for field cutting openings for counter-mounted fixtures. Mark tops for cutouts and drill holes at corners of cutout locations. Make corner holes of largest radius practical.
 - 3. Fittings: Drill countertops in shop for plumbing fittings, undercounter soap dispensers, and similar items.

2.3 INSTALLATION MATERIALS

- A. Adhesive: Product recommended by solid surface material manufacturer.

- B. Sealant for Countertops: Comply with applicable requirements in Section 079200 "Joint Sealants."

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates to receive solid surface material countertops and conditions under which countertops will be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of countertops.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Install countertops level to a tolerance of **1/8 inch in 8 feet (3 mm in 2.4 m)**, **1/4 inch (6 mm)** maximum. Do not exceed **1/64-inch (0.4-mm)** difference between planes of adjacent units.
- B. Fasten countertops by screwing through corner blocks of base units into underside of countertop. Predrill holes for screws as recommended by manufacturer. Align adjacent surfaces and, using adhesive in color to match countertop, form seams to comply with manufacturer's written instructions. Carefully dress joints smooth, remove surface scratches, and clean entire surface.
- C. Fasten subtops to cabinets by screwing through subtops into cornerblocks of base cabinets. Shim as needed to align subtops in a level plane.
- D. Secure countertops to subtops with adhesive according to solid surface material manufacturer's written instructions. Align adjacent surfaces and, using adhesive in color to match countertop, form seams to comply with manufacturer's written instructions. Carefully dress joints smooth, remove surface scratches, and clean entire surface.
- E. Bond joints with adhesive and draw tight as countertops are set. Mask areas of countertops adjacent to joints to prevent adhesive smears.
 - 1. Install metal splines in kerfs in countertop edges at joints where indicated. Fill kerfs with adhesive before inserting splines and remove excess immediately after adjoining units are drawn into position.
 - 2. Clamp units to temporary bracing, supports, or each other to ensure that countertops are properly aligned and joints are of specified width.
- F. Install backsplashes and end splashes by adhering to wall and countertops with adhesive. Mask areas of countertops and splashes adjacent to joints to prevent adhesive smears.
- G. Install aprons to backing and countertops with adhesive. Mask areas of countertops and splashes adjacent to joints to prevent adhesive smears. Fasten by screwing through backing. Predrill holes for screws as recommended by manufacturer.

- H. Complete cutouts not finished in shop. Mask areas of countertops adjacent to cutouts to prevent damage while cutting. Make cutouts to accurately fit items to be installed, and at right angles to finished surfaces unless beveling is required for clearance. Ease edges slightly to prevent snipping.
 - 1. Seal edges of cutouts in particleboard subtops by saturating with varnish.
- I. Apply sealant to gaps at walls; comply with Section 079200 "Joint Sealants."

END OF SECTION 123661.16

SECTION 139000 - INSTITUTIONAL COVER SYSTEM

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. Concealed snap-lock connection soffit/cover system.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated provide characteristics, performance and limitation criteria.
- B. Manufacturer's Installation Instructions: Indicate preparation and installation instructions.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified Installer.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation of units required for this Project with minimum of five (5) years experience with such systems.

1.6 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Full-size parts equal to five percent (5%) of each type of quantity installed.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Basis-of-Design:
 - 1. JG Innovations, Inc.; **Soffi-Steel System**
- B. 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. In-Ex Systems, Inc.
2. Substitutions: Under provisions of Section 012500 "Substitution Procedures".

2.2 MATERIALS

A. Soffit/Cover

1. The soffit/cover shall be smooth in appearance and shall be made of 18-gauge A60/G90 galvanized steel, with a paint grip finish. The cover shall have a snap-lock interfacing with the clips such that once assembled, it is rendered virtually irremovable with the use of ordinary tools.
2. The soffit/cover shall be sized in accordance with requirements to accommodate the specific application size as indicated in the Drawings.
3. Cover joints shall be interlocking integral joints with provision for securement utilizing stainless-steel rivets. Rivet spacing shall be at no greater than 2-inch intervals along the joint and positioned at a distance no greater than 1-inch from the end of the overlapping section. External couplings will NOT be allowed.
4. Cover design shall include a roll-formed "groove" at the interfacing of the cover and the adjacent construction surface to facilitate the application of sealant/adhesive compounds and enhance the security of such compounds from dislodging.
5. Color: New materials to match existing color, as selected by Architect from manufacturer's full range of standard colors.

B. Support/Attachment Devices

1. Spring steel shield clips of the size recommended by manufacturer, for securement of the cover. Clips shall be produced from 21-gauge minimum zinc-plated spring steel and shall have a reverse curvature design such that the clips soundly secure the soffit from easy removal. Each clip must be demonstrated as being able to resist a force of 200 lbs. uplift at the free end.

C. Accessories

1. The system shall include tamper-resistant end caps, prefabricated corners, wall flanges, couplings, and other items, which may be necessary to complete the system, and shall be installed in accordance with manufacturer recommendations.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Installer present, for compliance with requirements for opening configurations, penetrating items, substrates, and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Installation of system shall be in strict accordance with approved shop drawings and manufacturer's printed instructions.
1. Select appropriate fasteners for the substrate encountered to adequately secure cover system.
 2. To insure that the cover is linear and snug-fitting when installed, it is imperative that its support devices are anchored squarely and firmly against the structural surface in a straight line.
 3. All penetrations to the soffit/cover system must be field cut to prevent misalignment with intended protrusion. The exceptions to this are that access doors will be factory furnished and installed and perforations, if required, for ventilation purposes will be factory perforated.
 4. All field cut ends and scratches shall be "touched up" (spray or brush) with a matching paint.
 5. The completed installation shall be visibly searched for voids between the interfacing of the cover and construction surface. Voids shall be sealed with a color matching siliconized caulk or urethane caulk.

END OF SECTION 139000

SECTION 220513 - COMMON MOTOR REQUIREMENTS FOR PLUMBING EQUIPMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes general requirements for single-phase and polyphase, general-purpose, horizontal, small and medium, squirrel-cage induction motors for use on ac power systems up to 600 V and installed at equipment manufacturer's factory or shipped separately by equipment manufacturer for field installation.

1.3 COORDINATION

- A. Coordinate features of motors, installed units, and accessory devices to be compatible with the following:
 - 1. Motor controllers.
 - 2. Torque, speed, and horsepower requirements of the load.
 - 3. Ratings and characteristics of supply circuit and required control sequence.
 - 4. Ambient and environmental conditions of installation location.

PART 2 - PRODUCTS

2.1 GENERAL MOTOR REQUIREMENTS

- A. Comply with NEMA MG 1 unless otherwise indicated.
- B. Comply with IEEE 841 for severe-duty motors.

2.2 MOTOR CHARACTERISTICS

- A. Duty: Continuous duty at ambient temperature of 100 deg F and at altitude of 3300 feet above sea level.
- B. Capacity and Torque Characteristics: Sufficient to start, accelerate, and operate connected loads at designated speeds, at installed altitude and environment, with indicated operating sequence, and without exceeding nameplate ratings or considering service factor.

COMMON MOTOR REQUIREMENTS FOR PLUMBING EQUIPMENT

2.3 POLYPHASE MOTORS

- A. Description: NEMA MG 1, Design B, medium induction motor.
- B. Efficiency: Energy efficient, as defined in NEMA MG 1.
- C. Service Factor: 1.15.
- D. Multispeed Motors: Variable torque.
 - 1. For motors with 2:1 speed ratio, consequent pole, single winding.
 - 2. For motors with other than 2:1 speed ratio, separate winding for each speed.
- E. Multispeed Motors: Separate winding for each speed.
- F. Rotor: Random-wound, squirrel cage.
- G. Bearings: Regreasable, shielded, antifriction ball bearings suitable for radial and thrust loading.
- H. Temperature Rise: Match insulation rating.
- I. Insulation: Class F.
- J. Code Letter Designation:
 - 1. Motors 15 HP and Larger: NEMA starting Code F or Code G.
 - 2. Motors Smaller than 15 HP: Manufacturer's standard starting characteristic.
- K. Enclosure Material: Cast iron for motor frame sizes 324T and larger; rolled steel for motor frame sizes smaller than 324T.

2.4 POLYPHASE MOTORS WITH ADDITIONAL REQUIREMENTS

- A. Motors Used with Reduced-Voltage and Multispeed Controllers: Match wiring connection requirements for controller with required motor leads. Provide terminals in motor terminal box, suited to control method.
- B. Motors Used with Variable Frequency Controllers: Ratings, characteristics, and features coordinated with and approved by controller manufacturer.
 - 1. Windings: Copper magnet wire with moisture-resistant insulation varnish, designed and tested to resist transient spikes, high frequencies, and short time rise pulses produced by pulse-width modulated inverters.
 - 2. Energy- and Premium-Efficient Motors: Class B temperature rise; Class F insulation.
 - 3. Inverter-Duty Motors: Class F temperature rise; Class H insulation.
 - 4. Thermal Protection: Comply with NEMA MG 1 requirements for thermally protected motors.
- C. Severe-Duty Motors: Comply with IEEE 841, with 1.15 minimum service factor.

2.5 SINGLE-PHASE MOTORS

- A. Motors larger than 1/20 hp shall be one of the following, to suit starting torque and requirements of specific motor application:
 - 1. Permanent-split capacitor.
 - 2. Split phase.
 - 3. Capacitor start, inductor run.
 - 4. Capacitor start, capacitor run.
- B. Multispeed Motors: Variable-torque, permanent-split-capacitor type.
- C. Bearings: Prelubricated, antifriction ball bearings or sleeve bearings suitable for radial and thrust loading.
- D. Motors 1/20 HP and Smaller: Shaded-pole type.
- E. Thermal Protection: Internal protection to automatically open power supply circuit to motor when winding temperature exceeds a safe value calibrated to temperature rating of motor insulation. Thermal-protection device shall automatically reset when motor temperature returns to normal range.

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 220513

SECTION 220516 - EXPANSION FITTINGS AND LOOPS FOR PLUMBING PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 1. Flexible-hose packless expansion joints.
 2. Metal-bellows packless expansion joints.
 3. Rubber packless expansion joints.
 4. Grooved-joint expansion joints.
 5. Alignment guides and anchors.
 6. Pipe loops and swing connections.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Delegated-Design Submittal: For each anchor and alignment guide, including analysis data, signed and sealed by the qualified professional engineer responsible for their preparation.
 1. Design Calculations: Calculate requirements for thermal expansion of piping systems and for selecting and designing expansion joints, loops, and swing connections.
 2. Anchor Details: Detail fabrication of each anchor indicated. Show dimensions and methods of assembly and attachment to building structure.
 3. Alignment Guide Details: Detail field assembly and attachment to building structure.
 4. Schedule: Indicate type, manufacturer's number, size, material, pressure rating, end connections, and location for each expansion joint.

1.4 INFORMATIONAL SUBMITTALS

- A. Welding certificates.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For expansion joints to include in maintenance manuals.

1.6 QUALITY ASSURANCE

- A. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."
- B. Pipe and Pressure-Vessel Welding Qualifications: Qualify procedures and operators according to ASME Boiler and Pressure Vessel Code.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Compatibility: Products shall be suitable for piping service fluids, materials, working pressures, and temperatures.
- B. Capability: Products to absorb 200 percent of maximum axial movement between anchors.

2.2 PACKLESS EXPANSION JOINTS

- A. Flexible-Hose Packless Expansion Joints:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Flex Pression Ltd.
 - b. Flex-Hose Co., Inc.
 - c. Flexicraft Industries.
 - d. Mason Industries, Inc.
 - e. Metraflex Company (The).
 - f. Unisource Manufacturing, Inc.
 - 2. Description: Manufactured assembly with inlet and outlet elbow fittings and two flexible-metal-hose legs joined by long-radius, 180-degree return bend or center section of flexible hose.
 - 3. Flexible Hose: Corrugated-metal inner hoses and braided outer sheaths.
 - 4. Expansion Joints for Copper Tubing NPS 2 and Smaller: Copper-alloy fittings with solder-joint end connections.
 - a. Bronze hoses and single-braid bronze sheaths with 450 psig at 70 deg F and 340 psig at 450 deg F ratings.
 - 5. Expansion Joints for Copper Tubing NPS 2-1/2 to NPS 4: Copper-alloy fittings with threaded end connections.
 - a. Stainless-steel hoses and single-braid, stainless-steel sheaths with 300 psig at 70 deg F and 225 psig at 450 deg F ratings.

EXPANSION FITTINGS AND LOOPS FOR PLUMBING PIPING

6. Expansion Joints for Steel Piping NPS 2 and Smaller: Carbon-steel fittings with threaded end connections.
 - a. Stainless-steel hoses and single-braid, stainless-steel sheaths with 450 psig at 70 deg F and 325 psig at 600 deg F ratings.
7. Expansion Joints for Steel Piping NPS 2-1/2 to NPS 6: Carbon-steel fittings with flanged end connections.
 - a. Stainless-steel hoses and single-braid, stainless-steel sheaths with 200 psig at 70 deg F and 145 psig at 600 deg F ratings.

B. Metal-Bellows Packless Expansion Joints:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Adscos Manufacturing LLC.
 - b. American BOA, Inc.
 - c. Badger Industries, Inc.
 - d. Expansion Joint Systems, Inc.
 - e. Flex Pression Ltd.
 - f. Flex-Hose Co., Inc.
 - g. Flexicraft Industries.
 - h. Flex-Weld, Inc.
 - i. Flo Fab Inc.
 - j. Hyspan Precision Products, Inc.
 - k. Mason Industries, Inc.
 - l. Metraflex Company (The).
 - m. Proco Products, Inc.
 - n. Senior Flexonics Pathway.
 - o. Tozen Corporation.
 - p. U.S. Bellows, Inc.
 - q. Unaflex.
 - r. Unisource Manufacturing, Inc.
 - s. Universal Metal Hose.
 - t. WahlcoMetroflex.
2. Standards: ASTM F 1120 and EJMA's "Standards of the Expansion Joint Manufacturers Association, Inc."
3. Type: Circular, corrugated bellows with external tie rods.
4. Minimum Pressure Rating: 150 psig, unless otherwise indicated.
5. Configuration: Single joint class(es), unless otherwise indicated.
6. Expansion Joints for Copper Tubing: Single- or multi- ply phosphor-bronze bellows, copper pipe ends, and brass shrouds.
 - a. End Connections for Copper Tubing NPS 2 and Smaller: threaded.
 - b. End Connections for Copper Tubing NPS 2-1/2 to NPS 4: threaded.
 - c. End Connections for Copper Tubing NPS 5 and Larger: Flanged.

7. Expansion Joints for Steel Piping: Single- or multi- ply stainless-steel bellows, steel pipe ends, and carbon-steel shroud.
 - a. End Connections for Steel Pipe NPS 2 and Smaller: Threaded.
 - b. End Connections for Steel Pipe NPS 2-1/2 and Larger: Flanged.

C. Rubber Packless Expansion Joints:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Amber/Booth Company, Inc.; a VMC Group Company.
 - b. Flex-Hose Co., Inc.
 - c. Flexicraft Industries.
 - d. Flex-Weld, Inc.
 - e. Garlock Sealing Technologies.
 - f. General Rubber Corporation.
 - g. Mason Industries, Inc.
 - h. Metraflex Company (The).
 - i. Proco Products, Inc.
 - j. Red Valve Company, Inc.
 - k. Tozen Corporation.
 - l. Unaflex.
 - m. Unisource Manufacturing, Inc.
2. Standards: ASTM F 1123 and FSA's "Technical Handbook: Non-Metallic Expansion Joints and Flexible Pipe Connectors."
3. Material: Fabric-reinforced rubber complying with FSA-PSJ-703.
4. Arch Type: Single or multiple arches with external control rods.
5. Spherical Type: Single or multiple spheres with external control rods.
6. Minimum Pressure Rating for NPS 1-1/2 to NPS 4: 150 psig at 220 deg F.
7. Minimum Pressure Rating for NPS 5 and NPS 6: 140 psig at 200 deg F.
8. Minimum Pressure Rating for NPS 8 to NPS 12: 140 psig at 180 deg F.
9. Material for Fluids Containing Acids, Alkalis, or Chemicals: Ethylene-propylene-diene terpolymer rubber.
10. Material for Fluids Containing Gas, Hydrocarbons, or Oil: Buna-N.
11. Material for Water: Ethylene-propylene-diene terpolymer rubber.
12. End Connections: Full-faced, integral steel flanges with steel retaining rings.

2.3 GROOVED-JOINT EXPANSION JOINTS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 1. Anvil International.
 2. Shurjoint Piping Products.
 3. Victaulic Company.
- B. Description: Factory-assembled expansion joint made of several grooved-end pipe nipples, couplings, and grooved joints.

- C. Standard: AWWA C606, for grooved joints.
- D. Nipples: Galvanized, ASTM A 53/A 53M, Schedule 40, Type E or S, steel pipe with grooved ends.

2.4 ALIGNMENT GUIDES AND ANCHORS

A. Alignment Guides:

- 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Adscos Manufacturing LLC.
 - b. Advanced Thermal Systems, Inc.
 - c. Flex-Hose Co., Inc.
 - d. Flexicraft Industries.
 - e. Flex-Weld, Inc.
 - f. Hyspan Precision Products, Inc.
 - g. Mason Industries, Inc.
 - h. Metraflex Company (The).
 - i. Senior Flexonics Pathway.
 - j. U.S. Bellows, Inc.
 - k. Unisource Manufacturing, Inc.
- 2. Description: Steel, factory-fabricated alignment guide, with bolted two-section outer cylinder and base for attaching to structure; with two-section guiding slider for bolting to pipe.

B. Anchor Materials:

- 1. Steel Shapes and Plates: ASTM A 36/A 36M.
- 2. Bolts and Nuts: ASME B18.10 or ASTM A 183, steel hex head.
- 3. Washers: ASTM F 844, steel, plain, flat washers.
- 4. Mechanical Fasteners: Insert-wedge-type stud with expansion plug anchor for use in hardened portland cement concrete, with tension and shear capacities appropriate for application.
 - a. Stud: Threaded, zinc-coated carbon steel.
 - b. Expansion Plug: Zinc-coated steel.
 - c. Washer and Nut: Zinc-coated steel.
- 5. Chemical Fasteners: Insert-type stud, bonding-system anchor for use with hardened portland cement concrete, with tension and shear capacities appropriate for application.
 - a. Bonding Material: ASTM C 881/C 881M, Type IV, Grade 3, two-component epoxy resin suitable for surface temperature of hardened concrete where fastener is to be installed.
 - b. Stud: ASTM A 307, zinc-coated carbon steel with continuous thread on stud, unless otherwise indicated.
 - c. Washer and Nut: Zinc-coated steel.

PART 3 - EXECUTION

3.1 EXPANSION JOINT INSTALLATION

- A. Install expansion joints of sizes matching sizes of piping in which they are installed.
- B. Install metal-bellows expansion joints according to EJMA's "Standards of the Expansion Joint Manufacturers Association, Inc."
- C. Install rubber packless expansion joints according to FSA-PSJ-703.
- D. Install grooved-joint expansion joints to grooved-end steel piping.

3.2 PIPE LOOP AND SWING CONNECTION INSTALLATION

- A. Install pipe loops cold-sprung in tension or compression as required to partly absorb tension or compression produced during anticipated change in temperature.
- B. Connect risers and branch connections to mains with at least five pipe fittings, including tee in main.
- C. Connect risers and branch connections to terminal units with at least four pipe fittings, including tee in riser.
- D. Connect mains and branch connections to terminal units with at least four pipe fittings, including tee in main.

3.3 ALIGNMENT-GUIDE AND ANCHOR INSTALLATION

- A. Install alignment guides to guide expansion and to avoid end-loading and torsional stress.
- B. Install two guides on each side of pipe expansion fittings and loops. Install guides nearest to expansion joint not more than four pipe diameters from expansion joint.
- C. Attach guides to pipe, and secure guides to building structure.
- D. Install anchors at locations to prevent stresses from exceeding those permitted by ASME B31.9 and to prevent transfer of loading and stresses to connected equipment.
- E. Anchor Attachments:
 - 1. Anchor Attachment to Steel Pipe: Attach by welding. Comply with ASME B31.9 and ASME Boiler and Pressure Vessel Code: Section IX, "Welding and Brazing Qualifications."
 - 2. Anchor Attachment to Copper Tubing: Attach with pipe hangers. Use MSS SP-69, Type 24; U bolts bolted to anchor.

EXPANSION FITTINGS AND LOOPS FOR PLUMBING PIPING

- F. Fabricate and install steel anchors by welding steel shapes, plates, and bars. Comply with ASME B31.9 and AWS D1.1/D1.1M.
 - 1. Anchor Attachment to Steel Structural Members: Attach by welding.
 - 2. Anchor Attachment to Concrete Structural Members: Attach by fasteners. Follow fastener manufacturer's written instructions.

- G. Use grout to form flat bearing surfaces for guides and anchors attached to concrete.

END OF SECTION 220516

SECTION 220517 - SLEEVES AND SLEEVE SEALS FOR PLUMBING PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Sleeves.
 - 2. Stack-sleeve fittings.
 - 3. Sleeve-seal systems.
 - 4. Sleeve-seal fittings.
 - 5. Grout.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.

PART 2 - PRODUCTS

2.1 SLEEVES

- A. Cast-Iron Wall Pipes: Cast or fabricated of cast or ductile iron and equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop unless otherwise indicated.
- B. Galvanized-Steel Wall Pipes: ASTM A 53/A 53M, Schedule 40, with plain ends and welded steel collar; zinc coated.
- C. Galvanized-Steel-Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, zinc coated, with plain ends.

2.2 STACK-SLEEVE FITTINGS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. Jay R. Smith Mfg. Co.
 - 2. Zurn Industries, LLC.

- B. Description: Manufactured, cast-iron sleeve with integral clamping flange. Include clamping ring, bolts, and nuts for membrane flashing.

- 1. Underdeck Clamp: Clamping ring with setscrews.

2.3 SLEEVE-SEAL SYSTEMS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

- 1. Advance Products & Systems, Inc.
 - 2. CALPICO, Inc.
 - 3. GPT; an EnPro Industries company.
 - 4. Metraflex Company (The).
 - 5. Proco Products, Inc.

- B. Description: Modular sealing-element unit, designed for field assembly, for filling annular space between piping and sleeve.

- 1. Sealing Elements: EPDM-rubber interlocking links shaped to fit surface of pipe. Include type and number required for pipe material and size of pipe.
 - 2. Pressure Plates: Plastic or Stainless steel.
 - 3. Connecting Bolts and Nuts: Stainless steel of length required to secure pressure plates to sealing elements.

2.4 SLEEVE-SEAL FITTINGS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

- 1. Advance Products & Systems, Inc.
 - 2. CALPICO, Inc.
 - 3. GPT; an EnPro Industries company.
 - 4. Metraflex Company (The).
 - 5. Proco Products, Inc.

- B. Description: Manufactured plastic, sleeve-type, waterstop assembly made for imbedding in concrete slab or wall. Unit has plastic or rubber waterstop collar with center opening to match piping OD.

2.5 GROUT

- A. Standard: ASTM C 1107/C 1107M, Grade B, post-hardening and volume-adjusting, dry, hydraulic-cement grout.

- B. Characteristics: Nonshrink; recommended for interior and exterior applications.

- C. Design Mix: 5000-psi, 28-day compressive strength.

- D. Packaging: Premixed and factory packaged.

PART 3 - EXECUTION

3.1 SLEEVE INSTALLATION

- A. Install sleeves for piping passing through penetrations in floors, partitions, roofs, and walls.
- B. For sleeves that will have sleeve-seal system installed, select sleeves of size large enough to provide 1-inch annular clear space between piping and concrete slabs and walls.
 - 1. Sleeves are not required for core-drilled holes.
- C. Install sleeves in concrete floors, concrete roof slabs, and concrete walls as new slabs and walls are constructed.
 - 1. Cut sleeves to length for mounting flush with both surfaces.
 - a. Exception: Extend sleeves installed in floors of mechanical equipment areas or other wet areas 2 inches above finished floor level.
 - 2. Using grout, seal the space outside of sleeves in slabs and walls without sleeve-seal system.
- D. Install sleeves for pipes passing through interior partitions.
 - 1. Cut sleeves to length for mounting flush with both surfaces.
 - 2. Install sleeves that are large enough to provide 1/4-inch annular clear space between sleeve and pipe or pipe insulation.
 - 3. Seal annular space between sleeve and piping or piping insulation; use joint sealants appropriate for size, depth, and location of joint. Comply with requirements for sealants specified in Section 079200 "Joint Sealants."
- E. Fire-Barrier Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with firestop materials. Comply with requirements for firestopping specified in Section 078413 "Penetration Firestopping."

3.2 STACK-SLEEVE-FITTING INSTALLATION

- A. Install stack-sleeve fittings in new slabs as slabs are constructed.
 - 1. Install fittings that are large enough to provide 1/4-inch annular clear space between sleeve and pipe or pipe insulation.
 - 2. Secure flashing between clamping flanges for pipes penetrating floors with membrane waterproofing. Comply with requirements for flashing specified in Section 076200 "Sheet Metal Flashing and Trim."
 - 3. Install section of cast-iron soil pipe to extend sleeve to 2 inches above finished floor level.

4. Extend cast-iron sleeve fittings below floor slab as required to secure clamping ring if ring is specified.
5. Using grout, seal the space around outside of stack-sleeve fittings.

B. Fire-Barrier Penetrations: Maintain indicated fire rating of floors at pipe penetrations. Seal pipe penetrations with firestop materials. Comply with requirements for firestopping specified in Section 078413 "Penetration Firestopping."

3.3 SLEEVE-SEAL-SYSTEM INSTALLATION

- A. Install sleeve-seal systems in sleeves in exterior concrete walls and slabs-on-grade at service piping entries into building.
- B. Select type, size, and number of sealing elements required for piping material and size and for sleeve ID or hole size. Position piping in center of sleeve. Center piping in penetration, assemble sleeve-seal system components, and install in annular space between piping and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make a watertight seal.

3.4 SLEEVE-SEAL-FITTING INSTALLATION

- A. Install sleeve-seal fittings in new walls and slabs as they are constructed.
- B. Assemble fitting components of length to be flush with both surfaces of concrete slabs and walls. Position waterstop flange to be centered in concrete slab or wall.
- C. Secure nailing flanges to concrete forms.
- D. Using grout, seal the space around outside of sleeve-seal fittings.

3.5 SLEEVE AND SLEEVE-SEAL SCHEDULE

- A. Use sleeves and sleeve seals for the following piping-penetration applications:
 1. Exterior Concrete Walls above Grade:
 - a. Piping Smaller Than NPS 6: Galvanized-steel wall sleeves Sleeve-seal fittings.
 - b. Piping NPS 6 and Larger: Galvanized-steel wall sleeves.
 2. Exterior Concrete Walls below Grade:
 - a. Piping Smaller Than NPS 6: Galvanized-steel wall sleeves with sleeve-seal system.
 - 1) Select sleeve size to allow for 1-inch annular clear space between piping and sleeve for installing sleeve-seal system.
 - b. Piping NPS 6 and Larger: Galvanized-steel wall sleeves with sleeve-seal system.

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- 1) Select sleeve size to allow for 1-inch annular clear space between piping and sleeve for installing sleeve-seal system.
3. Concrete Slabs-on-Grade:
 - a. Piping Smaller Than NPS 6: Galvanized-steel wall sleeves with sleeve-seal system.
 - 1) Select sleeve size to allow for 1-inch annular clear space between piping and sleeve for installing sleeve-seal system.
 - b. Piping NPS 6 and Larger: Galvanized-steel wall sleeves with sleeve-seal system.
 - 1) Select sleeve size to allow for 1-inch annular clear space between piping and sleeve for installing sleeve-seal system.
4. Concrete Slabs above Grade:
 - a. Piping Smaller Than NPS 6: Galvanized-steel-pipe sleeves or Stack-sleeve fittings
 - b. Piping NPS 6 and Larger: Galvanized-steel-pipe sleeves or Stack-sleeve fittings.
5. Interior Partitions:
 - a. Piping Smaller Than NPS 6: Galvanized-steel-pipe sleeves.
 - b. Piping NPS 6 and Larger: Galvanized-steel-sheet sleeves.

END OF SECTION 220517

SECTION 220518 - ESCUTCHEONS FOR PLUMBING PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Escutcheons.
 - 2. Floor plates.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.

PART 2 - PRODUCTS

2.1 ESCUTCHEONS

- A. One-Piece, Cast-Brass Type: With polished, chrome-plated and rough-brass finish and setscrew fastener.
- B. One-Piece, Deep-Pattern Type: Deep-drawn, box-shaped brass with chrome-plated finish and spring-clip fasteners.
- C. One-Piece, Stamped-Steel Type: With chrome-plated finish and spring-clip fasteners.
- D. Split-Casting Brass Type: With polished, chrome-plated and rough-brass finish and with concealed hinge and setscrew.
- E. Split-Plate, Stamped-Steel Type: With chrome-plated finish, concealed hinge, and spring-clip fasteners.

2.2 FLOOR PLATES

- A. One-Piece Floor Plates: Cast-iron flange with holes for fasteners.
- B. Split-Casting Floor Plates: Cast brass with concealed hinge.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install escutcheons for piping penetrations of walls, ceilings, and finished floors.
- B. Install escutcheons with ID to closely fit around pipe, tube, and insulation of insulated piping and with OD that completely covers opening.
 - 1. Escutcheons for New Piping:
 - a. Piping with Fitting or Sleeve Protruding from Wall: One-piece, deep-pattern type.
 - b. Chrome-Plated Piping: One-piece, cast-brass type with polished, chrome-plated finish.
 - c. Insulated Piping: One-piece, stamped-steel type.
 - d. Bare Piping at Wall and Floor Penetrations in Finished Spaces: One-piece, cast-brass type with polished, chrome-plated finish.
 - e. Bare Piping at Wall and Floor Penetrations in Finished Spaces: One-piece, stamped-steel type.
 - f. Bare Piping at Ceiling Penetrations in Finished Spaces: One-piece, cast-brass type with polished, chrome-plated finish.
 - g. Bare Piping at Ceiling Penetrations in Finished Spaces: One-piece, stamped-steel type.
 - h. Bare Piping in Unfinished Service Spaces: One-piece, cast-brass type with rough-brass finish.
 - i. Bare Piping in Unfinished Service Spaces: One-piece, stamped-steel type.
 - j. Bare Piping in Equipment Rooms: One-piece, cast-brass type with rough-brass finish.
 - k. Bare Piping in Equipment Rooms: One-piece, stamped-steel type.
 - 2. Escutcheons for Existing Piping:
 - a. Chrome-Plated Piping: Split-casting brass type with polished, chrome-plated finish.
 - b. Insulated Piping: Split-plate, stamped-steel type with concealed hinge.
 - c. Bare Piping at Wall and Floor Penetrations in Finished Spaces: Split-casting brass type with polished, chrome-plated finish.
 - d. Bare Piping at Wall and Floor Penetrations in Finished Spaces: Split-plate, stamped-steel type with concealed hinge.
 - e. Bare Piping at Ceiling Penetrations in Finished Spaces: Split-casting brass type with polished, chrome-plated finish.
 - f. Bare Piping at Ceiling Penetrations in Finished Spaces: Split-plate, stamped-steel type with concealed hinge.
 - g. Bare Piping in Unfinished Service Spaces: Split-casting brass type with rough-brass finish.
 - h. Bare Piping in Unfinished Service Spaces: Split-plate, stamped-steel type with concealed hinge.
 - i. Bare Piping in Equipment Rooms: Split-casting brass type with rough-brass finish.
 - j. Bare Piping in Equipment Rooms: Split-plate, stamped-steel type with concealed hinge.

- C. Install floor plates for piping penetrations of equipment-room floors.
- D. Install floor plates with ID to closely fit around pipe, tube, and insulation of piping and with OD that completely covers opening.
 - 1. New Piping: One-piece, floor-plate type.
 - 2. Existing Piping: Split-casting, floor-plate type.

3.2 FIELD QUALITY CONTROL

- A. Replace broken and damaged escutcheons and floor plates using new materials.

END OF SECTION 220518

SECTION 220519 - METERS AND GAGES FOR PLUMBING PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Bimetallic-actuated thermometers.
 - 2. Filled-system thermometers.
 - 3. Liquid-in-glass thermometers.
 - 4. Thermowells.
 - 5. Dial-type pressure gages.
 - 6. Gage attachments.
 - 7. Test plugs.
 - 8. Test-plug kits.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.

1.4 INFORMATIONAL SUBMITTALS

- A. Product Certificates: For each type of meter and gage.

1.5 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For meters and gages to include in operation and maintenance manuals.

PART 2 - PRODUCTS

2.1 BIMETALLIC-ACTUATED THERMOMETERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Ashcroft Inc.

2. Ernst Flow Industries.
3. Marsh Bellofram.
4. Miljoco Corporation.
5. Nanmac Corporation.
6. Noshok.
7. Palmer Wahl Instrumentation Group.
8. REOTEMP Instrument Corporation.
9. Tel-Tru Manufacturing Company.
10. Terice, H. O. Co.
11. Watts; a Watts Water Technologies company.
12. Weiss Instruments, Inc.
13. Weksler Glass Thermometer Corp.
14. WIKA Instrument Corporation.
15. Winters Instruments - U.S.

B. Standard: ASME B40.200.

C. Case: Liquid-filled and sealed type(s); stainless steel with 3-inch nominal diameter.

D. Dial: Nonreflective aluminum with permanently etched scale markings and scales in deg F.

E. Connector Type(s): Union joint, adjustable angle and rigid, bottom, with unified-inch screw threads.

F. Connector Size: 1/2 inch, with ASME B1.1 screw threads.

G. Stem: 0.25 or 0.375 inch in diameter; stainless steel.

H. Window: Plain glass.

I. Ring: Stainless steel.

J. Element: Bimetal coil.

K. Pointer: Dark-colored metal.

L. Accuracy: Plus or minus 1 percent of scale range.

2.2 FILLED-SYSTEM THERMOMETERS

A. Direct-Mounted, Metal-Case, Vapor-Actuated Thermometers:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Ashcroft Inc.
 - b. Marsh Bellofram.
 - c. Miljoco Corporation.
 - d. Palmer Wahl Instrumentation Group.
 - e. REOTEMP Instrument Corporation.

- f. Trerice, H. O. Co.
 - g. Weiss Instruments, Inc.
2. Standard: ASME B40.200.
 3. Case: Sealed type, cast aluminum or drawn steel; 4-1/2-inch nominal diameter.
 4. Element: Bourdon tube or other type of pressure element.
 5. Movement: Mechanical, with link to pressure element and connection to pointer.
 6. Dial: Nonreflective aluminum with permanently etched scale markings graduated in deg F.
 7. Pointer: Dark-colored metal.
 8. Window: Glass.
 9. Ring: Stainless steel.
 10. Connector Type(s): Union joint, adjustable, 180 degrees in vertical plane, 360 degrees in horizontal plane, with locking device rigid, bottom; with ASME B1.1 screw threads.
 11. Thermal System: Liquid-filled bulb in copper-plated steel, aluminum, or brass stem and of length to suit installation.
 - a. Design for Thermowell Installation: Bare stem.
 12. Accuracy: Plus or minus 1 percent of scale range.
- B. Remote-Mounted, Metal-Case, Vapor-Actuated Thermometers:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. AMETEK, Inc.
 - b. Ashcroft Inc.
 - c. Marsh Bellofram.
 - d. Miljoco Corporation.
 - e. Palmer Wahl Instrumentation Group.
 - f. REOTEMP Instrument Corporation.
 - g. Trerice, H. O. Co.
 - h. Weiss Instruments, Inc.
 - i. WIKA Instrument Corporation.
 2. Standard: ASME B40.200.
 3. Case: Sealed type, cast aluminum or drawn steel; 4-1/2-inch nominal diameter with back flange and holes for panel mounting.
 4. Element: Bourdon tube or other type of pressure element.
 5. Movement: Mechanical, with link to pressure element and connection to pointer.
 6. Dial: Nonreflective aluminum with permanently etched scale markings graduated in deg F.
 7. Pointer: Dark-colored metal.
 8. Window: Glass.
 9. Ring: Stainless steel.
 10. Connector Type(s): Union joint, bottom; with ASME B1.1 screw threads.
 11. Thermal System: Liquid-filled bulb in copper-plated steel, aluminum, or brass stem and of length to suit installation.
 - a. Design for Thermowell Installation: Bare stem.

12. Accuracy: Plus or minus 1 percent of scale range.

2.3 LIQUID-IN-GLASS THERMOMETERS

A. Metal-Case, Compact-Style, Liquid-in-Glass Thermometers:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Terrice, H. O. Co.
2. Standard: ASME B40.200.
3. Case: Cast aluminum; 6-inch nominal size.
4. Case Form: Back angle unless otherwise indicated.
5. Tube: Glass with magnifying lens and blue organic liquid.
6. Tube Background: Nonreflective aluminum with permanently etched scale markings graduated in deg F.
7. Window: Glass or plastic.
8. Stem: Aluminum or brass and of length to suit installation.
 - a. Design for Thermowell Installation: Bare stem.
9. Connector: 3/4 inch, with ASME B1.1 screw threads.
10. Accuracy: Plus or minus 1 percent of scale range or one scale division, to a maximum of 1.5 percent of scale range.

B. Metal-Case, Industrial-Style, Liquid-in-Glass Thermometers:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Flo Fab Inc.
 - b. Miljoco Corporation.
 - c. Palmer Wahl Instrumentation Group.
 - d. Tel-Tru Manufacturing Company.
 - e. Terrice, H. O. Co.
 - f. Weiss Instruments, Inc.
 - g. Weksler Glass Thermometer Corp.
 - h. Winters Instruments - U.S.
2. Standard: ASME B40.200.
3. Case: Cast aluminum; 7-inch nominal size unless otherwise indicated.
4. Case Form: Adjustable angle unless otherwise indicated.
5. Tube: Glass with magnifying lens and blue organic liquid.
6. Tube Background: Nonreflective aluminum with permanently etched scale markings graduated in deg F.
7. Window: Glass.
8. Stem: Aluminum and of length to suit installation.

- a. Design for Thermowell Installation: Bare stem.
- 9. Connector: 1-1/4 inches, with ASME B1.1 screw threads.
- 10. Accuracy: Plus or minus 1 percent of scale range or one scale division, to a maximum of 1.5 percent of scale range.

2.4 THERMOWELLS

A. Thermowells:

- 1. Standard: ASME B40.200.
- 2. Description: Pressure-tight, socket-type fitting made for insertion into piping tee fitting.
- 3. Material for Use with Copper Tubing: CNR or CUNI.
- 4. Material for Use with Steel Piping: CRES.
- 5. Type: Stepped shank unless straight or tapered shank is indicated.
- 6. External Threads: NPS 1/2, NPS 3/4, or NPS 1, ASME B1.20.1 pipe threads.
- 7. Internal Threads: 1/2, 3/4, and 1 inch, with ASME B1.1 screw threads.
- 8. Bore: Diameter required to match thermometer bulb or stem.
- 9. Insertion Length: Length required to match thermometer bulb or stem.
- 10. Lagging Extension: Include on thermowells for insulated piping and tubing.
- 11. Bushings: For converting size of thermowell's internal screw thread to size of thermometer connection.

B. Heat-Transfer Medium: Mixture of graphite and glycerin.

2.5 PRESSURE GAGES

A. Direct-Mounted, Metal-Case, Dial-Type Pressure Gages:

- 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Ametek U.S. Gauge.
 - b. Ashcroft Inc.
 - c. Ernst Flow Industries.
 - d. Flo Fab Inc.
 - e. Marsh Bellofram.
 - f. Miljoco Corporation.
 - g. Noshok.
 - h. Palmer Wahl Instrumentation Group.
 - i. REOTEMP Instrument Corporation.
 - j. Tel-Tru Manufacturing Company.
 - k. Trerice, H. O. Co.
 - l. Watts; a Watts Water Technologies company.
 - m. Weiss Instruments, Inc.
 - n. Weksler Glass Thermometer Corp.
 - o. WIKA Instrument Corporation.
 - p. Winters Instruments - U.S.

2. Standard: ASME B40.100.
3. Case: Liquid-filled Sealed type(s); cast aluminum or drawn steel; 4-1/2-inch nominal diameter.
4. Pressure-Element Assembly: Bourdon tube unless otherwise indicated.
5. Pressure Connection: Brass, with NPS 1/4 or NPS 1/2, ASME B1.20.1 pipe threads and bottom-outlet type unless back-outlet type is indicated.
6. Movement: Mechanical, with link to pressure element and connection to pointer.
7. Dial: Nonreflective aluminum with permanently etched scale markings graduated in psi.
8. Pointer: Dark-colored metal.
9. Window: Glass.
10. Ring: Stainless steel.
11. Accuracy: Grade A, plus or minus 1 percent of middle half of scale range.

B. Remote-Mounted, Metal-Case, Dial-Type Pressure Gages:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Ametek U.S. Gauge.
 - b. Ashcroft Inc.
 - c. Ernst Flow Industries.
 - d. Flo Fab Inc.
 - e. Marsh Bellofram.
 - f. Miljoco Corporation.
 - g. Noshok.
 - h. Palmer Wahl Instrumentation Group.
 - i. REOTEMP Instrument Corporation.
 - j. Tel-Tru Manufacturing Company.
 - k. Trerice, H. O. Co.
 - l. Watts; a Watts Water Technologies company.
 - m. Weiss Instruments, Inc.
 - n. WIKA Instrument Corporation.
 - o. Winters Instruments - U.S.
2. Standard: ASME B40.100.
3. Case: Liquid-filled Sealed type; cast aluminum or drawn steel; 4-1/2-inch nominal diameter with back flange and holes for panel mounting.
4. Pressure-Element Assembly: Bourdon tube unless otherwise indicated.
5. Pressure Connection: Brass, with NPS 1/4 or NPS 1/2, ASME B1.20.1 pipe threads and bottom-outlet type unless back-outlet type is indicated.
6. Movement: Mechanical, with link to pressure element and connection to pointer.
7. Dial: Nonreflective aluminum with permanently etched scale markings graduated in psi.
8. Pointer: Dark-colored metal.
9. Window: Glass.
10. Ring: Stainless steel.
11. Accuracy: Grade A, plus or minus 1 percent of middle half of scale range.

2.6 GAGE ATTACHMENTS

- A. Snubbers: ASME B40.100, brass; with NPS 1/4 or NPS 1/2, ASME B1.20.1 pipe threads and porous-metal-type surge-dampening device. Include extension for use on insulated piping.
- B. Valves: Brass ball, with NPS 1/4 or NPS 1/2, ASME B1.20.1 pipe threads.

2.7 TEST PLUGS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Flow Design, Inc.
 - 2. Miljoco Corporation.
 - 3. Nexus Valve, Inc.
 - 4. Peterson Equipment Co., Inc.
 - 5. Sisco Manufacturing Company, Inc.
 - 6. Trerice, H. O. Co.
 - 7. Watts; a Watts Water Technologies company.
 - 8. Weiss Instruments, Inc.
 - 9. Weksler Glass Thermometer Corp.
- B. Description: Test-station fitting made for insertion into piping tee fitting.
- C. Body: Brass or stainless steel with core inserts and gasketed and threaded cap. Include extended stem on units to be installed in insulated piping.
- D. Thread Size: NPS 1/4 or NPS 1/2, ASME B1.20.1 pipe thread.
- E. Minimum Pressure and Temperature Rating: 500 psig at 200 deg F.
- F. Core Inserts: EPDM self-sealing rubber.

2.8 TEST-PLUG KITS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Flow Design, Inc.
 - 2. Miljoco Corporation.
 - 3. Nexus Valve, Inc.
 - 4. Peterson Equipment Co., Inc.
 - 5. Sisco Manufacturing Company, Inc.
 - 6. Trerice, H. O. Co.
 - 7. Watts; a Watts Water Technologies company.
 - 8. Weiss Instruments, Inc.

- B. Furnish one test-plug kit containing thermometer(s), one pressure gage and adapter, and carrying case. Thermometer sensing elements, pressure gage, and adapter probes shall be of diameter to fit test plugs and of length to project into piping.
- C. Low-Range Thermometer: Small, bimetallic insertion type with 1- to 2-inch- diameter dial and tapered-end sensing element. Dial range shall be at least 25 to 125 deg F.
- D. High-Range Thermometer: Small, bimetallic insertion type with 1- to 2-inch- diameter dial and tapered-end sensing element. Dial range shall be at least 0 to 220 deg F.
- E. Pressure Gage: Small, Bourdon-tube insertion type with 2- to 3-inch- diameter dial and probe. Dial range shall be at least 0 to 200 psig.
- F. Carrying Case: Metal or plastic, with formed instrument padding.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install thermowells with socket extending to center of pipe and in vertical position in piping tees.
- B. Install thermowells of sizes required to match thermometer connectors. Include bushings if required to match sizes.
- C. Install thermowells with extension on insulated piping.
- D. Fill thermowells with heat-transfer medium.
- E. Install direct-mounted thermometers in thermowells and adjust vertical and tilted positions.
- F. Install remote-mounted thermometer bulbs in thermowells and install cases on panels; connect cases with tubing and support tubing to prevent kinks. Use minimum tubing length.
- G. Install direct-mounted pressure gages in piping tees with pressure gage located on pipe at the most readable position.
- H. Install remote-mounted pressure gages on panel.
- I. Install valve and snubber in piping for each pressure gage for fluids.
- J. Install test plugs in piping tees.
- K. Install thermometers in the following locations:
 - 1. Inlet and outlet of each water heater.
 - 2. Inlet and outlet of each domestic hot-water storage tank.
- L. Install pressure gages in the following locations:

1. Building water service entrance into building.

3.2 CONNECTIONS

- A. Install meters and gages adjacent to machines and equipment to allow service and maintenance of meters, gages, machines, and equipment.

3.3 ADJUSTING

- A. Adjust faces of meters and gages to proper angle for best visibility.

3.4 THERMOMETER SCALE-RANGE SCHEDULE

- A. Scale Range for Domestic Cold-Water Piping: 0 to 100 deg F.
- B. Scale Range for Domestic Hot-Water Piping: 0 to 250 deg F.
- C. Scale Range for Domestic Cooled-Water Piping: 0 to 100 deg F.

END OF SECTION 220519

SECTION 220523.12 - BALL VALVES FOR PLUMBING PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Bronze ball valves.

1.3 DEFINITIONS

- A. CWP: Cold working pressure.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of valve.
 - 1. Certification that products comply with NSF 61 Annex G and NSF 372.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Prepare valves for shipping as follows:
 - 1. Protect internal parts against rust and corrosion.
 - 2. Protect threads, flange faces, and soldered ends.
 - 3. Set ball valves open to minimize exposure of functional surfaces.
- B. Use the following precautions during storage:
 - 1. Maintain valve end protection.
 - 2. Store valves indoors and maintain at higher-than-ambient-dew-point temperature. If outdoor storage is necessary, store valves off the ground in watertight enclosures.
- C. Use sling to handle large valves; rig sling to avoid damage to exposed parts. Do not use operating handles or stems as lifting or rigging points.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS FOR VALVES

- A. Source Limitations for Valves: Obtain each type of valve from single source from single manufacturer.
- B. ASME Compliance:
 - 1. ASME B1.20.1 for threads for threaded end valves.
 - 2. ASME B16.1 for flanges on iron valves.
 - 3. ASME B16.5 for flanges on steel valves.
 - 4. ASME B16.10 and ASME B16.34 for ferrous valve dimensions and design criteria.
 - 5. ASME B16.18 for solder-joint connections.
 - 6. ASME B31.9 for building services piping valves.
- C. NSF Compliance: NSF 61 Annex G and NSF 372 for valve materials for potable-water service.
- D. Bronze valves shall be made with dezincification-resistant materials. Bronze valves made with copper alloy (brass) containing more than 15 percent zinc are not permitted.
- E. Valve Pressure-Temperature Ratings: Not less than indicated and as required for system pressures and temperatures.
- F. Valve Sizes: Same as upstream piping unless otherwise indicated.
- G. Valve Actuator Types:
 - 1. Gear Actuator: For quarter-turn valves NPS 4 and larger.
 - 2. Handlever: For quarter-turn valves smaller than NPS 4.
- H. Valves in Insulated Piping:
 - 1. Include 2-inch stem extensions.
 - 2. Extended operating handles of nonthermal-conductive material and protective sleeves that allow operation of valves without breaking vapor seals or disturbing insulation.
 - 3. Memory stops that are fully adjustable after insulation is applied.

2.2 BRONZE BALL VALVES

- A. Bronze Ball Valves, Two-Piece with Full Port and Stainless-Steel Trim:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Apollo Valves; Conbraco Industries, Inc.
 - b. Crane; Crane Energy Flow Solutions.
 - c. Hammond Valve.
 - d. Lance Valves.

- e. Milwaukee Valve Company.
 - f. NIBCO INC.
 - g. Watts; a Watts Water Technologies company.
2. Description:
- a. Standard: MSS SP-110.
 - b. CWP Rating: 600 psig.
 - c. Body Design: Two piece.
 - d. Body Material: Bronze.
 - e. Ends: Threaded or soldered.
 - f. Seats: PTFE.
 - g. Stem: Stainless steel.
 - h. Ball: Stainless steel, vented.
 - i. Port: Full.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine valve interior for cleanliness, freedom from foreign matter, and corrosion. Remove special packing materials, such as blocks, used to prevent disc movement during shipping and handling.
- B. Operate valves in positions from fully open to fully closed. Examine guides and seats made accessible by such operations.
- C. Examine threads on valve and mating pipe for form and cleanliness.
- D. Examine mating flange faces for conditions that might cause leakage. Check bolting for proper size, length, and material. Verify that gasket is of proper size, that its material composition is suitable for service, and that it is free from defects and damage.
- E. Do not attempt to repair defective valves; replace with new valves.

3.2 VALVE INSTALLATION

- A. Install valves with unions or flanges at each piece of equipment arranged to allow service, maintenance, and equipment removal without system shutdown.
- B. Locate valves for easy access and provide separate support where necessary.
- C. Install valves in horizontal piping with stem at or above center of pipe.
- D. Install valves in position to allow full stem movement.
- E. Install valve tags. Comply with requirements in Section 220553 "Identification for Plumbing Piping and Equipment" for valve tags and schedules.

3.3 GENERAL REQUIREMENTS FOR VALVE APPLICATIONS

- A. If valves with specified CWP ratings are unavailable, the same types of valves with higher CWP ratings may be substituted.
- B. Select valves with the following end connections:
 - 1. For Copper Tubing, NPS 2 and Smaller: Threaded ends except where solder-joint valve-end option is indicated in valve schedules.
 - 2. For Copper Tubing, NPS 2-1/2 to NPS 4: Flanged ends except where threaded valve-end option is indicated in valve schedules.

END OF SECTION 220523.12

SECTION 220523.14 - CHECK VALVES FOR PLUMBING PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Bronze swing check valves.

1.3 DEFINITIONS

- A. CWP: Cold working pressure.
- B. EPDM: Ethylene propylene-diene terpolymer rubber.
- C. NBR: Acrylonitrile-butadiene, Buna-N, or nitrile rubber.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of valve.
 - 1. Certification that products comply with NSF 61 Annex G and NSF 372.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Prepare valves for shipping as follows:
 - 1. Protect internal parts against rust and corrosion.
 - 2. Protect threads, flange faces, grooves, and weld ends.
 - 3. Set check valves in either closed or open position.
- B. Use the following precautions during storage:
 - 1. Maintain valve end protection.
 - 2. Store valves indoors and maintain at higher-than-ambient-dew-point temperature. If outdoor storage is necessary, store valves off the ground in watertight enclosures.
- C. Use sling to handle large valves; rig sling to avoid damage to exposed parts. Do not use handwheels or stems as lifting or rigging points.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS FOR VALVES

- A. Source Limitations for Valves: Obtain each type of valve from single source from single manufacturer.
- B. ASME Compliance:
 - 1. ASME B1.20.1 for threads for threaded end valves.
 - 2. ASME B16.1 for flanges on iron valves.
 - 3. ASME B16.10 and ASME B16.34 for ferrous valve dimensions and design criteria.
 - 4. ASME B16.18 for solder joint.
 - 5. ASME B31.9 for building services piping valves.
- C. AWWA Compliance: Comply with AWWA C606 for grooved-end connections.
- D. NSF Compliance: NSF 61 Annex G and NSF 372 for valve materials for potable-water service.
- E. Bronze valves shall be made with dezincification-resistant materials. Bronze valves made with copper alloy (brass) containing more than 15 percent zinc are not permitted.
- F. Valve Pressure-Temperature Ratings: Not less than indicated and as required for system pressures and temperatures.
- G. Valve Sizes: Same as upstream piping unless otherwise indicated.
- H. Valve Bypass and Drain Connections: MSS SP-45.

2.2 BRONZE SWING CHECK VALVES

- A. Bronze Swing Check Valves with Bronze Disc, Class 125:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. American Valve, Inc.
 - b. Apollo Valves; Conbraco Industries, Inc.
 - c. Crane; Crane Energy Flow Solutions.
 - d. Hammond Valve.
 - e. Jenkins Valves; Crane Energy Flow Solutions.
 - f. KITZ Corporation.
 - g. Macomb Groups (The).
 - h. Milwaukee Valve Company.
 - i. NIBCO INC.
 - j. Powell Valves.
 - k. Red-White Valve Corporation.
 - l. Stockham; Crane Energy Flow Solutions.
 - m. Watts; a Watts Water Technologies company.

2. Description:
 - a. Standard: MSS SP-80, Type 3.
 - b. CWP Rating: 200 psig.
 - c. Body Design: Horizontal flow.
 - d. Body Material: ASTM B 62, bronze.
 - e. Ends: Threaded or soldered. See valve schedule articles.
 - f. Disc: Bronze.

B. Bronze Swing Check Valves with Nonmetallic Disc, Class 125:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Apollo Valves; Conbraco Industries, Inc.
 - b. Crane; Crane Energy Flow Solutions.
 - c. Hammond Valve.
 - d. Jenkins Valves; Crane Energy Flow Solutions.
 - e. KITZ Corporation.
 - f. Milwaukee Valve Company.
 - g. NIBCO INC.
 - h. Red-White Valve Corporation.
 - i. Stockham; Crane Energy Flow Solutions.
 - j. Watts; a Watts Water Technologies company.
2. Description:
 - a. Standard: MSS SP-80, Type 4.
 - b. CWP Rating: 200 psig.
 - c. Body Design: Horizontal flow.
 - d. Body Material: ASTM B 62, bronze.
 - e. Ends: Threaded or soldered. See valve schedule articles.
 - f. Disc: PTFE.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine valve interior for cleanliness, freedom from foreign matter, and corrosion. Remove special packing materials, such as blocks, used to prevent disc movement during shipping and handling.
- B. Operate valves in positions from fully open to fully closed. Examine guides and seats made accessible by such operations.
- C. Examine threads on valve and mating pipe for form and cleanliness.

- D. Examine mating flange faces for conditions that might cause leakage. Check bolting for proper size, length, and material. Verify that gasket is of proper size, that its material composition is suitable for service, and that it is free from defects and damage.
- E. Do not attempt to repair defective valves; replace with new valves.

3.2 VALVE INSTALLATION

- A. Install valves with unions or flanges at each piece of equipment arranged to allow service, maintenance, and equipment removal without system shutdown.
- B. Locate valves for easy access and provide separate support where necessary.
- C. Install valves in horizontal piping with stem at or above center of pipe.
- D. Install valves in position to allow full stem movement.
- E. Install check valves for proper direction of flow and as follows:
 - 1. Swing Check Valves: In horizontal position with hinge pin level.
 - 2. Center-Guided and Plate-Type Check Valves: In horizontal or vertical position, between flanges.
 - 3. Lift Check Valves: With stem upright and plumb.
- F. Install valve tags. Comply with requirements in Section 220553 "Identification for Plumbing Piping and Equipment" for valve tags and schedules.

3.3 ADJUSTING

- A. Adjust or replace valve packing after piping systems have been tested and put into service but before final adjusting and balancing. Replace valves if persistent leaking occurs.

3.4 GENERAL REQUIREMENTS FOR VALVE APPLICATIONS

- A. If valve applications are not indicated, use the following:
 - 1. Pump-Discharge Check Valves:
 - a. NPS 2 and Smaller: Bronze swing check valves with bronze or nonmetallic disc.
- B. If valves with specified CWP ratings are unavailable, the same types of valves with higher CWP ratings may be substituted.
- C. End Connections:
 - 1. For Copper Tubing, NPS 2 and Smaller: Threaded or soldered.
 - 2. For Copper Tubing, NPS 2-1/2 to NPS 4: Flanged or threaded.
 - 3. For Steel Piping, NPS 2 and Smaller: Threaded.

3.5 DOMESTIC HOT- AND COLD-WATER VALVE SCHEDULE

- A. Pipe NPS 2 and Smaller: Bronze swing check valves with bronze disc, Class 125, with threaded end connections.

END OF SECTION 220523.14

SECTION 220529 - HANGERS AND SUPPORTS FOR PLUMBING PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Metal pipe hangers and supports.
 - 2. Trapeze pipe hangers.
 - 3. Fiberglass pipe hangers.
 - 4. Metal framing systems.
 - 5. Fiberglass strut systems.
 - 6. Thermal-hanger shield inserts.
 - 7. Fastener systems.
 - 8. Pipe stands.
 - 9. Pipe positioning systems.
 - 10. Equipment supports.

1.3 DEFINITIONS

- A. MSS: Manufacturers Standardization Society of The Valve and Fittings Industry Inc.

1.4 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Design trapeze pipe hangers and equipment supports, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.
- B. Structural Performance: Hangers and supports for plumbing piping and equipment shall withstand the effects of gravity loads and stresses within limits and under conditions indicated according to ASCE/SEI 7.
 - 1. Design supports for multiple pipes, including pipe stands, capable of supporting combined weight of supported systems, system contents, and test water.
 - 2. Design equipment supports capable of supporting combined operating weight of supported equipment and connected systems and components.
 - 3. Design seismic-restraint hangers and supports for piping and equipment and obtain approval from authorities having jurisdiction.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: Signed and sealed by a qualified professional engineer. Show fabrication and installation details and include calculations for the following; include Product Data for components:
 - 1. Trapeze pipe hangers.
 - 2. Metal framing systems.
 - 3. Fiberglass strut systems.
 - 4. Pipe stands.
 - 5. Equipment supports.
- C. Delegated-Design Submittal: For trapeze hangers indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
 - 1. Detail fabrication and assembly of trapeze hangers.
 - 2. Design Calculations: Calculate requirements for designing trapeze hangers.

1.6 INFORMATIONAL SUBMITTALS

- A. Welding certificates.

1.7 QUALITY ASSURANCE

- A. Structural Steel Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."
- B. Pipe Welding Qualifications: Qualify procedures and operators according to ASME Boiler and Pressure Vessel Code.

PART 2 - PRODUCTS

2.1 METAL PIPE HANGERS AND SUPPORTS

- A. Carbon-Steel Pipe Hangers and Supports:
 - 1. Description: MSS SP-58, Types 1 through 58, factory-fabricated components.
 - 2. Galvanized Metallic Coatings: Pregalvanized or hot dipped.
 - 3. Nonmetallic Coatings: Plastic coating, jacket, or liner.
 - 4. Padded Hangers: Hanger with fiberglass or other pipe insulation pad or cushion to support bearing surface of piping.
 - 5. Hanger Rods: Continuous-thread rod, nuts, and washer made of stainless steel.
- B. Stainless-Steel Pipe Hangers and Supports:

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1. Description: MSS SP-58, Types 1 through 58, factory-fabricated components.
2. Padded Hangers: Hanger with fiberglass or other pipe insulation pad or cushion to support bearing surface of piping.
3. Hanger Rods: Continuous-thread rod, nuts, and washer made of stainless steel.

C. Copper Pipe Hangers:

1. Description: MSS SP-58, Types 1 through 58, copper-coated-steel, factory-fabricated components.
2. Hanger Rods: Continuous-thread rod, nuts, and washer made of stainless steel.

2.2 TRAPEZE PIPE HANGERS

- A. Description: MSS SP-69, Type 59, shop- or field-fabricated pipe-support assembly made from structural carbon-steel shapes with MSS SP-58 carbon-steel hanger rods, nuts, saddles, and U-bolts.

2.3 FIBERGLASS PIPE HANGERS

A. Clevis-Type, Fiberglass Pipe Hangers:

1. Description: Similar to MSS SP-58, Type 1, steel pipe hanger except hanger is made of fiberglass or fiberglass-reinforced resin.
2. Hanger Rods: Continuous-thread rod, washer, and nuts made of stainless steel.

B. Strap-Type, Fiberglass Pipe Hangers:

1. Description: Similar to MSS SP-58, Type 9 or Type 10, steel pipe hanger except hanger is made of fiberglass-reinforced resin.
2. Hanger Rod and Fittings: Continuous-thread rod, washer, and nuts made of stainless steel.

2.4 METAL FRAMING SYSTEMS

A. MFMA Manufacturer Metal Framing Systems:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Allied Tube & Conduit; a part of Atkore International.
 - b. B-line, an Eaton business.
 - c. Flex-Strut Inc.
 - d. Thomas & Betts Corporation; A Member of the ABB Group.
 - e. Unistrut; Part of Atkore International.
 - f. Wesanco, Inc.
2. Description: Shop- or field-fabricated pipe-support assembly for supporting multiple parallel pipes.

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3. Standard: MFMA-4.
4. Channels: Continuous slotted steel channel with inturned lips.
5. Channel Nuts: Formed or stamped steel nuts or other devices designed to fit into channel slot and, when tightened, prevent slipping along channel.
6. Hanger Rods: Continuous-thread rod, nuts, and washer made of stainless steel.
7. Metallic Coating: Hot-dipped galvanized.
8. Paint Coating: Epoxy.
9. Plastic Coating: Epoxy.

2.5 THERMAL-HANGER SHIELD INSERTS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 1. Carpenter & Paterson, Inc.
 2. Clement Support Services.
 3. ERICO International Corporation.
 4. National Pipe Hanger Corporation.
 5. PHS Industries, Inc.
 6. Pipe Shields Inc.
 7. Piping Technology & Products, Inc.
 8. Rilco Manufacturing Co., Inc.
 9. Value Engineered Products, Inc.
- B. Insulation-Insert Material for Cold Piping: ASTM C 591, Type VI, Grade 1 polyisocyanurate with 125-psig minimum compressive strength and vapor barrier.
- C. Insulation-Insert Material for Hot Piping: ASTM C 591, Type VI, Grade 1 polyisocyanurate with 125-psig minimum compressive strength.
- D. For Trapeze or Clamped Systems: Insert and shield shall cover entire circumference of pipe.
- E. For Clevis or Band Hangers: Insert and shield shall cover lower 180 degrees of pipe.
- F. Insert Length: Extend 2 inches beyond sheet metal shield for piping operating below ambient air temperature.

2.6 FASTENER SYSTEMS

- A. Mechanical-Expansion Anchors: Insert-wedge-type, stainless- steel anchors, for use in hardened portland cement concrete; with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

2.7 PIPE STANDS

- A. General Requirements for Pipe Stands: Shop- or field-fabricated assemblies made of manufactured corrosion-resistant components to support roof-mounted piping.

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- B. Compact Pipe Stand: One-piece plastic unit with integral-rod roller, pipe clamps, or V-shaped cradle to support pipe, for roof installation without membrane penetration.
- C. Low-Type, Single-Pipe Stand: One-piece stainless-steel base unit with plastic roller, for roof installation without membrane penetration.
- D. High-Type, Single-Pipe Stand:
 - 1. Description: Assembly of base, vertical and horizontal members, and pipe support, for roof installation without membrane penetration.
 - 2. Base: Stainless steel.
 - 3. Vertical Members: Two or more cadmium-plated-steel or stainless-steel, continuous-thread rods.
 - 4. Horizontal Member: Cadmium-plated-steel or stainless-steel rod with plastic or stainless-steel, roller-type pipe support.
- E. High-Type, Multiple-Pipe Stand:
 - 1. Description: Assembly of bases, vertical and horizontal members, and pipe supports, for roof installation without membrane penetration.
 - 2. Bases: One or more; plastic.
 - 3. Vertical Members: Two or more protective-coated-steel channels.
 - 4. Horizontal Member: Protective-coated-steel channel.
 - 5. Pipe Supports: Galvanized-steel, clevis-type pipe hangers.
- F. Curb-Mounting-Type Pipe Stands: Shop- or field-fabricated pipe supports made from structural-steel shapes, continuous-thread rods, and rollers, for mounting on permanent stationary roof curb.

2.8 PIPE POSITIONING SYSTEMS

- A. Description: IAPMO PS 42, positioning system of metal brackets, clips, and straps for positioning piping in pipe spaces; for plumbing fixtures in commercial applications.

2.9 EQUIPMENT SUPPORTS

- A. Description: Welded, shop- or field-fabricated equipment support made from structural carbon-steel shapes.

2.10 MISCELLANEOUS MATERIALS

- A. Structural Steel: ASTM A 36/A 36M, carbon-steel plates, shapes, and bars; black and galvanized.
- B. Grout: ASTM C 1107, factory-mixed and -packaged, dry, hydraulic-cement, nonshrink and nonmetallic grout; suitable for interior and exterior applications.
 - 1. Properties: Nonstaining, noncorrosive, and nongaseous.

2. Design Mix: 5000-psi, 28-day compressive strength.

PART 3 - EXECUTION

3.1 HANGER AND SUPPORT INSTALLATION

- A. Metal Pipe-Hanger Installation: Comply with MSS SP-69 and MSS SP-89. Install hangers, supports, clamps, and attachments as required to properly support piping from the building structure.
- B. Metal Trapeze Pipe-Hanger Installation: Comply with MSS SP-69 and MSS SP-89. Arrange for grouping of parallel runs of horizontal piping, and support together on field-fabricated trapeze pipe hangers.
 1. Pipes of Various Sizes: Support together and space trapezes for smallest pipe size or install intermediate supports for smaller diameter pipes as specified for individual pipe hangers.
 2. Field fabricate from ASTM A 36/A 36M, carbon-steel shapes selected for loads being supported. Weld steel according to AWS D1.1/D1.1M.
- C. Fiberglass Pipe-Hanger Installation: Comply with applicable portions of MSS SP-69 and MSS SP-89. Install hangers and attachments as required to properly support piping from building structure.
- D. Metal Framing System Installation: Arrange for grouping of parallel runs of piping, and support together on field-assembled metal framing systems.
- E. Fiberglass Strut System Installation: Arrange for grouping of parallel runs of piping, and support together on field-assembled fiberglass struts.
- F. Thermal-Hanger Shield Installation: Install in pipe hanger or shield for insulated piping.
- G. Fastener System Installation:
 1. Install mechanical-expansion anchors in concrete after concrete is placed and completely cured. Install fasteners according to manufacturer's written instructions.
- H. Pipe Stand Installation:
 1. Pipe Stand Types except Curb-Mounted Type: Assemble components and mount on smooth roof surface. Do not penetrate roof membrane.
 2. Curb-Mounted-Type Pipe Stands: Assemble components or fabricate pipe stand and mount on permanent, stationary roof curb. See Section 077200 "Roof Accessories" for curbs.
- I. Pipe Positioning-System Installation: Install support devices to make rigid supply and waste piping connections to each plumbing fixture.
- J. Install hangers and supports complete with necessary attachments, inserts, bolts, rods, nuts, washers, and other accessories.

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- K. Equipment Support Installation: Fabricate from welded-structural-steel shapes.
- L. Install hangers and supports to allow controlled thermal and seismic movement of piping systems, to permit freedom of movement between pipe anchors, and to facilitate action of expansion joints, expansion loops, expansion bends, and similar units.
- M. Install lateral bracing with pipe hangers and supports to prevent swaying.
- N. Install building attachments within concrete slabs or attach to structural steel. Install additional attachments at concentrated loads, including valves, flanges, and strainers, NPS 2-1/2 and larger and at changes in direction of piping. Install concrete inserts before concrete is placed; fasten inserts to forms and install reinforcing bars through openings at top of inserts.
- O. Load Distribution: Install hangers and supports so that piping live and dead loads and stresses from movement will not be transmitted to connected equipment.
- P. Pipe Slopes: Install hangers and supports to provide indicated pipe slopes and to not exceed maximum pipe deflections allowed by ASME B31.9 for building services piping.
- Q. Insulated Piping:
 - 1. Attach clamps and spacers to piping.
 - a. Piping Operating above Ambient Air Temperature: Clamp may project through insulation.
 - b. Piping Operating below Ambient Air Temperature: Use thermal-hanger shield insert with clamp sized to match OD of insert.
 - c. Do not exceed pipe stress limits allowed by ASME B31.9 for building services piping.
 - 2. Install MSS SP-58, Type 39, protection saddles if insulation without vapor barrier is indicated. Fill interior voids with insulation that matches adjoining insulation.
 - a. Option: Thermal-hanger shield inserts may be used. Include steel weight-distribution plate for pipe NPS 4 and larger if pipe is installed on rollers.
 - 3. Install MSS SP-58, Type 40, protective shields on cold piping with vapor barrier. Shields shall span an arc of 180 degrees.
 - a. Option: Thermal-hanger shield inserts may be used. Include steel weight-distribution plate for pipe NPS 4 and larger if pipe is installed on rollers.
 - 4. Shield Dimensions for Pipe: Not less than the following:
 - a. NPS 1/4 to NPS 3-1/2: 12 inches long and 0.048 inch thick.
 - b. NPS 4: 12 inches long and 0.06 inch thick.
 - c. NPS 5 and NPS 6: 18 inches long and 0.06 inch thick.
 - d. NPS 8 to NPS 14: 24 inches long and 0.075 inch thick.
 - e. NPS 16 to NPS 24: 24 inches long and 0.105 inch thick.

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5. Pipes NPS 8 and Larger: Include wood or reinforced calcium-silicate-insulation inserts of length at least as long as protective shield.
6. Thermal-Hanger Shields: Install with insulation same thickness as piping insulation.

3.2 EQUIPMENT SUPPORTS

- A. Fabricate structural-steel stands to suspend equipment from structure overhead or to support equipment above floor.
- B. Grouting: Place grout under supports for equipment and make bearing surface smooth.
- C. Provide lateral bracing, to prevent swaying, for equipment supports.

3.3 METAL FABRICATIONS

- A. Cut, drill, and fit miscellaneous metal fabrications for trapeze pipe hangers and equipment supports.
- B. Fit exposed connections together to form hairline joints. Field weld connections that cannot be shop welded because of shipping size limitations.
- C. Field Welding: Comply with AWS D1.1/D1.1M procedures for shielded, metal arc welding; appearance and quality of welds; and methods used in correcting welding work; and with the following:
 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 2. Obtain fusion without undercut or overlap.
 3. Remove welding flux immediately.
 4. Finish welds at exposed connections so no roughness shows after finishing and so contours of welded surfaces match adjacent contours.

3.4 ADJUSTING

- A. Hanger Adjustments: Adjust hangers to distribute loads equally on attachments and to achieve indicated slope of pipe.
- B. Trim excess length of continuous-thread hanger and support rods to 1-1/2 inches.

3.5 PAINTING

- A. Touchup: Clean field welds and abraded areas of shop paint. Paint exposed areas immediately after erecting hangers and supports. Use same materials as used for shop painting. Comply with SSPC-PA 1 requirements for touching up field-painted surfaces.
 1. Apply paint by brush or spray to provide a minimum dry film thickness of 2.0 mils.

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- B. Touchup: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint on miscellaneous metal are specified in Division 9.
- C. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.

3.6 HANGER AND SUPPORT SCHEDULE

- A. Specific hanger and support requirements are in Sections specifying piping systems and equipment.
- B. Comply with MSS SP-69 for pipe-hanger selections and applications that are not specified in piping system Sections.
- C. Use hangers and supports with galvanized metallic coatings for piping and equipment that will not have field-applied finish.
- D. Use nonmetallic coatings on attachments for electrolytic protection where attachments are in direct contact with copper tubing.
- E. Use carbon-steel pipe hangers and supports, metal trapeze pipe hangers and metal framing systems and attachments for general service applications.
- F. Use stainless-steel pipe hangers and fiberglass pipe hangers and fiberglass strut systems and stainless-steel attachments for hostile environment applications.
- G. Use copper-plated pipe hangers and stainless-steel attachments for copper piping and tubing.
- H. Use padded hangers for piping that is subject to scratching.
- I. Use thermal-hanger shield inserts for insulated piping and tubing.
- J. Horizontal-Piping Hangers and Supports: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
 - 1. Adjustable, Steel Clevis Hangers (MSS Type 1): For suspension of noninsulated or insulated, stationary pipes NPS 1/2 to NPS 30.
 - 2. Yoke-Type Pipe Clamps (MSS Type 2): For suspension of up to 1050 deg F, pipes NPS 4 to NPS 24, requiring up to 4 inches of insulation.
 - 3. Carbon- or Alloy-Steel, Double-Bolt Pipe Clamps (MSS Type 3): For suspension of pipes NPS 3/4 to NPS 36, requiring clamp flexibility and up to 4 inches of insulation.
 - 4. Steel Pipe Clamps (MSS Type 4): For suspension of cold and hot pipes NPS 1/2 to NPS 24 if little or no insulation is required.
 - 5. Pipe Hangers (MSS Type 5): For suspension of pipes NPS 1/2 to NPS 4, to allow off-center closure for hanger installation before pipe erection.
 - 6. Adjustable, Swivel Split- or Solid-Ring Hangers (MSS Type 6): For suspension of noninsulated, stationary pipes NPS 3/4 to NPS 8.
 - 7. Adjustable, Steel Band Hangers (MSS Type 7): For suspension of noninsulated, stationary pipes NPS 1/2 to NPS 8.

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8. Adjustable Band Hangers (MSS Type 9): For suspension of noninsulated, stationary pipes NPS 1/2 to NPS 8.
 9. Adjustable, Swivel-Ring Band Hangers (MSS Type 10): For suspension of noninsulated, stationary pipes NPS 1/2 to NPS 8.
 10. Split Pipe Ring with or without Turnbuckle Hangers (MSS Type 11): For suspension of noninsulated, stationary pipes NPS 3/8 to NPS 8.
 11. Extension Hinged or Two-Bolt Split Pipe Clamps (MSS Type 12): For suspension of noninsulated, stationary pipes NPS 3/8 to NPS 3.
 12. U-Bolts (MSS Type 24): For support of heavy pipes NPS 1/2 to NPS 30.
 13. Clips (MSS Type 26): For support of insulated pipes not subject to expansion or contraction.
 14. Pipe Saddle Supports (MSS Type 36): For support of pipes NPS 4 to NPS 36, with steel-pipe base stanchion support and cast-iron floor flange or carbon-steel plate.
 15. Pipe Stanchion Saddles (MSS Type 37): For support of pipes NPS 4 to NPS 36, with steel-pipe base stanchion support and cast-iron floor flange or carbon-steel plate, and with U-bolt to retain pipe.
 16. Adjustable Pipe Saddle Supports (MSS Type 38): For stanchion-type support for pipes NPS 2-1/2 to NPS 36 if vertical adjustment is required, with steel-pipe base stanchion support and cast-iron floor flange.
 17. Single-Pipe Rolls (MSS Type 41): For suspension of pipes NPS 1 to NPS 30, from two rods if longitudinal movement caused by expansion and contraction might occur.
 18. Adjustable Roller Hangers (MSS Type 43): For suspension of pipes NPS 2-1/2 to NPS 24, from single rod if horizontal movement caused by expansion and contraction might occur.
 19. Complete Pipe Rolls (MSS Type 44): For support of pipes NPS 2 to NPS 42 if longitudinal movement caused by expansion and contraction might occur but vertical adjustment is not necessary.
 20. Pipe Roll and Plate Units (MSS Type 45): For support of pipes NPS 2 to NPS 24 if small horizontal movement caused by expansion and contraction might occur and vertical adjustment is not necessary.
 21. Adjustable Pipe Roll and Base Units (MSS Type 46): For support of pipes NPS 2 to NPS 30 if vertical and lateral adjustment during installation might be required in addition to expansion and contraction.
- K. Vertical-Piping Clamps: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
1. Extension Pipe or Riser Clamps (MSS Type 8): For support of pipe risers NPS 3/4 to NPS 24.
 2. Carbon- or Alloy-Steel Riser Clamps (MSS Type 42): For support of pipe risers NPS 3/4 to NPS 24 if longer ends are required for riser clamps.
- L. Hanger-Rod Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
1. Steel Turnbuckles (MSS Type 13): For adjustment up to 6 inches for heavy loads.
 2. Steel Clevises (MSS Type 14): For 120 to 450 deg F piping installations.
 3. Swivel Turnbuckles (MSS Type 15): For use with MSS Type 11, split pipe rings.
 4. Malleable-Iron Sockets (MSS Type 16): For attaching hanger rods to various types of building attachments.
 5. Steel Weldless Eye Nuts (MSS Type 17): For 120 to 450 deg F piping installations.

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- M. Building Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
1. Steel or Malleable Concrete Inserts (MSS Type 18): For upper attachment to suspend pipe hangers from concrete ceiling.
 2. Top-Beam C-Clamps (MSS Type 19): For use under roof installations with bar-joint construction, to attach to top flange of structural shape.
 3. Side-Beam or Channel Clamps (MSS Type 20): For attaching to bottom flange of beams, channels, or angles.
 4. Center-Beam Clamps (MSS Type 21): For attaching to center of bottom flange of beams.
 5. Welded Beam Attachments (MSS Type 22): For attaching to bottom of beams if loads are considerable and rod sizes are large.
 6. C-Clamps (MSS Type 23): For structural shapes.
 7. Top-Beam Clamps (MSS Type 25): For top of beams if hanger rod is required tangent to flange edge.
 8. Side-Beam Clamps (MSS Type 27): For bottom of steel I-beams.
 9. Steel-Beam Clamps with Eye Nuts (MSS Type 28): For attaching to bottom of steel I-beams for heavy loads.
 10. Linked-Steel Clamps with Eye Nuts (MSS Type 29): For attaching to bottom of steel I-beams for heavy loads, with link extensions.
 11. Malleable-Beam Clamps with Extension Pieces (MSS Type 30): For attaching to structural steel.
 12. Welded-Steel Brackets: For support of pipes from below or for suspending from above by using clip and rod. Use one of the following for indicated loads:
 - a. Light (MSS Type 31): 750 lb.
 - b. Medium (MSS Type 32): 1500 lb.
 - c. Heavy (MSS Type 33): 3000 lb.
 13. Side-Beam Brackets (MSS Type 34): For sides of steel or wooden beams.
 14. Plate Lugs (MSS Type 57): For attaching to steel beams if flexibility at beam is required.
 15. Horizontal Travelers (MSS Type 58): For supporting piping systems subject to linear horizontal movement where headroom is limited.
- N. Saddles and Shields: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
1. Steel-Pipe-Covering Protection Saddles (MSS Type 39): To fill interior voids with insulation that matches adjoining insulation.
 2. Protection Shields (MSS Type 40): Of length recommended in writing by manufacturer to prevent crushing insulation.
 3. Thermal-Hanger Shield Inserts: For supporting insulated pipe.
- O. Spring Hangers and Supports: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
1. Restraint-Control Devices (MSS Type 47): Where indicated to control piping movement.
 2. Spring Cushions (MSS Type 48): For light loads if vertical movement does not exceed 1-1/4 inches.
 3. Spring-Cushion Roll Hangers (MSS Type 49): For equipping Type 41, roll hanger with springs.

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4. Spring Sway Braces (MSS Type 50): To retard sway, shock, vibration, or thermal expansion in piping systems.
 5. Variable-Spring Hangers (MSS Type 51): Preset to indicated load and limit variability factor to 25 percent to allow expansion and contraction of piping system from hanger.
 6. Variable-Spring Base Supports (MSS Type 52): Preset to indicated load and limit variability factor to 25 percent to allow expansion and contraction of piping system from base support.
 7. Variable-Spring Trapeze Hangers (MSS Type 53): Preset to indicated load and limit variability factor to 25 percent to allow expansion and contraction of piping system from trapeze support.
 8. Constant Supports: For critical piping stress and if necessary to avoid transfer of stress from one support to another support, critical terminal, or connected equipment. Include auxiliary stops for erection, hydrostatic test, and load-adjustment capability. These supports include the following types:
 - a. Horizontal (MSS Type 54): Mounted horizontally.
 - b. Vertical (MSS Type 55): Mounted vertically.
 - c. Trapeze (MSS Type 56): Two vertical-type supports and one trapeze member.
- P. Comply with MSS SP-69 for trapeze pipe-hanger selections and applications that are not specified in piping system Sections.
- Q. Comply with MFMA-103 for metal framing system selections and applications that are not specified in piping system Sections.
- R. Use mechanical-expansion anchors instead of building attachments where required in concrete construction.
- S. Use pipe positioning systems in pipe spaces behind plumbing fixtures to support supply and waste piping for plumbing fixtures.

END OF SECTION 220529

SECTION 220548 - VIBRATION AND SEISMIC CONTROLS FOR PLUMBING PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Elastomeric isolation pads.
2. Elastomeric isolation mounts.
3. Restrained elastomeric isolation mounts.
4. Open-spring isolators.
5. Housed-spring isolators.
6. Restrained-spring isolators.
7. Housed-restrained-spring isolators.
8. Pipe-riser resilient supports.
9. Resilient pipe guides.
10. Elastomeric hangers.
11. Spring hangers.
12. Snubbers.
13. Restraint channel bracings.
14. Restraint cables.
15. Seismic-restraint accessories.
16. Mechanical anchor bolts.
17. Adhesive anchor bolts.

1.3 DEFINITIONS

- A. IBC: International Building Code.
- B. ICC-ES: ICC-Evaluation Service.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

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 vibration isolation device and seismic-restraint component required.

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- 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. Interlocking Snubbers: Include ratings for horizontal, vertical, and combined loads.
- B. Shop Drawings:
1. Detail fabrication and assembly of equipment bases. Detail fabrication including anchorages and attachments to structure and to supported equipment.
- C. Delegated-Design Submittal: For each vibration isolation and seismic-restraint device.
1. Include design calculations and details for selecting vibration isolators and seismic restraints complying with performance requirements, design criteria, and analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
 2. Design Calculations: Calculate static and dynamic loading due to equipment weight and operation, due to seismic forces required to select vibration isolators, and due to seismic restraints.
 3. Riser Supports: Include riser diagrams and calculations showing anticipated expansion and contraction at each support point, initial and final loads on building structure, spring deflection changes, and seismic loads. Include certification that riser system was examined for excessive stress and that none exists.
 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. Coordinate seismic-restraint and vibration isolation details with wind-restraint details required for equipment mounted outdoors. Comply with requirements in other Sections for equipment mounted outdoors.
 - d. 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).

1.5 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Show coordination of vibration isolation device installation and seismic bracing for plumbing piping and equipment with other systems and equipment in the vicinity, including other supports and restraints, if any.
- B. Qualification Data: For professional engineer and testing agency.
- C. Welding certificates.

D. Field quality-control reports.

1.6 QUALITY ASSURANCE

- A. Testing Agency Qualifications: An independent agency, with the experience and capability to conduct the testing indicated, that is an 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 Qualifications: 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 unavailable, 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.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Seismic-Restraint Loading:
 - 1. Site Class as Defined in the IBC: D.
 - 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: 2.5.
 - c. Component Amplification Factor: 1.0.
 - 3. Design Spectral Response Acceleration at Short Periods (0.2 Second): $SDS=0.197$.
 - 4. Design Spectral Response Acceleration at 1.0-Second Period: $SD1=0.101$.
 - 5. Rated strengths, features, and applications shall be as defined in reports by an agency acceptable to authorities having jurisdiction.
 - a. Structural Safety Factor: Allowable strength in tension, shear, and pullout force of components shall be at least four (4) times the maximum seismic forces to which they are subjected.

2.2 ELASTOMERIC ISOLATION PADS

- A. Elastomeric Isolation Pads:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one (1) of the following:

- a. Ace Mountings Co., Inc.
 - b. California Dynamics Corporation
 - c. Isolation Technology, Inc.
 - d. Kinetics Noise Control, Inc.
 - e. Mason Industries, Inc.
 - f. Novia; A Division of C&P
 - g. Vibration Eliminator Co., Inc.
 - h. Vibration Isolation
 - i. Vibration Mountings & Controls, Inc.
2. Fabrication: Single or multiple layers of sufficient durometer stiffness for uniform loading over pad area.
 3. Size: Factory or field cut to match requirements of supported equipment.
 4. Pad Material: Oil and water resistant with elastomeric properties.
 5. Surface Pattern: Ribbed and/or waffle pattern.
 6. Infused nonwoven cotton or synthetic fibers.
 7. Load-bearing metal plates adhered to pads.
 8. Sandwich-Core Material: Resilient and/or elastomeric.
 - a. Surface Pattern: Ribbed and/or waffle pattern.
 - b. Infused nonwoven cotton or synthetic fibers.

2.3 ELASTOMERIC ISOLATION MOUNTS

A. Double-Deflection, Elastomeric Isolation Mounts:

1. Manufacturers: Subject to compliance with requirements, provide products by one (1) of the following:
 - a. Ace Mountings Co., Inc.
 - b. California Dynamics Corporation
 - c. Isolation Technology, Inc.
 - d. Kinetics Noise Control, Inc.
 - e. Mason Industries, Inc.
 - f. Novia; A Division of C&P
 - g. Vibration Eliminator Co., Inc.
 - h. Vibration Isolation
 - i. Vibration Mountings & Controls, Inc.
2. Mounting Plates:
 - a. Top Plate: Encapsulated steel load transfer top plates, factory drilled and threaded with threaded studs or bolts.
 - b. Baseplate: Encapsulated steel bottom plates with holes provided for anchoring to support structure.
3. Elastomeric Material: Molded, oil-resistant rubber, neoprene, or other elastomeric material.

2.4 RESTRAINED ELASTOMERIC ISOLATION MOUNTS

A. Restrained Elastomeric Isolation Mounts:

1. Manufacturers: Subject to compliance with requirements, provide products by one (1) of the following:
 - a. Ace Mountings Co., Inc.
 - b. California Dynamics Corporation
 - c. Isolation Technology, Inc.
 - d. Kinetics Noise Control, Inc.
 - e. Mason Industries, Inc.
 - f. Novia; A Division of C&P
 - g. Vibration Eliminator Co., Inc.
 - h. Vibration Isolation
 - i. Vibration Mountings & Controls, Inc.

2. Description: All-directional isolator with seismic restraints containing two (2) separate and opposing elastomeric elements that prevent central threaded element and attachment hardware from contacting the housing during normal operation.
 - a. Housing: Cast-ductile iron or welded steel.
 - b. Elastomeric Material: Molded, oil-resistant rubber, neoprene, or other elastomeric material.

2.5 OPEN-SPRING ISOLATORS

A. Freestanding, Laterally Stable, Open-Spring Isolators:

1. Manufacturers: Subject to compliance with requirements, provide products by one (1) of the following:
 - a. Ace Mountings Co., Inc.
 - b. California Dynamics Corporation
 - c. Isolation Technology, Inc.
 - d. Kinetics Noise Control, Inc.
 - e. Mason Industries, Inc.
 - f. Novia; A Division of C&P
 - g. Vibration Eliminator Co., Inc.
 - h. Vibration Isolation
 - i. Vibration Mountings & Controls, Inc.

2. Outside Spring Diameter: Not less than eighty percent (80%) of the compressed height of the spring at rated load.
3. Minimum Additional Travel: Fifty percent (50%) of the required deflection at rated load.
4. Lateral Stiffness: More than eighty percent (80%) of rated vertical stiffness.
5. Overload Capacity: Support two hundred percent (200%) of rated load, fully compressed, without deformation or failure.
6. Baseplates: Factory-drilled steel plate for bolting to structure with an elastomeric isolator pad attached to the underside. Baseplates shall limit floor load to 500 psig.

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7. Top Plate and Adjustment Bolt: Threaded top plate with adjustment bolt and cap screw to fasten and level equipment.

2.6 HOUSED-SPRING ISOLATORS

A. Freestanding, Laterally Stable, Open-Spring Isolators in Two-Part Telescoping Housing:

1. Manufacturers: Subject to compliance with requirements, provide products by one (1) of the following:
 - a. Ace Mountings Co., Inc.
 - b. California Dynamics Corporation
 - c. Isolation Technology, Inc.
 - d. Kinetics Noise Control, Inc.
 - e. Mason Industries, Inc.
 - f. Vibration Eliminator Co., Inc.
 - g. Vibration Isolation
 - h. Vibration Mountings & Controls, Inc.
2. Outside Spring Diameter: Not less than eighty percent (80%) of the compressed height of the spring at rated load.
3. Minimum Additional Travel: Fifty percent (50%) of the required deflection at rated load.
4. Lateral Stiffness: More than eighty percent (80%) of rated vertical stiffness.
5. Overload Capacity: Support two hundred percent (200%) of rated load, fully compressed, without deformation or failure.
6. Two-Part Telescoping Housing: A steel top and bottom frame separated by an elastomeric material and enclosing the spring isolators.
 - a. Drilled base housing for bolting to structure with an elastomeric isolator pad attached to the underside. Bases shall limit floor load to 500 psig.
 - b. Top housing with attachment and leveling bolt.

2.7 RESTRAINED-SPRING ISOLATORS

A. Freestanding, Laterally Stable, Open-Spring Isolators with Vertical-Limit Stop Restraint:

1. Manufacturers: Subject to compliance with requirements, provide products by one (1) of the following:
 - a. Ace Mountings Co., Inc.
 - b. California Dynamics Corporation
 - c. Isolation Technology, Inc.
 - d. Kinetics Noise Control, Inc.
 - e. Mason Industries, Inc.
 - f. Novia; A Division of C&P
 - g. Vibration Eliminator Co., Inc.
 - h. Vibration Isolation
 - i. Vibration Mountings & Controls, Inc.
2. Housing: Steel housing with vertical-limit stops to prevent spring extension due to weight being removed.

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- a. Base with holes for bolting to structure with an elastomeric isolator pad attached to the underside. Bases shall limit floor load to 500 psig.
 - b. Top plate with threaded mounting holes.
 - c. Internal leveling bolt that acts as blocking during installation.
3. Restraint: Limit stop as required for equipment and authorities having jurisdiction.
 4. Outside Spring Diameter: Not less than eighty percent (80%) of the compressed height of the spring at rated load.
 5. Minimum Additional Travel: Fifty percent (50%) of the required deflection at rated load.
 6. Lateral Stiffness: More than eighty percent (80%) of rated vertical stiffness.
 7. Overload Capacity: Support two hundred percent (200%) of rated load, fully compressed, without deformation or failure.

2.8 HOUSED-RESTRAINED-SPRING ISOLATORS

- A. Freestanding, Steel, Open-Spring Isolators with Vertical-Limit Stop Restraint in Two-Part Telescoping Housing:
 1. Manufacturers: Subject to compliance with requirements, provide products by one (1) of the following:
 - a. Ace Mountings Co., Inc.
 - b. California Dynamics Corporation
 - c. Isolation Technology, Inc.
 - d. Kinetics Noise Control, Inc.
 - e. Mason Industries, Inc.
 - f. Vibration Eliminator Co., Inc.
 - g. Vibration Isolation
 - h. Vibration Mountings & Controls, Inc.
 2. Two-Part Telescoping Housing: A steel top and bottom frame separated by an elastomeric material and enclosing the spring isolators. Housings are equipped with adjustable snubbers to limit vertical movement.
 - a. Drilled base housing for bolting to structure with an elastomeric isolator pad attached to the underside. Bases shall limit floor load to 500 psig.
 - b. Threaded top housing with adjustment bolt and cap screw to fasten and level equipment.
 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.
 6. Overload Capacity: Support two hundred percent (200%) of rated load, fully compressed, without deformation or failure.

2.9 PIPE-RISER RESILIENT SUPPORT

- A. Description: All-directional, acoustical pipe anchor consisting of two (2) steel tubes separated by a minimum ½-inch-thick neoprene.

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1. Vertical-Limit Stops: Steel and neoprene vertical-limit stops arranged to prevent vertical travel in both directions.
2. Maximum Load Per Support: 500 psig on isolation material providing equal isolation in all directions.

2.10 RESILIENT PIPE GUIDES

- A. Description: Telescopic arrangement of two steel tubes or post and sleeve arrangement separated by a minimum ½-inch-thick neoprene.
 1. Factory-Set Height Guide with Shear Pin: Shear pin shall be removable and reinsertable to allow for selection of pipe movement. Guides shall be capable of motion to meet location requirements.

2.11 ELASTOMERIC HANGERS

- A. Elastomeric Mount in a Steel Frame with Upper and Lower Steel Hanger Rods:
 1. Manufacturers: Subject to compliance with requirements, provide products by one (1) of the following:
 - a. Ace Mountings Co., Inc.
 - b. California Dynamics Corporation
 - c. Isolation Technology, Inc.
 - d. Kinetics Noise Control, Inc.
 - e. Mason Industries, Inc.
 - f. Novia; A Division of C&P
 - g. Vibration Eliminator Co., Inc.
 - h. Vibration Mountings & Controls, Inc.
 2. Frame: Steel, fabricated with a connection for an upper threaded hanger rod and an opening on the underside to allow for a maximum of 30 degrees of angular lower hanger-rod misalignment without binding or reducing isolation efficiency.
 3. Dampening Element: Molded, oil-resistant rubber, neoprene, or other elastomeric material with a projecting bushing for the underside opening preventing steel to steel contact.

2.12 SPRING HANGERS

- A. Combination Coil-Spring and Elastomeric-Insert Hanger with Spring and Insert in Compression:
 1. Manufacturers: Subject to compliance with requirements, provide products by one (1) of the following:
 - a. Ace Mountings Co., Inc.
 - b. California Dynamics Corporation
 - c. Kinetics Noise Control, Inc.
 - d. Mason Industries, Inc.
 - e. Novia; A Division of C&P
 - f. Vibration Eliminator Co., Inc.

- g. Vibration Isolation
 - h. Vibration Mountings & Controls, Inc.
2. Frame: Steel, fabricated for connection to threaded hanger rods and to allow for a maximum of 30 degrees of angular hanger-rod misalignment without binding or reducing isolation efficiency.
 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.
 6. Overload Capacity: Support two hundred percent (200%) of rated load, fully compressed, without deformation or failure.
 7. Elastomeric Element: Molded, oil-resistant rubber or neoprene. Steel-washer-reinforced cup to support spring and bushing projecting through bottom of frame.
 8. Adjustable Vertical Stop: Steel washer with neoprene washer "up-stop" on lower threaded rod.
 9. Self-centering hanger-rod cap to ensure concentricity between hanger rod and support spring coil.

2.13 SNUBBERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one (1) of the following:
 1. Kinetics Noise Control, Inc.
 2. Mason Industries, Inc.
 3. Novia; A Division of C&P
 4. Vibration Mountings & Controls, Inc.
- B. Description: Factory fabricated using welded structural-steel shapes and plates, anchor bolts, and replaceable resilient isolation washers and bushings.
 1. Anchor bolts for attaching to concrete shall be seismic-rated, drill-in, and stud-wedge or female-wedge type.
 2. Resilient Isolation Washers and Bushings: Oil- and water-resistant neoprene.
 3. Maximum ¼-inch air gap, and minimum ¼-inch-thick resilient cushion.

2.14 RESTRAINT CHANNEL BRACINGS

- A. Manufacturers: Subject to compliance with requirements, provide products by one (1) of the following:
 1. B-line, an Eaton business
 2. Hilti, Inc.
 3. Mason Industries, Inc.
 4. Unistrut; Part of Atkore International
- B. Description: MFMA-4, shop- or field-fabricated bracing assembly made of slotted steel channels with accessories for attachment to braced component at one end and to building structure at the other end and other matching components and with corrosion-resistant coating; rated in tension, compression, and torsion forces.

2.15 RESTRAINT CABLES

- A. Manufacturers: Subject to compliance with requirements, provide products by one (1) of the following:
 - 1. Kinetics Noise Control, Inc.
 - 2. Mason Industries, Inc.
 - 3. Novia; A Division of C&P
 - 4. Vibration & Seismic Technologies, LLC
 - 5. Vibration Mountings & Controls, Inc.
- B. Restraint Cables: ASTM A 492 stainless-steel cables. End connections made of steel assemblies with thimbles, brackets, swivel, and bolts designed for restraining cable service; with a minimum of two (2) clamping bolts for cable engagement.

2.16 SEISMIC-RESTRAINT ACCESSORIES

- A. Manufacturers: Subject to compliance with requirements, provide products by one (1) of the following:
 - 1. B-line, an Eaton business
 - 2. Kinetics Noise Control, Inc.
 - 3. Mason Industries, Inc.
 - 4. Novia; A Division of C&P
 - 5. TOLCO
 - 6. Vibration & Seismic Technologies, LLC
- B. Hanger-Rod Stiffener: Steel tube or steel slotted-support-system sleeve with internally bolted connections to hanger rod.
- C. Hinged and Swivel Brace Attachments: Multifunctional steel connectors for attaching hangers to rigid channel bracings and restraint cables.
- D. Bushings for Floor-Mounted Equipment Anchor Bolts: Neoprene bushings designed for rigid equipment mountings, and matched to type and size of anchor bolts and studs.
- E. 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 used.
- F. Resilient Isolation Washers and Bushings: One-piece, molded, oil- and water-resistant neoprene, with a flat washer face.

2.17 MECHANICAL ANCHOR BOLTS

- A. Manufacturers: Subject to compliance with requirements, provide products by one (1) of the following:
 - 1. B-line, an Eaton business
 - 2. Hilti, Inc.
 - 3. Kinetics Noise Control, Inc.

4. Mason Industries, Inc.

- B. Mechanical Anchor Bolts: Drilled-in and stud-wedge or female-wedge type in 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.

2.18 ADHESIVE ANCHOR BOLTS

- A. Manufacturers: Subject to compliance with requirements, provide products by one (1) of the following:

1. Hilti, Inc.
2. Kinetics Noise Control, Inc.
3. Mason Industries, Inc.

- B. Adhesive Anchor Bolts: Drilled-in and capsule anchor system containing PVC 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.

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 of the Work.
- 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 Pipe Supports: Secure pipes to trapeze member with clamps approved for application by an agency acceptable to authorities having jurisdiction.
- 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 is adequate to carry present and future static and seismic loads within specified loading limits.

3.3 VIBRATION CONTROL AND SEISMIC-RESTRAINT DEVICE INSTALLATION

- A. Coordinate the location of embedded connection hardware with supported equipment attachment and mounting points and with requirements for concrete reinforcement and formwork specified in Division 03.
- B. Installation of vibration isolators must not cause any change of position of equipment, piping, or ductwork resulting in stresses or misalignment.
- C. Comply with requirements in Section 077200 "Roof Accessories" for installation of roof curbs, equipment supports, and roof penetrations.
- D. Equipment Restraints:
 - 1. Install seismic snubbers on plumbing equipment mounted on vibration isolators. Locate snubbers as close as possible to vibration isolators and bolt to equipment base and supporting structure.
 - 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 that provides required submittals for component.
- E. Piping Restraints:
 - 1. Comply with requirements in MSS SP-127.
 - 2. Space lateral supports a maximum of 40 feet o.c., and longitudinal supports a maximum of 80 feet o.c.
 - 3. Brace a change of direction longer than 12 feet.
- F. Install cables so they do not bend across edges of adjacent equipment or building structure.
- G. Install seismic-restraint devices using methods approved by an agency acceptable to authorities having jurisdiction that provides required submittals for component.
- H. Install bushing assemblies for anchor bolts for floor-mounted equipment, arranged to provide resilient media between anchor bolt and mounting hole in concrete base.
- I. 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.
- J. 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.
- K. 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 pre-stressed tendons, electrical and telecommunications conduit, and gas lines.

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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.

3.4 ACCOMMODATION OF DIFFERENTIAL SEISMIC MOTION

- A. Install flexible connections in piping where they cross seismic joints, where adjacent sections or branches are supported by different structural elements, and where the connections terminate with connection to equipment that is anchored to a different structural element from the one supporting the connections as they approach equipment. Comply with requirements in Section 221116 "Domestic Water Piping" for piping flexible connections.

3.5 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
- 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 post-connection 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.
- C. Remove and replace malfunctioning units and retest as specified above.
- D. Prepare test and inspection reports.

3.6 ADJUSTING

- A. Adjust isolators after piping system is at operating weight.

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- 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.

END OF SECTION 220548

SECTION 220553 - IDENTIFICATION FOR PLUMBING PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Equipment labels.
 - 2. Warning signs and labels.
 - 3. Pipe labels.
 - 4. Stencils.
 - 5. Valve tags.
 - 6. Warning tags.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Samples: For color, letter style, and graphic representation required for each identification material and device.
- C. Equipment Label Schedule: Include a listing of all equipment to be labeled with the proposed content for each label.
- D. Valve numbering scheme.
- E. Valve Schedules: For each piping system to include in maintenance manuals.

PART 2 - PRODUCTS

2.1 EQUIPMENT LABELS

- A. Metal Labels for Equipment:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Brady Corporation.
 - b. Brimar Industries, Inc.

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- c. Carlton Industries, LP.
 - d. Champion America.
 - e. Craftmark Pipe Markers.
 - f. emedco.
 - g. Kolbi Pipe Marker Co.
 - h. LEM Products Inc.
 - i. Marking Services, Inc.
 - j. Seton Identification Products.
2. Material and Thickness: Brass, 0.032-inch minimum thickness, and having predrilled or stamped holes for attachment hardware.
 3. Letter Color: White.
 4. Background Color: Black.
 5. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch.
 6. Minimum Letter Size: 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-quarters the size of principal lettering.
 7. Fasteners: Stainless-steel rivets or self-tapping screws.
 8. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.

B. Plastic Labels for Equipment:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Brady Corporation.
 - b. Brimar Industries, Inc.
 - c. Carlton Industries, LP.
 - d. Champion America.
 - e. Craftmark Pipe Markers.
 - f. emedco.
 - g. Kolbi Pipe Marker Co.
 - h. LEM Products Inc.
 - i. Marking Services, Inc.
 - j. Seton Identification Products.
2. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, 1/8 inch thick, and having predrilled holes for attachment hardware.
3. Letter Color: White.
4. Background Color: Black.
5. Maximum Temperature: Able to withstand temperatures up to 160 deg F.
6. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch.
7. Minimum Letter Size: 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-quarters the size of principal lettering.
8. Fasteners: Stainless-steel rivets or self-tapping screws.

- 9. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.
- C. Label Content: Include equipment's Drawing designation or unique equipment number, Drawing numbers where equipment is indicated (plans, details, and schedules), and the Specification Section number and title where equipment is specified.
- D. Equipment Label Schedule: For each item of equipment to be labeled, on 8-1/2-by-11-inch bond paper. Tabulate equipment identification number, and identify Drawing numbers where equipment is indicated (plans, details, and schedules) and the Specification Section number and title where equipment is specified. Equipment schedule shall be included in operation and maintenance data.

2.2 WARNING SIGNS AND LABELS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Brady Corporation.
 - 2. Brimar Industries, Inc.
 - 3. Carlton Industries, LP.
 - 4. Champion America.
 - 5. Craftmark Pipe Markers.
 - 6. emedco.
 - 7. LEM Products Inc.
 - 8. Marking Sevices Inc.
 - 9. National Marker Company.
 - 10. Seton Identification Products.
 - 11. Stranco, Inc.
- B. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, 1/8-inch-thick, and having predrilled holes for attachment hardware.
- C. Letter Color: Black.
- D. Background Color: Yellow.
- E. Maximum Temperature: Able to withstand temperatures up to 160 deg F.
- F. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch.
- G. Minimum Letter Size: 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-quarters the size of principal lettering.
- H. Fasteners: Stainless-steel rivets or self-tapping screws.
- I. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.

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- J. Label Content: Include caution and warning information plus emergency notification instructions.

2.3 PIPE LABELS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Actioncraft Products, Inc.; a division of Industrial Test Equipment Co., Inc.
 - 2. Brady Corporation.
 - 3. Brimar Industries, Inc.
 - 4. Carlton Industries, LP.
 - 5. Champion America.
 - 6. Craftmark Pipe Markers.
 - 7. emedco.
 - 8. Kolbi Pipe Marker Co.
 - 9. LEM Products Inc.
 - 10. Marking Sevices Inc.
 - 11. Seton Identification Products.
- B. General Requirements for Manufactured Pipe Labels: Preprinted, color-coded, with lettering indicating service, and showing flow direction.
- C. Pretensioned Pipe Labels: Precoiled, semirigid plastic formed to cover full circumference of pipe and to attach to pipe without fasteners or adhesive.
- D. Self-Adhesive Pipe Labels: Printed plastic with contact-type, permanent-adhesive backing.
- E. Pipe Label Contents: Include identification of piping service using same designations or abbreviations as used on Drawings; also include pipe size and an arrow indicating flow direction.
 - 1. Flow-Direction Arrows: Integral with piping-system service lettering to accommodate both directions or as separate unit on each pipe label to indicate flow direction.
 - 2. Lettering Size: Size letters according to ASME A13.1 for piping.

2.4 STENCILS

- A. Stencils for Piping:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Brimar Industries, Inc.
 - b. Carlton Industries, LP.
 - c. Champion America.
 - d. Craftmark Pipe Markers.
 - e. Kolbi Pipe Marker Co.
 - f. Marking Sevices Inc.

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2. Lettering Size: Size letters according to ASME A13.1 for piping.
3. Stencil Material: Fiberboard or metal.
4. Stencil Paint: Exterior, gloss, acrylic enamel in colors complying with recommendations in ASME A13.1 unless otherwise indicated. Paint may be in pressurized spray-can form.
5. Identification Paint: Exterior, acrylic enamel in colors according to ASME A13.1 unless otherwise indicated. Paint may be in pressurized spray-can form.

2.5 VALVE TAGS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 1. Actioncraft Products, Inc.; a division of Industrial Test Equipment Co., Inc.
 2. Brady Corporation.
 3. Brimar Industries, Inc.
 4. Carlton Industries, LP.
 5. Champion America.
 6. Craftmark Pipe Markers.
 7. emedco.
 8. Kolbi Pipe Marker Co.
 9. LEM Products Inc.
 10. Marking Sevices Inc.
 11. Seton Identification Products.
- B. Valve Tags: Stamped or engraved with 1/4-inch letters for piping system abbreviation and 1/2-inch numbers.
 1. Tag Material: Brass, 0.032-inch minimum thickness, and having predrilled or stamped holes for attachment hardware.
 2. Fasteners: Brass wire-link chain or S-hook.
- C. Valve Schedules: For each piping system, on 8-1/2-by-11-inch bond paper. Tabulate valve number, piping system, system abbreviation (as shown on valve tag), location of valve (room or space), normal-operating position (open, closed, or modulating), and variations for identification. Mark valves for emergency shutoff and similar special uses.
 1. Valve-tag schedule shall be included in operation and maintenance data.

2.6 WARNING TAGS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 1. Brady Corporation.
 2. Brimar Industries, Inc.
 3. Carlton Industries, LP.
 4. Champion America.
 5. Craftmark Pipe Markers.
 6. emedco.

IDENTIFICATION FOR PLUMBING PIPING AND EQUIPMENT

7. Kolbi Pipe Marker Co.
 8. LEM Products Inc.
 9. Marking Sevices Inc.
 10. Seton Identification Products.
- B. Description: Preprinted or partially preprinted accident-prevention tags of plasticized card stock with matte finish suitable for writing.
1. Size: 3 by 5-1/4 inches minimum.
 2. Fasteners: Brass grommet and wire.
 3. Nomenclature: Large-size primary caption such as "DANGER," "CAUTION," or "DO NOT OPERATE."
 4. Color: Safety yellow background with black lettering.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Clean piping and equipment surfaces of substances that could impair bond of identification devices, including dirt, oil, grease, release agents, and incompatible primers, paints, and encapsulants.

3.2 GENERAL INSTALLATION REQUIREMENTS

- A. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.
- B. Coordinate installation of identifying devices with locations of access panels and doors.
- C. Install identifying devices before installing acoustical ceilings and similar concealment.

3.3 EQUIPMENT LABEL INSTALLATION

- A. Install or permanently fasten labels on each major item of mechanical equipment.
- B. Locate equipment labels where accessible and visible.

3.4 PIPE LABEL INSTALLATION

- A. Piping Color Coding: Painting of piping is specified in Division 9.
- B. Stenciled Pipe Label Option: Stenciled labels may be provided instead of manufactured pipe labels, at Installer's option. Install stenciled pipe labels, complying with ASME A13.1, with painted, color-coded bands or rectangles on each piping system.
1. Identification Paint: Use for contrasting background.

2. Stencil Paint: Use for pipe marking.
- C. Pipe Label Locations: Locate pipe labels where piping is exposed or above accessible ceilings in finished spaces; machine rooms; accessible maintenance spaces such as shafts, tunnels, and plenums; and exterior exposed locations as follows:
1. Near each valve and control device.
 2. Near each branch connection, excluding short takeoffs for fixtures and terminal units. Where flow pattern is not obvious, mark each pipe at branch.
 3. Near penetrations through walls, floors, ceilings, and inaccessible enclosures.
 4. At access doors, manholes, and similar access points that permit view of concealed piping.
 5. Near major equipment items and other points of origination and termination.
 6. Spaced at maximum intervals of 50 feet along each run. Reduce intervals to 25 feet in areas of congested piping and equipment.
 7. On piping above removable acoustical ceilings. Omit intermediately spaced labels.
- D. Directional Flow Arrows: Arrows shall be used to indicate direction of flow in pipes, including pipes where flow is allowed in both directions.
- E. Pipe Label Color Schedule:
1. Domestic Water Piping
 - a. Background: Safety green.
 - b. Letter Colors: White.

3.5 VALVE-TAG INSTALLATION

- A. Install tags on valves and control devices in piping systems, except check valves, valves within factory-fabricated equipment units, shutoff valves, faucets, convenience and lawn-watering hose connections, and similar roughing-in connections of end-use fixtures and units. List tagged valves in a valve schedule.
- B. Valve-Tag Application Schedule: Tag valves according to size, shape, and color scheme and with captions similar to those indicated in the following subparagraphs:
1. Valve-Tag Size and Shape:
 - a. Cold Water: 2 inches, round.
 - b. Hot Water: 2 inches, round.
 2. Valve-Tag Colors:
 - a. Cold Water: Safety green.
 - b. Hot Water: Safety green.
 3. Letter Colors:
 - a. Cold Water: White.

- b. Hot Water: White.

3.6 WARNING-TAG INSTALLATION

- A. Write required message on, and attach warning tags to, equipment and other items where required.

END OF SECTION 220553

SECTION 220719 - PLUMBING PIPING INSULATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes insulating the following plumbing piping services:
 - 1. Domestic cold-water piping.
 - 2. Domestic hot-water piping.
 - 3. Domestic recirculating hot-water piping.
 - 4. Supplies and drains for handicap-accessible lavatories and sinks.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated. Include thermal conductivity, water-vapor permeance thickness, and jackets (both factory- and field-applied, if any).
- B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.
 - 1. Detail application of protective shields, saddles, and inserts at hangers for each type of insulation and hanger.
 - 2. Detail attachment and covering of heat tracing inside insulation.
 - 3. Detail insulation application at pipe expansion joints for each type of insulation.
 - 4. Detail insulation application at elbows, fittings, flanges, valves, and specialties for each type of insulation.
 - 5. Detail removable insulation at piping specialties, equipment connections, and access panels.
 - 6. Detail application of field-applied jackets.
 - 7. Detail application at linkages of control devices.
- C. Samples: For each type of insulation and jacket indicated. Identify each Sample, describing product and intended use. Sample sizes are as follows:
 - 1. Preformed Pipe Insulation Materials: 12 inches long by NPS 2.
 - 2. Jacket Materials for Pipe: 12 inches long by NPS 2.
 - 3. Sheet Jacket Materials: 12 inches square.
 - 4. Manufacturer's Color Charts: For products where color is specified, show the full range of colors available for each type of finish material.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified Installer.
- B. Material Test Reports: From a qualified testing agency acceptable to authorities having jurisdiction indicating, interpreting, and certifying test results for compliance of insulation materials, sealers, attachments, cements, and jackets, with requirements indicated. Include dates of tests and test methods employed.
- C. Field quality-control reports.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: Skilled mechanics who have successfully completed an apprenticeship program or another craft training program certified by the Department of Labor, Bureau of Apprenticeship and Training.
- B. Surface-Burning Characteristics: For insulation and related materials, as determined by testing identical products according to ASTM E 84 by a testing agency acceptable to authorities having jurisdiction. Factory label insulation and jacket materials and adhesive, mastic, tapes, and cement material containers, with appropriate markings of applicable testing agency.
 - 1. Insulation Installed Indoors: Flame-spread index of 25 or less, and smoke-developed index of 50 or less.
 - 2. Insulation Installed Outdoors: Flame-spread index of 75 or less, and smoke-developed index of 150 or less.
- C. Mockups: Before installing insulation, build mockups for each type of insulation and finish listed below to demonstrate quality of insulation application and finishes. Build mockups in the location indicated or, if not indicated, as directed by Architect. Use materials indicated for the completed Work.
 - 1. Piping Mockups:
 - a. One 10-foot section of NPS 2 straight pipe.
 - b. One each of a 90-degree threaded, welded, and flanged elbow.
 - c. One each of a threaded, welded, and flanged tee fitting.
 - d. One NPS 2 or smaller valve, and one NPS 2-1/2 or larger valve.
 - e. Four support hangers including hanger shield and insert.
 - f. One threaded strainer and one flanged strainer with removable portion of insulation.
 - g. One threaded reducer and one welded reducer.
 - h. One pressure temperature tap.
 - i. One mechanical coupling.
 - 2. For each mockup, fabricate cutaway sections to allow observation of application details for insulation materials, adhesives, mastics, attachments, and jackets.
 - 3. Notify Architect seven days in advance of dates and times when mockups will be constructed.
 - 4. Obtain Architect's approval of mockups before starting insulation application.

5. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
 6. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
 7. Demolish and remove mockups when directed.
- D. Comply with the following applicable standards and other requirements specified for miscellaneous components:
1. Supply and Drain Protective Shielding Guards: ICC A117.1.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Packaging: Insulation material containers shall be marked by manufacturer with appropriate ASTM standard designation, type and grade, and maximum use temperature.

1.7 COORDINATION

- A. Coordinate sizes and locations of supports, hangers, and insulation shields specified in Section 220529 "Hangers and Supports for Plumbing Piping and Equipment."
- B. Coordinate clearance requirements with piping Installer for piping insulation application. Before preparing piping Shop Drawings, establish and maintain clearance requirements for installation of insulation and field-applied jackets and finishes and for space required for maintenance.
- C. Coordinate installation and testing of heat tracing.

1.8 SCHEDULING

- A. Schedule insulation application after pressure testing systems and, where required, after installing and testing heat tracing. Insulation application may begin on segments that have satisfactory test results.
- B. Complete installation and concealment of plastic materials as rapidly as possible in each area of construction.

PART 2 - PRODUCTS

2.1 INSULATION MATERIALS

- A. Comply with requirements in "Piping Insulation Schedule, General," "Indoor Piping Insulation Schedule," "Outdoor, Aboveground Piping Insulation Schedule," and "Outdoor, Underground Piping Insulation Schedule" articles for where insulating materials shall be applied.
- B. Products shall not contain asbestos, lead, mercury, or mercury compounds.

- C. Products that come in contact with stainless steel shall have a leachable chloride content of less than 50 ppm when tested according to ASTM C 871.
- D. Insulation materials for use on austenitic stainless steel shall be qualified as acceptable according to ASTM C 795.
- E. Foam insulation materials shall not use CFC or HCFC blowing agents in the manufacturing process.
- F. Cellular Glass: Inorganic, incombustible, foamed or cellulated glass with annealed, rigid, hermetically sealed cells. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.
 - 1. 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. Pittsburgh Corning Corporation.
 - 2. Block Insulation: ASTM C 552, Type I.
 - 3. Special-Shaped Insulation: ASTM C 552, Type III.
 - 4. Preformed Pipe Insulation without Jacket: Comply with ASTM C 552, Type II, Class 1.
 - 5. Preformed Pipe Insulation with Factory-Applied ASJ-SSL: Comply with ASTM C 552, Type II, Class 2.
 - 6. Factory fabricate shapes according to ASTM C 450 and ASTM C 585.
- G. Flexible Elastomeric Insulation: Closed-cell, sponge- or expanded-rubber materials. Comply with ASTM C 534, Type I for tubular materials.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Aeroflex USA, Inc.
 - b. Armacell LLC.
 - c. K-Flex USA.
- H. Mineral-Fiber Blanket Insulation: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C 553, Type II and ASTM C 1290, Type I. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. CertainTeed Corporation.
 - b. Johns Manville; a Berkshire Hathaway company.
 - c. Knauf Insulation.
 - d. Manson Insulation Inc.
 - e. Owens Corning.
- I. Mineral-Fiber, Preformed Pipe Insulation:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Johns Manville; a Berkshire Hathaway company.
 - b. Knauf Insulation.
 - c. Manson Insulation Inc.
 - d. Owens Corning.
2. Type I, 850 Deg F Materials: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C 547, Type I, Grade A, with factory-applied ASJ-SSL. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.

J. Phenolic:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - a. Kingspan Tarec Industrial Insulation NV.
 - b. Resolco International BV.
2. Preformed pipe insulation of rigid, expanded, closed-cell structure. Comply with ASTM C 1126, Type III, Grade 1.
3. Block insulation of rigid, expanded, closed-cell structure. Comply with ASTM C 1126, Type II, Grade 1.
4. Factory fabricate shapes according to ASTM C 450 and ASTM C 585.
5. Factory-Applied Jacket: ASJ. Requirements are specified in "Factory-Applied Jackets" Article.

K. Polyolefin: Unicellular, polyethylene thermal plastic insulation. Comply with ASTM C 534 or ASTM C 1427, Type I, Grade 1 for tubular materials.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - a. Armacell LLC.
 - b. Nomaco Insulation.

2.2 INSULATING CEMENTS

A. Mineral-Fiber Insulating Cement: Comply with ASTM C 195.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - a. Ramco Insulation, Inc.

- B. Expanded or Exfoliated Vermiculite Insulating Cement: Comply with ASTM C 196.
 - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - a. Ramco Insulation, Inc.
- C. Mineral-Fiber, Hydraulic-Setting Insulating and Finishing Cement: Comply with ASTM C 449.
 - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - a. Ramco Insulation, Inc.

2.3 ADHESIVES

- A. Materials shall be compatible with insulation materials, jackets, and substrates and for bonding insulation to itself and to surfaces to be insulated, unless otherwise indicated.
- B. Cellular-Glass Adhesive: Two-component, thermosetting urethane adhesive containing no flammable solvents, with a service temperature range of minus 100 to plus 200 deg F.
 - 1. 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. Foster Brand; H. B. Fuller Construction Products.
- C. Flexible Elastomeric and Polyolefin Adhesive: Comply with MIL-A-24179A, Type II, Class I.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Aeroflex USA, Inc.
 - b. Armacell LLC.
 - c. Foster Brand; H. B. Fuller Construction Products.
 - d. K-Flex USA.
- D. Mineral-Fiber Adhesive: Comply with MIL-A-3316C, Class 2, Grade A.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Childers Brand; H. B. Fuller Construction Products.
 - b. Eagle Bridges - Marathon Industries.
 - c. Foster Brand; H. B. Fuller Construction Products.
 - d. Mon-Eco Industries, Inc.

- E. Phenolic Adhesive: Solvent-based resin adhesive, with a service temperature range of minus 75 to plus 300 deg F.
 - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - a. Childers Brand; H. B. Fuller Construction Products.
 - b. Foster Brand; H. B. Fuller Construction Products.
- F. ASJ Adhesive, and FSK Jacket Adhesive: Comply with MIL-A-3316C, Class 2, Grade A for bonding insulation jacket lap seams and joints.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Childers Brand; H. B. Fuller Construction Products.
 - b. Eagle Bridges - Marathon Industries.
 - c. Foster Brand; H. B. Fuller Construction Products.
 - d. Mon-Eco Industries, Inc.
- G. PVC Jacket Adhesive: Compatible with PVC jacket.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Dow Corning Corporation.
 - b. Johns Manville; a Berkshire Hathaway company.
 - c. P.I.C. Plastics, Inc.
 - d. Speedline Corporation.

2.4 MASTICS

- A. Materials shall be compatible with insulation materials, jackets, and substrates; comply with MIL-PRF-19565C, Type II.
- B. Vapor-Barrier Mastic: Water based; suitable for indoor use on below-ambient services.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Foster Brand; H. B. Fuller Construction Products.
 - b. Knauf Insulation.
 - c. Vimasco Corporation.
 - 2. Water-Vapor Permeance: ASTM E 96/E 96M, Procedure B, 0.013 perm at 43-mil dry film thickness.
 - 3. Service Temperature Range: Minus 20 to plus 180 deg F.
 - 4. Solids Content: ASTM D 1644, 58 percent by volume and 70 percent by weight.

5. Color: White.
- C. Vapor-Barrier Mastic: Solvent based; suitable for indoor use on below-ambient services.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Childers Brand; H. B. Fuller Construction Products.
 - b. Eagle Bridges - Marathon Industries.
 - c. Foster Brand; H. B. Fuller Construction Products.
 - d. Mon-Eco Industries, Inc.
 2. Water-Vapor Permeance: ASTM F 1249, 0.05 perm at 35-mil dry film thickness.
 3. Service Temperature Range: 0 to 180 deg F.
 4. Solids Content: ASTM D 1644, 44 percent by volume and 62 percent by weight.
 5. Color: White.
- D. Vapor-Barrier Mastic: Solvent based; suitable for outdoor use on below-ambient services.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Childers Brand; H. B. Fuller Construction Products.
 - b. Eagle Bridges - Marathon Industries.
 - c. Foster Brand; H. B. Fuller Construction Products.
 2. Water-Vapor Permeance: ASTM F 1249, 0.05 perm at 30-mil dry film thickness.
 3. Service Temperature Range: Minus 50 to plus 220 deg F.
 4. Solids Content: ASTM D 1644, 33 percent by volume and 46 percent by weight.
 5. Color: White.
- E. Breather Mastic: Water based; suitable for indoor and outdoor use on above-ambient services.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Childers Brand; H. B. Fuller Construction Products.
 - b. Eagle Bridges - Marathon Industries.
 - c. Foster Brand; H. B. Fuller Construction Products.
 - d. Knauf Insulation.
 - e. Mon-Eco Industries, Inc.
 - f. Vimasco Corporation.
 2. Water-Vapor Permeance: ASTM F 1249, 1.8 perms at 0.0625-inch dry film thickness.
 3. Service Temperature Range: Minus 20 to plus 180 deg F.
 4. Solids Content: 60 percent by volume and 66 percent by weight.
 5. Color: White.

2.5 LAGGING ADHESIVES

- A. Description: Comply with MIL-A-3316C, Class I, Grade A, and shall be compatible with insulation materials, jackets, and substrates.
1. For indoor applications, use lagging adhesives that have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Childers Brand; H. B. Fuller Construction Products.
 - b. Foster Brand; H. B. Fuller Construction Products.
 - c. Vimasco Corporation.
 3. Fire-resistant, water-based lagging adhesive and coating for use indoors to adhere fire-resistant lagging cloths over pipe insulation.
 4. Service Temperature Range: 0 to plus 180 deg F.
 5. Color: White.

2.6 SEALANTS

- A. Joint Sealants for Cellular-Glass and Phenolic Products:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Childers Brand; H. B. Fuller Construction Products.
 - b. Eagle Bridges - Marathon Industries.
 - c. Foster Brand; H. B. Fuller Construction Products.
 - d. Mon-Eco Industries, Inc.
 - e. Pittsburgh Corning Corporation.
 2. Materials shall be compatible with insulation materials, jackets, and substrates.
 3. Permanently flexible, elastomeric sealant.
 4. Service Temperature Range: Minus 100 to plus 300 deg F.
 5. Color: White or gray.
- B. FSK and Metal Jacket Flashing Sealants:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Childers Brand; H. B. Fuller Construction Products.
 - b. Eagle Bridges - Marathon Industries.
 - c. Foster Brand; H. B. Fuller Construction Products.
 - d. Mon-Eco Industries, Inc.

2. Materials shall be compatible with insulation materials, jackets, and substrates.
3. Fire- and water-resistant, flexible, elastomeric sealant.
4. Service Temperature Range: Minus 40 to plus 250 deg F.
5. Color: Aluminum.

C. ASJ Flashing Sealants, and Vinyl, PVDC, and PVC Jacket Flashing Sealants:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - a. Childers Brand; H. B. Fuller Construction Products.
2. Materials shall be compatible with insulation materials, jackets, and substrates.
3. Fire- and water-resistant, flexible, elastomeric sealant.
4. Service Temperature Range: Minus 40 to plus 250 deg F.
5. Color: White.

2.7 FACTORY-APPLIED JACKETS

- A. Insulation system schedules indicate factory-applied jackets on various applications. When factory-applied jackets are indicated, comply with the following:
1. ASJ: White, kraft-paper, fiberglass-reinforced scrim with aluminum-foil backing; complying with ASTM C 1136, Type I.
 2. ASJ-SSL: ASJ with self-sealing, pressure-sensitive, acrylic-based adhesive covered by a removable protective strip; complying with ASTM C 1136, Type I.
 3. FSK Jacket: Aluminum-foil, fiberglass-reinforced scrim with kraft-paper backing; complying with ASTM C 1136, Type II.

2.8 FIELD-APPLIED FABRIC-REINFORCING MESH

- A. Woven Glass-Fiber Fabric: Approximately 2 oz./sq. yd. with a thread count of 10 strands by 10 strands/sq. in. for covering pipe and pipe fittings.
1. 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. Childers Brand; H. B. Fuller Construction Products.
- B. Woven Polyester Fabric: Approximately 1 oz./sq. yd. with a thread count of 10 strands by 10 strands/sq. in., in a Leno weave, for pipe.
1. 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. Foster Brand; H. B. Fuller Construction Products.
- b. Vimasco Corporation.

2.9 FIELD-APPLIED CLOTHS

- A. Woven Glass-Fiber Fabric: Comply with MIL-C-20079H, Type I, plain weave, and presized a minimum of 8 oz./sq. yd..
 - 1. 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. Alpha Associates, Inc.

2.10 FIELD-APPLIED JACKETS

- A. Field-applied jackets shall comply with ASTM C 921, Type I, unless otherwise indicated.
- B. PVC Jacket: High-impact-resistant, UV-resistant PVC complying with ASTM D 1784, Class 16354-C; thickness as scheduled; roll stock ready for shop or field cutting and forming. Thickness is indicated in field-applied jacket schedules.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Johns Manville; a Berkshire Hathaway company.
 - b. P.I.C. Plastics, Inc.
 - c. Proto Corporation.
 - d. Speedline Corporation.
 - 2. Adhesive: As recommended by jacket material manufacturer.
 - 3. Color: Color-code jackets based on system. Color as selected by Architect.
 - 4. Factory-fabricated fitting covers to match jacket if available; otherwise, field fabricate.
 - a. Shapes: 45- and 90-degree, short- and long-radius elbows, tees, valves, flanges, unions, reducers, end caps, soil-pipe hubs, traps, mechanical joints, and P-trap and supply covers for lavatories.
- C. Metal Jacket:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Childers Brand; H. B. Fuller Construction Products.
 - b. ITW Insulation Systems; Illinois Tool Works, Inc.
 - c. RPR Products, Inc.
 - 2. Aluminum Jacket: Comply with ASTM B 209, Alloy 3003, 3005, 3105, or 5005, Temper H-14.

- a. Factory cut and rolled to size.
 - b. Finish and thickness are indicated in field-applied jacket schedules.
 - c. Moisture Barrier for Indoor Applications: 3-mil-thick, heat-bonded polyethylene and kraft paper.
 - d. Moisture Barrier for Outdoor Applications: 3-mil-thick, heat-bonded polyethylene and kraft paper.
 - e. Factory-Fabricated Fitting Covers:
 - 1) Same material, finish, and thickness as jacket.
 - 2) Preformed 2-piece or gore, 45- and 90-degree, short- and long-radius elbows.
 - 3) Tee covers.
 - 4) Flange and union covers.
 - 5) End caps.
 - 6) Beveled collars.
 - 7) Valve covers.
 - 8) Field fabricate fitting covers only if factory-fabricated fitting covers are not available.
3. Stainless-Steel Jacket: ASTM A 167 or ASTM A 240/A 240M.
- a. Factory cut and rolled to size.
 - b. Material, finish, and thickness are indicated in field-applied jacket schedules.
 - c. Moisture Barrier for Indoor Applications: 3-mil-thick, heat-bonded polyethylene and kraft paper.
 - d. Moisture Barrier for Outdoor Applications: 3-mil-thick, heat-bonded polyethylene and kraft paper.
 - e. Factory-Fabricated Fitting Covers:
 - 1) Same material, finish, and thickness as jacket.
 - 2) Preformed 2-piece or gore, 45- and 90-degree, short- and long-radius elbows.
 - 3) Tee covers.
 - 4) Flange and union covers.
 - 5) End caps.
 - 6) Beveled collars.
 - 7) Valve covers.
 - 8) Field fabricate fitting covers only if factory-fabricated fitting covers are not available.
- D. Underground Direct-Buried Jacket: 125-mil-thick vapor barrier and waterproofing membrane consisting of a rubberized bituminous resin reinforced with a woven-glass fiber or polyester scrim and laminated aluminum foil.
- 1. 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. Pittsburgh Corning Corporation.
 - b. Polyguard Products, Inc.

2.11 TAPES

- A. ASJ Tape: White vapor-retarder tape matching factory-applied jacket with acrylic adhesive, complying with ASTM C 1136.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Avery Dennison Corporation, Specialty Tapes Division.
 - b. Compac Corporation.
 - c. Ideal Tape Co., Inc., an American Biltrite Company.
 - d. Knauf Insulation.
 - e. Venture Tape.
 2. Width: 3 inches.
 3. Thickness: 11.5 mils.
 4. Adhesion: 90 ounces force/inch in width.
 5. Elongation: 2 percent.
 6. Tensile Strength: 40 lbf/inch in width.
 7. ASJ Tape Disks and Squares: Precut disks or squares of ASJ tape.
- B. FSK Tape: Foil-face, vapor-retarder tape matching factory-applied jacket with acrylic adhesive; complying with ASTM C 1136.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Avery Dennison Corporation, Specialty Tapes Division.
 - b. Compac Corporation.
 - c. Ideal Tape Co., Inc., an American Biltrite Company.
 - d. Knauf Insulation.
 - e. Venture Tape.
 2. Width: 3 inches.
 3. Thickness: 6.5 mils.
 4. Adhesion: 90 ounces force/inch in width.
 5. Elongation: 2 percent.
 6. Tensile Strength: 40 lbf/inch in width.
 7. FSK Tape Disks and Squares: Precut disks or squares of FSK tape.
- C. PVC Tape: White vapor-retarder tape matching field-applied PVC jacket with acrylic adhesive; suitable for indoor and outdoor applications.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Compac Corporation.
 - b. Ideal Tape Co., Inc., an American Biltrite Company.
 - c. Venture Tape.

2. Width: 2 inches.
3. Thickness: 6 mils.
4. Adhesion: 64 ounces force/inch in width.
5. Elongation: 500 percent.
6. Tensile Strength: 18 lbf/inch in width.

D. Aluminum-Foil Tape: Vapor-retarder tape with acrylic adhesive.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Avery Dennison Corporation, Specialty Tapes Division.
 - b. Compac Corporation.
 - c. Ideal Tape Co., Inc., an American Biltrite Company.
 - d. Knauf Insulation.
 - e. Venture Tape.
2. Width: 2 inches.
3. Thickness: 3.7 mils.
4. Adhesion: 100 ounces force/inch in width.
5. Elongation: 5 percent.
6. Tensile Strength: 34 lbf/inch in width.

2.12 SECUREMENTS

A. Bands:

1. 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. ITW Insulation Systems; Illinois Tool Works, Inc.
 - b. RPR Products, Inc.
2. Stainless Steel: ASTM A 167 or ASTM A 240/A 240M, Type 316; 0.015 inch thick, 3/4 inch wide with wing seal or closed seal.
3. Aluminum: ASTM B 209, Alloy 3003, 3005, 3105, or 5005; Temper H-14, 0.020 inch thick, 3/4 inch wide with wing seal or closed seal.

B. Staples: Outward-clinching insulation staples, nominal 3/4-inch-wide, stainless steel or Monel.

C. Wire: 0.062-inch soft-annealed, stainless steel.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - a. C & F Wire.

2.13 PROTECTIVE SHIELDING GUARDS

A. Protective Shielding Pipe Covers:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Engineered Brass Company.
 - b. Insul-Tect Products Co.
 - c. McGuire Manufacturing.
 - d. Plumberex Specialty Products, Inc.
 - e. Truebro.
 - f. Zurn Industries, LLC.
2. Description: Manufactured plastic wraps for covering plumbing fixture hot- and cold-water supplies and trap and drain piping. Comply with Americans with Disabilities Act (ADA) requirements.

B. Protective Shielding Piping Enclosures:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - a. Truebro.
 - b. Zurn Industries, LLC.
2. Description: Manufactured plastic enclosure for covering plumbing fixture hot- and cold-water supplies and trap and drain piping. Comply with ADA requirements.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions for compliance with requirements for installation tolerances and other conditions affecting performance of insulation application.
1. Verify that systems to be insulated have been tested and are free of defects.
 2. Verify that surfaces to be insulated are clean and dry.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Surface Preparation: Clean and dry surfaces to receive insulation. Remove materials that will adversely affect insulation application.

- B. Surface Preparation: Clean and prepare surfaces to be insulated. Before insulating, apply a corrosion coating to insulated surfaces as follows:
 - 1. Stainless Steel: Coat 300 series stainless steel with an epoxy primer 5 mils thick and an epoxy finish 5 mils thick if operating in a temperature range between 140 and 300 deg F. Consult coating manufacturer for appropriate coating materials and application methods for operating temperature range.
 - 2. Carbon Steel: Coat carbon steel operating at a service temperature between 32 and 300 deg F with an epoxy coating. Consult coating manufacturer for appropriate coating materials and application methods for operating temperature range.
- C. Coordinate insulation installation with the trade installing heat tracing. Comply with requirements for heat tracing that apply to insulation.
- D. Mix insulating cements with clean potable water; if insulating cements are to be in contact with stainless-steel surfaces, use demineralized water.

3.3 GENERAL INSTALLATION REQUIREMENTS

- A. Install insulation materials, accessories, and finishes with smooth, straight, and even surfaces; free of voids throughout the length of piping including fittings, valves, and specialties.
- B. Install insulation materials, forms, vapor barriers or retarders, jackets, and thicknesses required for each item of pipe system as specified in insulation system schedules.
- C. Install accessories compatible with insulation materials and suitable for the service. Install accessories that do not corrode, soften, or otherwise attack insulation or jacket in either wet or dry state.
- D. Install insulation with longitudinal seams at top and bottom of horizontal runs.
- E. Install multiple layers of insulation with longitudinal and end seams staggered.
- F. Do not weld brackets, clips, or other attachment devices to piping, fittings, and specialties.
- G. Keep insulation materials dry during application and finishing.
- H. Install insulation with tight longitudinal seams and end joints. Bond seams and joints with adhesive recommended by insulation material manufacturer.
- I. Install insulation with least number of joints practical.
- J. Where vapor barrier is indicated, seal joints, seams, and penetrations in insulation at hangers, supports, anchors, and other projections with vapor-barrier mastic.
 - 1. Install insulation continuously through hangers and around anchor attachments.
 - 2. For insulation application where vapor barriers are indicated, extend insulation on anchor legs from point of attachment to supported item to point of attachment to structure. Taper and seal ends at attachment to structure with vapor-barrier mastic.

3. Install insert materials and install insulation to tightly join the insert. Seal insulation to insulation inserts with adhesive or sealing compound recommended by insulation material manufacturer.
 4. Cover inserts with jacket material matching adjacent pipe insulation. Install shields over jacket, arranged to protect jacket from tear or puncture by hanger, support, and shield.
- K. Apply adhesives, mastics, and sealants at manufacturer's recommended coverage rate and wet and dry film thicknesses.
- L. Install insulation with factory-applied jackets as follows:
1. Draw jacket tight and smooth.
 2. Cover circumferential joints with 3-inch-wide strips, of same material as insulation jacket. Secure strips with adhesive and outward clinching staples along both edges of strip, spaced 4 inches o.c.
 3. Overlap jacket longitudinal seams at least 1-1/2 inches. Install insulation with longitudinal seams at bottom of pipe. Clean and dry surface to receive self-sealing lap. Staple laps with outward clinching staples along edge at 2 inches o.c.
 - a. For below-ambient services, apply vapor-barrier mastic over staples.
 4. Cover joints and seams with tape, according to insulation material manufacturer's written instructions, to maintain vapor seal.
 5. Where vapor barriers are indicated, apply vapor-barrier mastic on seams and joints and at ends adjacent to pipe flanges and fittings.
- M. Cut insulation in a manner to avoid compressing insulation more than 75 percent of its nominal thickness.
- N. Finish installation with systems at operating conditions. Repair joint separations and cracking due to thermal movement.
- O. Repair damaged insulation facings by applying same facing material over damaged areas. Extend patches at least 4 inches beyond damaged areas. Adhere, staple, and seal patches similar to butt joints.
- P. For above-ambient services, do not install insulation to the following:
1. Vibration-control devices.
 2. Testing agency labels and stamps.
 3. Nameplates and data plates.
 4. Cleanouts.

3.4 PENETRATIONS

- A. Insulation Installation at Roof Penetrations: Install insulation continuously through roof penetrations.
1. Seal penetrations with flashing sealant.

2. For applications requiring only indoor insulation, terminate insulation above roof surface and seal with joint sealant. For applications requiring indoor and outdoor insulation, install insulation for outdoor applications tightly joined to indoor insulation ends. Seal joint with joint sealant.
 3. Extend jacket of outdoor insulation outside roof flashing at least 2 inches below top of roof flashing.
 4. Seal jacket to roof flashing with flashing sealant.
- B. Insulation Installation at Underground Exterior Wall Penetrations: Terminate insulation flush with sleeve seal. Seal terminations with flashing sealant.
- C. Insulation Installation at Aboveground Exterior Wall Penetrations: Install insulation continuously through wall penetrations.
1. Seal penetrations with flashing sealant.
 2. For applications requiring only indoor insulation, terminate insulation inside wall surface and seal with joint sealant. For applications requiring indoor and outdoor insulation, install insulation for outdoor applications tightly joined to indoor insulation ends. Seal joint with joint sealant.
 3. Extend jacket of outdoor insulation outside wall flashing and overlap wall flashing at least 2 inches.
 4. Seal jacket to wall flashing with flashing sealant.
- D. Insulation Installation at Interior Wall and Partition Penetrations (That Are Not Fire Rated): Install insulation continuously through walls and partitions.
- E. Insulation Installation at Fire-Rated Wall and Partition Penetrations: Install insulation continuously through penetrations of fire-rated walls and partitions.
1. Comply with requirements in Section 078413 "Penetration Firestopping" for firestopping and fire-resistive joint sealers.
- F. Insulation Installation at Floor Penetrations:
1. Pipe: Install insulation continuously through floor penetrations.
 2. Seal penetrations through fire-rated assemblies. Comply with requirements in Section 078413 "Penetration Firestopping."

3.5 GENERAL PIPE INSULATION INSTALLATION

- A. Requirements in this article generally apply to all insulation materials except where more specific requirements are specified in various pipe insulation material installation articles.
- B. Insulation Installation on Fittings, Valves, Strainers, Flanges, and Unions:
1. Install insulation over fittings, valves, strainers, flanges, unions, and other specialties with continuous thermal and vapor-retarder integrity unless otherwise indicated.
 2. Insulate pipe elbows using preformed fitting insulation or mitered fittings made from same material and density as adjacent pipe insulation. Each piece shall be butted tightly against adjoining piece and bonded with adhesive. Fill joints, seams, voids, and irregular

- surfaces with insulating cement finished to a smooth, hard, and uniform contour that is uniform with adjoining pipe insulation.
3. Insulate tee fittings with preformed fitting insulation or sectional pipe insulation of same material and thickness as used for adjacent pipe. Cut sectional pipe insulation to fit. Butt each section closely to the next and hold in place with tie wire. Bond pieces with adhesive.
 4. Insulate valves using preformed fitting insulation or sectional pipe insulation of same material, density, and thickness as used for adjacent pipe. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker. For valves, insulate up to and including the bonnets, valve stuffing-box studs, bolts, and nuts. Fill joints, seams, and irregular surfaces with insulating cement.
 5. Insulate strainers using preformed fitting insulation or sectional pipe insulation of same material, density, and thickness as used for adjacent pipe. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker. Fill joints, seams, and irregular surfaces with insulating cement. Insulate strainers so strainer basket flange or plug can be easily removed and replaced without damaging the insulation and jacket. Provide a removable reusable insulation cover. For below-ambient services, provide a design that maintains vapor barrier.
 6. Insulate flanges and unions using a section of oversized preformed pipe insulation. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker.
 7. Cover segmented insulated surfaces with a layer of finishing cement and coat with a mastic. Install vapor-barrier mastic for below-ambient services and a breather mastic for above-ambient services. Reinforce the mastic with fabric-reinforcing mesh. Trowel the mastic to a smooth and well-shaped contour.
 8. For services not specified to receive a field-applied jacket except for flexible elastomeric and polyolefin, install fitted PVC cover over elbows, tees, strainers, valves, flanges, and unions. Terminate ends with PVC end caps. Tape PVC covers to adjoining insulation facing using PVC tape.
 9. Stencil or label the outside insulation jacket of each union with the word "union." Match size and color of pipe labels.
- C. Insulate instrument connections for thermometers, pressure gages, pressure temperature taps, test connections, flow meters, sensors, switches, and transmitters on insulated pipes. Shape insulation at these connections by tapering it to and around the connection with insulating cement and finish with finishing cement, mastic, and flashing sealant.
- D. Install removable insulation covers at locations indicated. Installation shall conform to the following:
1. Make removable flange and union insulation from sectional pipe insulation of same thickness as that on adjoining pipe. Install same insulation jacket as adjoining pipe insulation.
 2. When flange and union covers are made from sectional pipe insulation, extend insulation from flanges or union long at least two times the insulation thickness over adjacent pipe insulation on each side of flange or union. Secure flange cover in place with stainless-steel or aluminum bands. Select band material compatible with insulation and jacket.
 3. Construct removable valve insulation covers in same manner as for flanges, except divide the two-part section on the vertical center line of valve body.

4. When covers are made from block insulation, make two halves, each consisting of mitered blocks wired to stainless-steel fabric. Secure this wire frame, with its attached insulation, to flanges with tie wire. Extend insulation at least 2 inches over adjacent pipe insulation on each side of valve. Fill space between flange or union cover and pipe insulation with insulating cement. Finish cover assembly with insulating cement applied in two coats. After first coat is dry, apply and trowel second coat to a smooth finish.
5. Unless a PVC jacket is indicated in field-applied jacket schedules, finish exposed surfaces with a metal jacket.

3.6 INSTALLATION OF CELLULAR-GLASS INSULATION

A. Insulation Installation on Straight Pipes and Tubes:

1. Secure each layer of insulation to pipe with wire or bands and tighten bands without deforming insulation materials.
2. Where vapor barriers are indicated, seal longitudinal seams, end joints, and protrusions with vapor-barrier mastic and joint sealant.
3. For insulation with factory-applied jackets on above-ambient services, secure laps with outward clinched staples at 6 inches o.c.
4. For insulation with factory-applied jackets on below-ambient services, do not staple longitudinal tabs. Instead, secure tabs with additional adhesive as recommended by insulation material manufacturer and seal with vapor-barrier mastic and flashing sealant.

B. Insulation Installation on Pipe Flanges:

1. Install preformed pipe insulation to outer diameter of pipe flange.
2. Make width of insulation section same as overall width of flange and bolts, plus twice the thickness of pipe insulation.
3. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with cut sections of cellular-glass block insulation of same thickness as pipe insulation.
4. Install jacket material with manufacturer's recommended adhesive, overlap seams at least 1 inch, and seal joints with flashing sealant.

C. Insulation Installation on Pipe Fittings and Elbows:

1. Install preformed sections of same material as straight segments of pipe insulation when available. Secure according to manufacturer's written instructions.
2. When preformed sections of insulation are not available, install mitered sections of cellular-glass insulation. Secure insulation materials with wire or bands.

D. Insulation Installation on Valves and Pipe Specialties:

1. Install preformed sections of cellular-glass insulation to valve body.
2. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
3. Install insulation to flanges as specified for flange insulation application.

3.7 INSTALLATION OF FLEXIBLE ELASTOMERIC INSULATION

- A. Seal longitudinal seams and end joints with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.
- B. Insulation Installation on Pipe Flanges:
 - 1. Install pipe insulation to outer diameter of pipe flange.
 - 2. Make width of insulation section same as overall width of flange and bolts, plus twice the thickness of pipe insulation.
 - 3. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with cut sections of sheet insulation of same thickness as pipe insulation.
 - 4. Secure insulation to flanges and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.
- C. Insulation Installation on Pipe Fittings and Elbows:
 - 1. Install mitered sections of pipe insulation.
 - 2. Secure insulation materials and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.
- D. Insulation Installation on Valves and Pipe Specialties:
 - 1. Install preformed valve covers manufactured of same material as pipe insulation when available.
 - 2. When preformed valve covers are not available, install cut sections of pipe and sheet insulation to valve body. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
 - 3. Install insulation to flanges as specified for flange insulation application.
 - 4. Secure insulation to valves and specialties and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

3.8 INSTALLATION OF MINERAL-FIBER INSULATION

- A. Insulation Installation on Straight Pipes and Tubes:
 - 1. Secure each layer of preformed pipe insulation to pipe with wire or bands and tighten bands without deforming insulation materials.
 - 2. Where vapor barriers are indicated, seal longitudinal seams, end joints, and protrusions with vapor-barrier mastic and joint sealant.
 - 3. For insulation with factory-applied jackets on above-ambient surfaces, secure laps with outward clinched staples at 6 inches o.c.
 - 4. For insulation with factory-applied jackets on below-ambient surfaces, do not staple longitudinal tabs. Instead, secure tabs with additional adhesive as recommended by insulation material manufacturer and seal with vapor-barrier mastic and flashing sealant.
- B. Insulation Installation on Pipe Flanges:

1. Install preformed pipe insulation to outer diameter of pipe flange.
2. Make width of insulation section same as overall width of flange and bolts, plus twice the thickness of pipe insulation.
3. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with mineral-fiber blanket insulation.
4. Install jacket material with manufacturer's recommended adhesive, overlap seams at least 1 inch, and seal joints with flashing sealant.

C. Insulation Installation on Pipe Fittings and Elbows:

1. Install preformed sections of same material as straight segments of pipe insulation when available.
2. When preformed insulation elbows and fittings are not available, install mitered sections of pipe insulation, to a thickness equal to adjoining pipe insulation. Secure insulation materials with wire or bands.

D. Insulation Installation on Valves and Pipe Specialties:

1. Install preformed sections of same material as straight segments of pipe insulation when available.
2. When preformed sections are not available, install mitered sections of pipe insulation to valve body.
3. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
4. Install insulation to flanges as specified for flange insulation application.

3.9 INSTALLATION OF PHENOLIC INSULATION

A. General Installation Requirements:

1. Secure single-layer insulation with stainless-steel bands at 12-inch intervals and tighten bands without deforming insulation materials.
2. Install 2-layer insulation with joints tightly butted and staggered at least 3 inches. Secure inner layer with 0.062-inch wire spaced at 12-inch intervals. Secure outer layer with stainless-steel bands at 12-inch intervals.

B. Insulation Installation on Straight Pipes and Tubes:

1. Secure each layer of insulation to pipe with wire or bands and tighten bands without deforming insulation materials.
2. Where vapor barriers are indicated, seal longitudinal seams, end joints, and protrusions with vapor-barrier mastic and joint sealant.
3. For insulation with factory-applied jackets on above-ambient services, secure laps with outward clinched staples at 6 inches o.c.
4. For insulation with factory-applied jackets with vapor retarders on below-ambient services, do not staple longitudinal tabs. Instead, secure tabs with additional adhesive as recommended by insulation material manufacturer and seal with vapor-barrier mastic and flashing sealant.

C. Insulation Installation on Pipe Flanges:

1. Install preformed pipe insulation to outer diameter of pipe flange.
2. Make width of insulation section same as overall width of flange and bolts, plus twice the thickness of pipe insulation.
3. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with cut sections of block insulation of same material and thickness as pipe insulation.

D. Insulation Installation on Pipe Fittings and Elbows:

1. Install preformed insulation sections of same material as straight segments of pipe insulation. Secure according to manufacturer's written instructions.

E. Insulation Installation on Valves and Pipe Specialties:

1. Install preformed insulation sections of same material as straight segments of pipe insulation. Secure according to manufacturer's written instructions.
2. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
3. Install insulation to flanges as specified for flange insulation application.

3.10 INSTALLATION OF POLYOLEFIN INSULATION

A. Insulation Installation on Straight Pipes and Tubes:

1. Seal split-tube longitudinal seams and end joints with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

B. Insulation Installation on Pipe Flanges:

1. Install pipe insulation to outer diameter of pipe flange.
2. Make width of insulation section same as overall width of flange and bolts, plus twice the thickness of pipe insulation.
3. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with cut sections of polyolefin sheet insulation of same thickness as pipe insulation.
4. Secure insulation to flanges and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

C. Insulation Installation on Pipe Fittings and Elbows:

1. Install mitered sections of polyolefin pipe insulation.
2. Secure insulation materials and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

D. Insulation Installation on Valves and Pipe Specialties:

1. Install cut sections of polyolefin pipe and sheet insulation to valve body.
2. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.

3. Install insulation to flanges as specified for flange insulation application.
4. Secure insulation to valves and specialties, and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

3.11 FIELD-APPLIED JACKET INSTALLATION

- A. Where glass-cloth jackets are indicated, install directly over bare insulation or insulation with factory-applied jackets.
 1. Draw jacket smooth and tight to surface with 2-inch overlap at seams and joints.
 2. Embed glass cloth between two 0.062-inch-thick coats of lagging adhesive.
 3. Completely encapsulate insulation with coating, leaving no exposed insulation.
- B. Where FSK jackets are indicated, install as follows:
 1. Draw jacket material smooth and tight.
 2. Install lap or joint strips with same material as jacket.
 3. Secure jacket to insulation with manufacturer's recommended adhesive.
 4. Install jacket with 1-1/2-inch laps at longitudinal seams and 3-inch-wide joint strips at end joints.
 5. Seal openings, punctures, and breaks in vapor-retarder jackets and exposed insulation with vapor-barrier mastic.
- C. Where PVC jackets are indicated, install with 1-inch overlap at longitudinal seams and end joints. Seal with manufacturer's recommended adhesive.
 1. Apply two continuous beads of adhesive to seams and joints, one bead under lap and the finish bead along seam and joint edge.
- D. Where metal jackets are indicated, install with 2-inch overlap at longitudinal seams and end joints. Overlap longitudinal seams arranged to shed water. Seal end joints with weatherproof sealant recommended by insulation manufacturer. Secure jacket with stainless-steel bands 12 inches o.c. and at end joints.

3.12 FINISHES

- A. Insulation with ASJ, Glass-Cloth, or Other Paintable Jacket Material: Paint jacket with paint system identified below and as specified in Section 099113 "Exterior Painting" and Section 099123 "Interior Painting."
 1. Flat Acrylic Finish: Two finish coats over a primer that is compatible with jacket material and finish coat paint. Add fungicidal agent to render fabric mildew proof.
 - a. Finish Coat Material: Interior, flat, latex-emulsion size.
- B. Flexible Elastomeric Thermal Insulation: After adhesive has fully cured, apply two coats of insulation manufacturer's recommended protective coating.

- C. Color: Final color as selected by Architect. Vary first and second coats to allow visual inspection of the completed Work.
- D. Do not field paint aluminum or stainless-steel jackets.

3.13 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
- B. Perform tests and inspections.
- C. Tests and Inspections:
 - 1. Inspect pipe, fittings, strainers, and valves, randomly selected by Architect, by removing field-applied jacket and insulation in layers in reverse order of their installation. Extent of inspection shall be limited to three locations of straight pipe, three locations of threaded fittings, three locations of welded fittings, two locations of threaded strainers, two locations of welded strainers, three locations of threaded valves, and [three] locations of flanged valves for each pipe service defined in the "Piping Insulation Schedule, General" Article.
- D. All insulation applications will be considered defective Work if sample inspection reveals noncompliance with requirements.

3.14 PIPING INSULATION SCHEDULE, GENERAL

- A. Acceptable preformed pipe and tubular insulation materials and thicknesses are identified for each piping system and pipe size range. If more than one material is listed for a piping system, selection from materials listed is Contractor's option.
- B. Items Not Insulated: Unless otherwise indicated, do not install insulation on the following:
 - 1. Drainage piping located in crawl spaces.
 - 2. Underground piping.
 - 3. Chrome-plated pipes and fittings unless there is a potential for personnel injury.

3.15 PIPING INSULATION SCHEDULE

- A. Refer to Drawing Schedule

END OF SECTION 220719

SECTION 221116 - DOMESTIC WATER PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Copper tube and fittings.
 - 2. CPVC piping.
 - 3. PEX tube and fittings.
 - 4. Piping joining materials.
 - 5. Encasement for piping.
 - 6. Transition fittings.
 - 7. Dielectric fittings.

1.3 ACTION SUBMITTALS

- A. Product Data: For transition fittings and dielectric fittings.

1.4 INFORMATIONAL SUBMITTALS

- A. System purging and disinfecting activities report.
- B. Field quality-control reports.

1.5 FIELD CONDITIONS

- A. Interruption of Existing Water Service: Do not interrupt water service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary water service according to requirements indicated:
 - 1. Notify Owner no fewer than two days in advance of proposed interruption of water service.
 - 2. Do not interrupt water service without Owner's written permission.

PART 2 - PRODUCTS

2.1 PIPING MATERIALS

- A. Comply with requirements in "Piping Schedule" Article for applications of pipe, tube, fitting materials, and joining methods for specific services, service locations, and pipe sizes.
- B. Potable-water piping and components shall comply with NSF 14 and NSF 61 Annex G. Plastic piping components shall be marked with "NSF-pw."
- C. Comply with NSF Standard 372 for low lead.

2.2 COPPER TUBE AND FITTINGS

- A. Hard Copper Tube: ASTM B 88, Type L water tube, drawn temper.
- B. Soft Copper Tube: ASTM B 88, Type K and ASTM B 88, Type L water tube, annealed temper.
- C. Copper Unions:
 - 1. MSS SP-123.
 - 2. Cast-copper-alloy, hexagonal-stock body.
 - 3. Ball-and-socket, metal-to-metal seating surfaces.
 - 4. Threaded ends.
- D. Copper Pressure-Seal-Joint Fittings:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Apollo Valves; Conbraco Industries, Inc.
 - b. Elkhart Products Corporation.
 - c. NIBCO INC.
 - d. Viega LLC.
 - e. Mueller Industries
 - 2. Fittings for NPS 2 and Smaller: Wrought-copper fitting with EPDM-rubber, O-ring seal in each end.
 - 3. Fittings for NPS 2-1/2 to NPS 4: Cast-bronze or wrought-copper fitting with EPDM-rubber, O-ring seal in each end.
- E. Appurtenances for Grooved-End Copper Tubing:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Anvil International.
 - b. Grinnell Mechanical Products.

- c. Shurjoint Piping Products.
 - d. Victaulic Company.
2. Bronze Fittings for Grooved-End, Copper Tubing: ASTM B 75/B 75M copper tube or ASTM B 584 bronze castings.
 3. Mechanical Couplings for Grooved-End Copper Tubing:
 - a. Copper-tube dimensions and design similar to AWWA C606.
 - b. Ferrous housing sections.
 - c. EPDM-rubber gaskets suitable for hot and cold water.
 - d. Bolts and nuts.
 - e. Minimum Pressure Rating: 300 psig.

2.3 CPVC PIPING

- A. CPVC Pipe: ASTM F 441/F 441M, Schedule 40 and Schedule 80.
 1. CPVC Socket Fittings: ASTM F 438 for Schedule 40 and ASTM F 439 for Schedule 80.
 2. CPVC Threaded Fittings: ASTM F 437, Schedule 80.
- B. CPVC Piping System: ASTM D 2846/D 2846M, SDR 11, pipe and socket fittings.
- C. CPVC Tubing System: ASTM D 2846/D 2846M, SDR 11, tube and socket fittings.

2.4 PEX TUBE AND FITTINGS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 1. Apollo Valves; Conbraco Industries, Inc.
 2. Elkhart Products Corporation.
 3. IPEX USA LLC.
 4. Uponor.
 5. Viega LLC.
 6. Watts Radiant; a Watts Water Technologies company.
 7. Zurn Industries, LLC.
- B. Tube Material: PEX plastic according to ASTM F 876 and ASTM F 877.
- C. Fittings: ASTM F 1807, metal insert and copper crimp rings.

2.5 PIPING JOINING MATERIALS

- A. Pipe-Flange Gasket Materials:
 1. AWWA C110/A21.10, rubber, flat face, 1/8 inch thick or ASME B16.21, nonmetallic and asbestos free unless otherwise indicated.
 2. Full-face or ring type unless otherwise indicated.

- B. Metal, Pipe-Flange Bolts and Nuts: ASME B18.2.1, carbon steel unless otherwise indicated.
- C. Solvent Cements for Joining CPVC Piping and Tubing: ASTM F 493.
- D. Plastic, Pipe-Flange Gaskets, Bolts, and Nuts: Type and material recommended by piping system manufacturer unless otherwise indicated.

2.6 ENCASEMENT FOR PIPING

- A. Standard: ASTM A 674 or AWWA C105/A21.5.
- B. Form: Sheet or tube.
- C. Color: Black or natural.

2.7 TRANSITION FITTINGS

- A. General Requirements:
 - 1. Same size as pipes to be joined.
 - 2. Pressure rating at least equal to pipes to be joined.
 - 3. End connections compatible with pipes to be joined.
- B. Fitting-Type Transition Couplings: Manufactured piping coupling or specified piping system fitting.
- C. Sleeve-Type Transition Coupling: AWWA C219.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Cascade Waterworks Mfg. Co.
 - b. Dresser, Inc.
 - c. Ford Meter Box Company, Inc. (The).
 - d. Jay R. Smith Mfg. Co.
 - e. JCM Industries, Inc.
 - f. Romac Industries, Inc.
 - g. Smith-Blair, Inc.
 - h. Viking Johnson.
- D. Plastic-to-Metal Transition Fittings:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Charlotte Pipe and Foundry Company.
 - b. Harvel Plastics, Inc.
 - c. Spears Manufacturing Company.
 - d. Uponor.

2. Description:
 - a. CPVC or PVC one-piece fitting with manufacturer's Schedule 80 equivalent dimensions.
 - b. One end with threaded brass insert and one solvent-cement-socket or threaded end.

E. Plastic-to-Metal Transition Unions:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Colonial Engineering, Inc.
 - b. NIBCO INC.
 - c. Spears Manufacturing Company.
2. Description:
 - a. CPVC or PVC four-part union.
 - b. Brass or stainless-steel threaded end.
 - c. Solvent-cement-joint or threaded plastic end.
 - d. Rubber O-ring.
 - e. Union nut.

2.8 DIELECTRIC FITTINGS

- A. General Requirements: Assembly of copper alloy and ferrous materials with separating nonconductive insulating material. Include end connections compatible with pipes to be joined.
- B. Dielectric Unions:
 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. A.Y. McDonald Mfg. Co.
 - b. Capitol Manufacturing Company.
 - c. Central Plastics Company.
 - d. HART Industrial Unions, LLC.
 - e. Jomar Valve.
 - f. Matco-Norca.
 - g. Watts; a Watts Water Technologies company.
 - h. Wilkins.
 - i. Zurn Industries, LLC.
 2. Standard: ASSE 1079.
 3. Pressure Rating: 125 psig minimum at 180 deg F.
 4. End Connections: Solder-joint copper alloy and threaded ferrous.
- C. Dielectric Flanges:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Capitol Manufacturing Company.
 - b. Central Plastics Company.
 - c. Matco-Norca.
 - d. Watts; a Watts Water Technologies company.
 - e. Wilkins.
 - f. Zurn Industries, LLC.
2. Standard: ASSE 1079.
3. Factory-fabricated, bolted, companion-flange assembly.
4. Pressure Rating: 125 psig minimum at 180 deg F.
5. End Connections: Solder-joint copper alloy and threaded ferrous; threaded solder-joint copper alloy and threaded ferrous.

D. Dielectric-Flange Insulating Kits:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Advance Products & Systems, Inc.
 - b. Calpico, Inc.
 - c. Central Plastics Company.
 - d. Pipeline Seal and Insulator, Inc.
2. Nonconducting materials for field assembly of companion flanges.
3. Pressure Rating: 150 psig.
4. Gasket: Neoprene or phenolic.
5. Bolt Sleeves: Phenolic or polyethylene.
6. Washers: Phenolic with steel backing washers.

E. Dielectric Nipples:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Elster Perfection Corporation.
 - b. Grinnell Mechanical Products.
 - c. Matco-Norca.
 - d. Precision Plumbing Products.
 - e. Victaulic Company.
2. Standard: IAPMO PS 66.
3. Electroplated steel nipple complying with ASTM F 1545.
4. Pressure Rating and Temperature: 300 psig at 225 deg F.
5. End Connections: Male threaded or grooved.
6. Lining: Inert and noncorrosive, propylene.

PART 3 - EXECUTION**3.1 PIPING INSTALLATION**

- A. Drawing plans, schematics, and diagrams indicate general location and arrangement of domestic water piping. Indicated locations and arrangements are used to size pipe and calculate friction loss, expansion, and other design considerations. Install piping as indicated unless deviations to layout are approved on coordination drawings.
- B. Install shutoff valve, hose-end drain valve, strainer, pressure gage, and test tee with valve inside the building at each domestic water-service entrance. Comply with requirements for pressure gages in Section 220519 "Meters and Gages for Plumbing Piping" and with requirements for drain valves and strainers in Section 221119 "Domestic Water Piping Specialties."
- C. Install shutoff valve immediately upstream of each dielectric fitting.
- D. Install domestic water piping level without pitch and plumb.
- E. Install piping concealed from view and protected from physical contact by building occupants unless otherwise indicated and except in equipment rooms and service areas.
- F. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.
- G. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal, and coordinate with other services occupying that space.
- H. Install piping to permit valve servicing.
- I. Install nipples, unions, special fittings, and valves with pressure ratings the same as or higher than the system pressure rating used in applications below unless otherwise indicated.
- J. Install piping free of sags and bends.
- K. Install fittings for changes in direction and branch connections.
- L. Install PEX tubing with loop at each change of direction of more than 90 degrees.
- M. Install unions in copper tubing at final connection to each piece of equipment, machine, and specialty.
- N. Install pressure gages on suction and discharge piping for each plumbing pump. Comply with requirements for pressure gages in Section 220519 "Meters and Gages for Plumbing Piping."
- O. Install thermostats in hot-water circulation piping. Comply with requirements for thermostats in Section 221123 "Domestic Water Pumps."
- P. Install thermometers on inlet and outlet piping from each water heater. Comply with requirements for thermometers in Section 220519 "Meters and Gages for Plumbing Piping."

- Q. Install sleeves for piping penetrations of walls, ceilings, and floors. Comply with requirements for sleeves specified in Section 220517 "Sleeves and Sleeve Seals for Plumbing Piping."
- R. Install sleeve seals for piping penetrations of concrete walls and slabs. Comply with requirements for sleeve seals specified in Section 220517 "Sleeves and Sleeve Seals for Plumbing Piping."
- S. Install escutcheons for piping penetrations of walls, ceilings, and floors. Comply with requirements for escutcheons specified in Section 220518 "Escutcheons for Plumbing Piping."

3.2 JOINT CONSTRUCTION

- A. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.
- B. Remove scale, slag, dirt, and debris from inside and outside of pipes, tubes, and fittings before assembly.
- C. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:
 - 1. Apply appropriate tape or thread compound to external pipe threads.
 - 2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged.
- D. Pressure-Sealed Joints for Copper Tubing: Join copper tube and pressure-seal fittings with tools recommended by fitting manufacturer.
- E. Joint Construction for Grooved-End Copper Tubing: Make joints according to AWWA C606. Roll groove ends of tubes. Lubricate and install gasket over ends of tubes or tube and fitting. Install coupling housing sections over gasket with keys seated in tubing grooves. Install and tighten housing bolts.
- F. Flanged Joints: Select appropriate asbestos-free, nonmetallic gasket material in size, type, and thickness suitable for domestic water service. Join flanges with gasket and bolts according to ASME B31.9.
- G. Joint Construction for Solvent-Cemented Plastic Piping: 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. Apply primer.
 - 2. CPVC Piping: Join according to ASTM D 2846/D 2846M Appendix.
 - 3. PVC Piping: Join according to ASTM D 2855.
- H. Joints for PEX Tubing: Join according to ASTM F 1807 for metal insert and copper crimp ring fittings and ASTM F 1960 for cold expansion fittings and reinforcing rings.
- I. Joints for Dissimilar-Material Piping: Make joints using adapters compatible with materials of both piping systems.

3.3 TRANSITION FITTING INSTALLATION

- A. Install transition couplings at joints of dissimilar piping.
- B. Transition Fittings in Underground Domestic Water Piping:
 - 1. Fittings for NPS 1-1/2 and Smaller: Fitting-type coupling.
 - 2. Fittings for NPS 2 and Larger: Sleeve-type coupling.
- C. Transition Fittings in Aboveground Domestic Water Piping NPS 2 and Smaller: Plastic-to-metal transition fittings or unions.

3.4 DIELECTRIC FITTING INSTALLATION

- A. Install dielectric fittings in piping at connections of dissimilar metal piping and tubing.
- B. Dielectric Fittings for NPS 2 and Smaller: Use dielectric unions.
- C. Dielectric Fittings for NPS 2-1/2 and larger: Use dielectric flanges or flange kits.

3.5 HANGER AND SUPPORT INSTALLATION

- A. Comply with requirements for seismic-restraint devices in Section 220548 "Vibration and Seismic Controls for Plumbing Piping and Equipment."
- B. Comply with requirements for pipe hanger, support products, and installation in Section 220529 "Hangers and Supports for Plumbing Piping and Equipment."
 - 1. Vertical Piping: MSS Type 8 or 42, clamps.
 - 2. Individual, Straight, Horizontal Piping Runs:
 - a. 100 Feet and Less: MSS Type 1, adjustable, steel clevis hangers.
 - b. Longer Than 100 Feet: MSS Type 43, adjustable roller hangers.
 - c. Longer Than 100 Feet if Indicated: MSS Type 49, spring cushion rolls.
 - 3. Multiple, Straight, Horizontal Piping Runs 100 Feet or Longer: MSS Type 44, pipe rolls. Support pipe rolls on trapeze.
 - 4. Base of Vertical Piping: MSS Type 52, spring hangers.
- C. Support vertical piping and tubing at base and at each floor.
- D. Rod diameter may be reduced one size for double-rod hangers, to a minimum of 3/8 inch.
- E. Install hangers for copper tubing with the following maximum horizontal spacing and minimum rod diameters:
 - 1. NPS 3/4 and Smaller: 60 inches with 3/8-inch rod.
 - 2. NPS 1 and NPS 1-1/4: 72 inches with 3/8-inch rod.
 - 3. NPS 1-1/2 and NPS 2: 96 inches with 3/8-inch rod.

4. NPS 2-1/2: 108 inches with 1/2-inch rod.
 5. NPS 3 to NPS 5: 10 feet with 1/2-inch rod.
 6. NPS 6: 10 feet with 5/8-inch rod.
 7. NPS 8: 10 feet with 3/4-inch rod.
- F. Install supports for vertical copper tubing every 10 feet.
- G. Install vinyl-coated hangers for CPVC piping with the following maximum horizontal spacing and minimum rod diameters:
1. NPS 1 and Smaller: 36 inches with 3/8-inch rod.
 2. NPS 1-1/4 to NPS 2: 48 inches with 3/8-inch rod.
 3. NPS 2-1/2 to NPS 3-1/2: 48 inches with 1/2-inch rod.
 4. NPS 4 and NPS 5: 48 inches with 5/8-inch rod.
 5. NPS 6: 48 inches with 3/4-inch rod.
 6. NPS 8: 48 inches with 7/8-inch rod.
- H. Install supports for vertical CPVC piping every 60 inches for NPS 1 and smaller, and every 72 inches for NPS 1-1/4 and larger.
- I. Install vinyl-coated hangers for PEX tubing with the following maximum horizontal spacing and minimum rod diameters:
1. NPS 1 and Smaller: 32 inches with 3/8-inch rod.
- J. Install hangers for vertical PEX tubing every 48 inches.
- K. Support piping and tubing not listed in this article according to MSS SP-58 and manufacturer's written instructions.

3.6 CONNECTIONS

- A. Drawings indicate general arrangement of piping, fittings, and specialties.
- B. When installing piping adjacent to equipment and machines, allow space for service and maintenance.
- C. Connect domestic water piping to exterior water-service piping. Use transition fitting to join dissimilar piping materials.
- D. Connect domestic water piping to water-service piping with shutoff valve; extend and connect to the following:
1. Water Heaters: Cold-water inlet and hot-water outlet piping in sizes indicated, but not smaller than sizes of water heater connections.
 2. Plumbing Fixtures: Cold- and hot-water-supply piping in sizes indicated, but not smaller than that required by plumbing code.
 3. Equipment: Cold- and hot-water-supply piping as indicated, but not smaller than equipment connections. Provide shutoff valve and union for each connection. Use flanges instead of unions for NPS 2-1/2 and larger.

3.7 IDENTIFICATION

- A. Identify system components. Comply with requirements for identification materials and installation in Section 220553 "Identification for Plumbing Piping and Equipment."
- B. Label pressure piping with system operating pressure.

3.8 FIELD QUALITY CONTROL

- A. Perform the following tests and inspections:

- 1. Piping Inspections:

- a. Do not enclose, cover, or put piping into operation until it has been inspected and approved by authorities having jurisdiction.
- b. During installation, notify authorities having jurisdiction at least one day before inspection must be made. Perform tests specified below in presence of authorities having jurisdiction:
 - 1) Roughing-in Inspection: Arrange for inspection of piping before concealing or closing in after roughing in and before setting fixtures.
 - 2) Final Inspection: Arrange for authorities having jurisdiction to observe tests specified in "Piping Tests" Subparagraph below and to ensure compliance with requirements.
- c. Reinspection: If authorities having jurisdiction find that piping will not pass tests or inspections, make required corrections and arrange for reinspection.
- d. Reports: Prepare inspection reports and have them signed by authorities having jurisdiction.

- 2. Piping Tests:

- a. Fill domestic water piping. Check components to determine that they are not air bound and that piping is full of water.
- b. Test for leaks and defects in new piping and parts of existing piping that have been altered, extended, or repaired. If testing is performed in segments, submit a separate report for each test, complete with diagram of portion of piping tested.
- c. Leave new, altered, extended, or replaced domestic water piping uncovered and unconcealed until it has been tested and approved. Expose work that was covered or concealed before it was tested.
- d. Cap and subject piping to static water pressure of 50 psig above operating pressure, without exceeding pressure rating of piping system materials. Isolate test source and allow it to stand for four hours. Leaks and loss in test pressure constitute defects that must be repaired.
- e. Repair leaks and defects with new materials, and retest piping or portion thereof until satisfactory results are obtained.
- f. Prepare reports for tests and for corrective action required.

- B. Domestic water piping will be considered defective if it does not pass tests and inspections.

- C. Prepare test and inspection reports.

3.9 ADJUSTING

- A. Perform the following adjustments before operation:

1. Close drain valves, hydrants, and hose bibbs.
2. Open shutoff valves to fully open position.
3. Open throttling valves to proper setting.
4. Adjust balancing valves in hot-water-circulation return piping to provide adequate flow.
 - a. Manually adjust ball-type balancing valves in hot-water-circulation return piping to provide hot-water flow in each branch.
 - b. Adjust calibrated balancing valves to flows indicated.
5. Remove plugs used during testing of piping and for temporary sealing of piping during installation.
6. Remove and clean strainer screens. Close drain valves and replace drain plugs.
7. Remove filter cartridges from housings and verify that cartridges are as specified for application where used and are clean and ready for use.
8. Check plumbing specialties and verify proper settings, adjustments, and operation.

3.10 CLEANING

- A. Clean and disinfect potable domestic water piping as follows:

1. Purge new piping and parts of existing piping that have been altered, extended, or repaired before using.
2. Use purging and disinfecting procedures prescribed by authorities having jurisdiction; if methods are not prescribed, use procedures described in either AWWA C651 or AWWA C652 or follow procedures described below:
 - a. Flush piping system with clean, potable water until dirty water does not appear at outlets.
 - b. Fill and isolate system according to either of the following:
 - 1) Fill system or part thereof with water/chlorine solution with at least 50 ppm of chlorine. Isolate with valves and allow to stand for 24 hours.
 - 2) Fill system or part thereof with water/chlorine solution with at least 200 ppm of chlorine. Isolate and allow to stand for three hours.
 - c. Flush system with clean, potable water until no chlorine is in water coming from system after the standing time.
 - d. Repeat procedures if biological examination shows contamination.
 - e. Submit water samples in sterile bottles to authorities having jurisdiction.

- B. Prepare and submit reports of purging and disinfecting activities. Include copies of water-sample approvals from authorities having jurisdiction.

- C. Clean interior of domestic water piping system. Remove dirt and debris as work progresses.

END OF SECTION 221116

SECTION 221119 - DOMESTIC WATER PIPING SPECIALTIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Vacuum breakers.
 - 2. Backflow preventers.
 - 3. Temperature-actuated, water mixing valves.
 - 4. Strainers.
 - 5. Outlet boxes
 - 6. Hose bibbs.
 - 7. Wall hydrants.
 - 8. Water-hammer arresters.
 - 9. Flexible connectors.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: For domestic water piping specialties.
 - 1. Include diagrams for power, signal, and control wiring.

1.4 INFORMATIONAL SUBMITTALS

- A. Field quality-control reports.

1.5 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For domestic water piping specialties to include in emergency, operation, and maintenance manuals.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS FOR PIPING SPECIALTIES

- A. Potable-water piping and components shall comply with NSF 61 Annex G and NSF 14. Mark "NSF-pw" on plastic piping components.

2.2 PERFORMANCE REQUIREMENTS

- A. Minimum Working Pressure for Domestic Water Piping Specialties: 125 psig unless otherwise indicated.

2.3 VACUUM BREAKERS

- A. Pipe-Applied, Atmospheric-Type Vacuum Breakers:

- 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Ames Co.
 - b. Ames Fire & Waterworks.
 - c. Apollo Valves; Conbraco Industries, Inc.
 - d. Cash Acme.
 - e. FEBCO.
 - f. Rain Bird Corporation.
 - g. Toro Company (The).
 - h. Watts; a Watts Water Technologies company.
 - i. Zurn Industries, LLC.
- 2. Standard: ASSE 1001.
- 3. Size: NPS 1/4 to NPS 3, as required to match connected piping.
- 4. Body: Bronze.
- 5. Inlet and Outlet Connections: Threaded.
- 6. Finish: Chrome plated.

- B. Hose-Connection Vacuum Breakers:

- 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Apollo Valves; Conbraco Industries, Inc.
 - b. Arrowhead Brass Products.
 - c. Cash Acme.
 - d. Legend Valve & Fitting, Inc.
 - e. MIFAB, Inc.
 - f. Prier Products, Inc.
 - g. Watts; a Watts Water Technologies company.

- h. Woodford Manufacturing Company.
 - i. Zurn Industries, LLC.
 - 2. Standard: ASSE 1011.
 - 3. Body: Bronze, nonremovable, with manual drain.
 - 4. Outlet Connection: Garden-hose threaded complying with ASME B1.20.7.
 - 5. Finish: Rough bronze.
- C. Pressure Vacuum Breakers :
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Ames Co.
 - b. Ames Fire & Waterworks.
 - c. Apollo Valves; Conbraco Industries, Inc.
 - d. FEBCO.
 - e. Flomatic Corporation.
 - f. Toro Company (The).
 - g. Watts; a Watts Water Technologies company.
 - h. Zurn Industries, LLC.
 - 2. Standard: ASSE 1020.
 - 3. Operation: Continuous-pressure applications.
 - 4. Pressure Loss: 5 psig maximum, through middle third of flow range.
 - 5. Accessories:
 - a. Valves: Ball type, on inlet and outlet.

2.4 BACKFLOW PREVENTERS

- A. Dual-Check-Valve Backflow Preventers:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. A.Y. McDonald Mfg. Co.
 - b. Apollo Valves; Conbraco Industries, Inc.
 - c. Cash Acme.
 - d. FEBCO.
 - e. Flomatic Corporation.
 - f. Ford Meter Box Company, Inc. (The).
 - g. Honeywell Water Controls.
 - h. Legend Valve & Fitting, Inc.
 - i. Mueller Co.
 - j. Watts; a Watts Water Technologies company.
 - k. Zurn Industries, LLC.

2. Standard: ASSE 1024.
3. Operation: Continuous-pressure applications.
4. Body: Bronze with union inlet.

B. Hose-Connection Backflow Preventers:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Apollo Valves; Conbraco Industries, Inc.
 - b. Watts; a Watts Water Technologies company.
 - c. Woodford Manufacturing Company.
2. Standard: ASSE 1052.
3. Operation: Up to 10-foot head of water back pressure.
4. Inlet Size: NPS 1/2 or NPS 3/4.
5. Outlet Size: Garden-hose thread complying with ASME B1.20.7.
6. Capacity: At least 3-gpm flow.

2.5 TEMPERATURE-ACTUATED, WATER MIXING VALVES

A. Primary, Thermostatic, Water Mixing Valves:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Acorn Engineering Company.
 - b. Apollo Valves; Conbraco Industries, Inc.
 - c. Armstrong International, Inc.
 - d. Lawler Manufacturing Company, Inc.
 - e. Leonard Valve Company.
 - f. Powers.
 - g. Symmons Industries, Inc.
 - h. Zurn Industries, LLC.
2. Standard: ASSE 1017.
3. Pressure Rating: 125 psig minimum unless otherwise indicated.
4. Type: Exposed-mounted, thermostatically controlled, water mixing valve.
5. Material: Bronze body with corrosion-resistant interior components.
6. Connections: Threaded union inlets and outlet.
7. Accessories: Manual temperature control, check stops on hot- and cold-water supplies, and adjustable, temperature-control handle.
8. Cabinet: Factory fabricated, stainless steel, for surface mounting and with hinged, stainless-steel door.

B. Individual-Fixture, Water Tempering Valves:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Acorn Engineering Company.
 - b. Apollo Valves; Conbraco Industries, Inc.
 - c. Cash Acme.
 - d. Honeywell Water Controls.
 - e. Lawler Manufacturing Company, Inc.
 - f. Leonard Valve Company.
 - g. Powers.
 - h. Watts; a Watts Water Technologies company.
 - i. Zurn Industries, LLC.
2. Standard: ASSE 1016, thermostatically controlled, water tempering valve.
3. Pressure Rating: 125 psig minimum unless otherwise indicated.
4. Body: Bronze body with corrosion-resistant interior components.
5. Temperature Control: Adjustable.
6. Inlets and Outlet: Threaded.
7. Finish: Rough or chrome-plated bronze.

2.6 STRAINERS FOR DOMESTIC WATER PIPING

A. Y-Pattern Strainers:

1. Pressure Rating: 125 psig minimum unless otherwise indicated.
2. Body: Bronze for NPS 2 and smaller; cast iron with interior lining that complies with AWWA C550 or that is FDA approved, epoxy coated and for NPS 2-1/2 and larger.
3. End Connections: Threaded for NPS 2 and smaller; flanged for NPS 2-1/2 and larger.
4. Screen: Stainless steel with round perforations unless otherwise indicated.
5. Drain: Factory-installed, hose-end drain valve.

2.7 OUTLET BOXES

A. Clothes Washer Outlet Boxes:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Acorn Engineering Company.
 - b. Guy Gray Manufacturing Co., Inc.
 - c. IPS Corporation.
 - d. LSP Products Group, Inc.
 - e. Oatey.
 - f. Plastic Oddities.
 - g. Symmons Industries, Inc.
 - h. Watts; a Watts Water Technologies company.
 - i. Whitehall Manufacturing.
 - j. Zurn Industries, LLC.

2. Mounting: Recessed.
3. Material and Finish: Enameled-steel or epoxy-painted-steel box and faceplate.
4. Faucet: Combination valved fitting or separate hot- and cold-water valved fittings complying with ASME A112.18.1. Include garden-hose thread complying with ASME B1.20.7 on outlets.
5. Supply Shutoff Fittings: NPS 1/2 gate, globe, or ball valves and NPS 1/2 copper, water tubing.
6. Drain: NPS 2 standpipe and P-trap for direct waste connection to drainage piping.
7. Inlet Hoses: Two 60-inch-long, rubber household clothes washer inlet hoses with female, garden-hose-thread couplings. Include rubber washers.
8. Drain Hose: One 48-inch-long, rubber household clothes washer drain hose with hooked end.

2.8 HOSE BIBBS

A. Hose Bibbs:

1. Standard: ASME A112.18.1 for sediment faucets.
2. Body Material: Bronze.
3. Seat: Bronze, replaceable.
4. Supply Connections: NPS 1/2 or NPS 3/4 threaded or solder-joint inlet.
5. Outlet Connection: Garden-hose thread complying with ASME B1.20.7.
6. Pressure Rating: 125 psig.
7. Vacuum Breaker: Integral or field-installation, nonremovable, drainable, hose-connection vacuum breaker complying with ASSE 1011.
8. Finish for Equipment Rooms: Rough bronze, or chrome or nickel plated.
9. Finish for Service Areas: Chrome or nickel plated.
10. Finish for Finished Rooms: Chrome or nickel plated.
11. Operation for Equipment Rooms: Wheel handle or operating key.
12. Operation for Service Areas: Wheel handle.
13. Operation for Finished Rooms: Operating key.
14. Include operating key with each operating-key hose bibb.
15. Include integral wall flange with each chrome- or nickel-plated hose bibb.

2.9 WALL HYDRANTS

A. Nonfreeze Wall Hydrants:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Jay R. Smith Mfg. Co.
 - b. Josam Company.
 - c. MIFAB, Inc.
 - d. Prier Products, Inc.
 - e. Tyler Pipe; a subsidiary of McWane Inc.
 - f. Watts; a Watts Water Technologies company.
 - g. Woodford Manufacturing Company.

- h. Zurn Industries, LLC.
- 2. Standard: ASME A112.21.3M for concealed-outlet, self-draining wall hydrants.
- 3. Pressure Rating: 125 psig.
- 4. Operation: Loose key.
- 5. Casing and Operating Rod: Of length required to match wall thickness. Include wall clamp.
- 6. Inlet: NPS 3/4 or NPS 1.
- 7. Outlet: Concealed, with integral vacuum breaker and garden-hose thread complying with ASME B1.20.7.
- 8. Box: Deep, flush mounted with cover.
- 9. Box and Cover Finish: Polished nickel bronze.
- 10. Outlet: Exposed, with integral vacuum breaker and garden-hose thread complying with ASME B1.20.7.
- 11. Nozzle and Wall-Plate Finish: Polished nickel bronze.
- 12. Operating Keys(s): Two with each wall hydrant.

2.10 WATER-HAMMER ARRESTERS

A. Water-Hammer Arresters:

- 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. AMTROL, Inc.
 - b. Jay R. Smith Mfg. Co.
 - c. Josam Company.
 - d. MIFAB, Inc.
 - e. Precision Plumbing Products.
 - f. Sioux Chief Manufacturing Company, Inc.
 - g. Tyler Pipe; a subsidiary of McWane Inc.
 - h. Watts; a Watts Water Technologies company.
 - i. Zurn Industries, LLC.
- 2. Standard: ASSE 1010 or PDI-WH 201.
- 3. Type: Copper tube with piston.
- 4. Size: ASSE 1010, Sizes AA and A through F, or PDI-WH 201, Sizes A through F.

2.11 FLEXIBLE CONNECTORS

- ### A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
- 1. Flex Pression Ltd.
 - 2. Flex-Hose Co., Inc.
 - 3. Flexicraft Industries.
 - 4. Flex-Weld, Inc.

5. Hyspan Precision Products, Inc.
 6. Mercer Gasket & Shim, Inc.
 7. Metraflex Company (The).
 8. Proco Products, Inc.
 9. Tozen Corporation.
 10. Unaflex.
 11. Universal Metal Hose.
- B. Bronze-Hose Flexible Connectors: Corrugated-bronze tubing with bronze wire-braid covering and ends brazed to inner tubing.
1. Working-Pressure Rating: Minimum 200 psig.
 2. End Connections NPS 2 and Smaller: Threaded copper pipe or plain-end copper tube.
 3. End Connections NPS 2-1/2 and Larger: Flanged copper alloy.
- C. Stainless-Steel-Hose Flexible Connectors: Corrugated-stainless-steel tubing with stainless-steel wire-braid covering and ends welded to inner tubing.
1. Working-Pressure Rating: Minimum 200 psig.
 2. End Connections NPS 2 and Smaller: Threaded steel-pipe nipple.
 3. End Connections NPS 2-1/2 and Larger: Flanged steel nipple.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install backflow preventers in each water supply to mechanical equipment and systems and to other equipment and water systems that may be sources of contamination. Comply with authorities having jurisdiction.
1. Locate backflow preventers in same room as connected equipment or system.
 2. Install drain for backflow preventers with atmospheric-vent drain connection with air-gap fitting, fixed air-gap fitting, or equivalent positive pipe separation of at least two pipe diameters in drain piping and pipe-to-floor drain. Locate air-gap device attached to or under backflow preventer. Simple air breaks are unacceptable for this application.
 3. Do not install bypass piping around backflow preventers.
- B. Install temperature-actuated, water mixing valves with check stops or shutoff valves on inlets and with shutoff valve on outlet.
- C. Install Y-pattern strainers for water on supply side of each control valve, water pressure-reducing valve, solenoid valve, and pump.
- D. Install water-hammer arresters in water piping according to PDI-WH 201.

3.2 CONNECTIONS

- A. Comply with requirements for ground equipment in Section 260526 "Grounding and Bonding for Electrical Systems."
- B. Fire-retardant-treated-wood blocking is specified in Section 260519 "Low-Voltage Electrical Power Conductors and Cables" for electrical connections.

3.3 LABELING AND IDENTIFYING

- A. Equipment Nameplates and Signs: Install engraved plastic-laminate equipment nameplate or sign on or near each of the following:
 - 1. Pressure vacuum breakers.
 - 2. Intermediate atmospheric-vent backflow preventers.
 - 3. Double-check, backflow-prevention assemblies.
 - 4. Dual-check-valve backflow preventers.
 - 5. Primary, thermostatic, water mixing valves.
 - 6. Outlet boxes.
- B. Distinguish among multiple units, inform operator of operational requirements, indicate safety and emergency precautions, and warn of hazards and improper operations, in addition to identifying unit. Nameplates and signs are specified in Section 220553 "Identification for Plumbing Piping and Equipment."

3.4 FIELD QUALITY CONTROL

- A. Perform the following tests and inspections:
 - 1. Test each pressure vacuum breaker, reduced-pressure-principle backflow preventer, double-check backflow-prevention assembly and double-check detector-assembly backflow preventer according to authorities having jurisdiction and the device's reference standard.
- B. Domestic water piping specialties will be considered defective if they do not pass tests and inspections.
- C. Prepare test and inspection reports.

3.5 ADJUSTING

- A. Set field-adjustable temperature set points of temperature-actuated, water mixing valves.

END OF SECTION 221119

SECTION 221123 - DOMESTIC WATER PUMPS

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. In-line, close-coupled centrifugal pumps.

1.3 DEFINITIONS

- A. Low Voltage: As defined in NFPA 70 for circuits and equipment operating at less than 50 V or for remote-control, signaling power-limited circuits.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated. Include materials of construction, rated capacities, certified performance curves with operating points plotted on curves, operating characteristics, electrical characteristics, and furnished specialties and accessories.

1.5 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For domestic water pumps to include in operation and maintenance manuals.

1.6 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. UL Compliance: Comply with UL 778 for motor-operated water pumps.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Retain shipping flange protective covers and protective coatings during storage.
- B. Protect bearings and couplings against damage.

1.8 COORDINATION

- A. Coordinate sizes and locations of concrete bases with actual equipment provided.

PART 2 - PRODUCTS

2.1 IN-LINE, CLOSE-COUPLED CENTRIFUGAL PUMPS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Alyan Pump Company.
 - 2. Armstrong Pumps, Inc.
 - 3. Bell & Gossett; a Xylem brand.
 - 4. Flo Fab Inc.
 - 5. Grundfos Pumps Corp.
 - 6. Marshall Engineered Products Co.
 - 7. PACO Pumps; Grundfos Pumps Corporation, USA.
 - 8. Pentair Pump Group.
 - 9. TACO Comfort Solutions, Inc.
 - 10. Thrush Co. Inc.
 - 11. Weinman Division.
- B. Description: Factory-assembled and -tested, in-line, single-stage, close-coupled, overhung-impeller centrifugal pumps designed for installation with pump and motor shaft mounted vertical.
- C. Pump Construction:
 - 1. Casing: Radially split, cast iron, with wear rings and threaded companion-flange connections for pumps with NPS 2 pipe connections and flanged connections for pumps with NPS 2-1/2 pipe connections. Include pump manufacturer's base attachment for mounting pump on concrete base.
 - 2. Impeller: Statically and dynamically balanced, closed, and keyed to shaft.
 - 3. Shaft and Shaft Sleeve: Stainless-steel shaft, with copper-alloy shaft sleeve.
 - 4. Seal: Mechanical, with carbon-steel rotating ring, stainless-steel spring, ceramic seat, and rubber bellows and gasket. Include water slinger on shaft between motor and seal.
 - 5. Bearings: Oil-lubricated; bronze-journal or ball type.
 - 6. Shaft Coupling: Flexible or rigid type if pump is provided with coupling.
- D. Motor: Single speed, with grease-lubricated ball bearings; rigidly mounted to pump casing.
- E. Capacities and Characteristics:
 - 1. Refer to schedules on drawings for pump requirements

2.2 MOTORS

- A. Comply with NEMA designation, temperature rating, service factor, enclosure type, and efficiency requirements for motors specified in Section 220513 "Common Motor Requirements for Plumbing Equipment."
1. Motor Sizes: Minimum size as indicated. If not indicated, large enough so driven load will not require motor to operate in service factor range above 1.0.

2.3 CONTROLS

- A. Pressure Switches: Electric, adjustable for control of water-supply pump.
1. Type: Water-immersion pressure sensor, for installation in piping.
 2. Enclosure: NEMA 250, Type 4X.
 3. Operation of Pump: On or off.
 4. Transformer: Provide if required.
 5. Power Requirement: 120 V, ac.
- B. Thermostats: Electric; adjustable for control of hot-water circulation pump.
1. Type: Water-immersion temperature sensor, for installation in piping.
 2. Range: 65 to 200 deg F.
 3. Enclosure: NEMA 250, Type 4X.
 4. Operation of Pump: On or off.
 5. Transformer: Provide if required.
 6. Power Requirement: 120 V, ac.
- C. Timers: Electric, for control of hot-water circulation pump.
1. Type: Programmable, seven-day clock with manual override on-off switch.
 2. Enclosure: NEMA 250, Type 1, suitable for wall mounting.
 3. Operation of Pump: On or off.
 4. Transformer: Provide if required.
 5. Power Requirement: 120-V ac.
 6. Programmable Sequence of Operation: Up to two on-off cycles each day for seven days.
- D. Time-Delay Relays: Electric, for control of hot-water circulation pump between water heater and connected hot-water storage tank.
1. Type: Adjustable time-delay relay.
 2. Range: Up to five minutes.
 3. Setting: Five minutes.
 4. Enclosure: NEMA 250, Type 4X.
 5. Operation of Pump: On or off.
 6. Transformer: Provide if required.
 7. Power Requirement: 120-V ac.
 8. Programmable Sequence of Operation: Limit pump operation to periods of burner operation plus maximum five minutes after the burner stops.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine roughing-in of domestic-water-piping system to verify actual locations of connections before pump installation.

3.2 PUMP INSTALLATION

- A. Comply with HI 1.4.
- B. Install in-line, close-coupled centrifugal pumps.
- C. Install continuous-thread hanger rods and spring hangers with vertical-limit stop of size required to support pump weight.
- D. Install pressure switches in water supply piping.
- E. Install thermostats in hot-water return piping.
- F. Install timers.

3.3 CONNECTIONS

- A. Comply with requirements for piping specified in Section 221116 "Domestic Water Piping." Drawings indicate general arrangement of piping, fittings, and specialties.
- B. Install piping adjacent to pumps to allow service and maintenance.
- C. Connect domestic water piping to pumps. Install suction and discharge piping equal to or greater than size of pump nozzles.
 - 1. Install flexible connectors adjacent to pumps in suction and discharge piping of the following pumps:
 - a. In-line, close-coupled centrifugal pumps.
- D. Install shutoff valve and strainer on suction side of each pump, and check, shutoff, and throttling valves on discharge side of each pump. Install valves same size as connected piping.
- E. Connect pressure switches, thermostats, time-delay relays, and timers to pumps that they control.

3.4 IDENTIFICATION

- A. Comply with requirements for identification specified in Section 220553 "Identification for Plumbing Piping and Equipment" for identification of pumps.

3.5 STARTUP SERVICE

- A. Perform startup service.
 - 1. Complete installation and startup checks according to manufacturer's written instructions.
 - 2. Check piping connections for tightness.
 - 3. Clean strainers on suction piping.
 - 4. Set pressure switches, thermostats, timers, and time-delay relays for automatic starting and stopping operation of pumps.
 - 5. Perform the following startup checks for each pump before starting:
 - a. Verify bearing lubrication.
 - b. Verify that pump is free to rotate by hand and that pump for handling hot liquid is free to rotate with pump hot and cold. If pump is bound or drags, do not operate until cause of trouble is determined and corrected.
 - c. Verify that pump is rotating in the correct direction.
 - 6. Prime pump by opening suction valves and closing drains and prepare pump for operation.
 - 7. Start motor.
 - 8. Open discharge valve slowly.
 - 9. Adjust temperature settings on thermostats.
 - 10. Adjust timer settings.

3.6 ADJUSTING

- A. Adjust domestic water pumps to function smoothly and lubricate as recommended by manufacturer.
- B. Adjust initial temperature set points.
- C. Set field-adjustable switches and circuit-breaker trip ranges as indicated.

END OF SECTION 221123

SECTION 223300 – ELECTRIC, DOMESTIC WATER HEATERS

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. Commercial, electric, storage, domestic-water heaters.
 - 2. Domestic-water heater accessories.

1.3 PERFORMANCE REQUIREMENTS

- A. Seismic Performance: Commercial domestic-water heaters 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."

1.4 ACTION SUBMITTALS

- A. Product Data: For each type and size of domestic-water heater indicated. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.
- B. Shop Drawings:
 - 1. Wiring Diagrams: For power, signal, and control wiring.

1.5 INFORMATIONAL SUBMITTALS

- A. Product Certificates: For each type of commercial, electric, domestic-water heater, from manufacturer.
- B. Domestic-Water Heater Labeling: Certified and labeled by testing agency acceptable to authorities having jurisdiction.
- C. Source quality-control reports.
- D. Field quality-control reports.

- E. Warranty: Sample of special warranty.

1.6 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For electric, domestic-water heaters to include in emergency, operation, and maintenance manuals.

1.7 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. ASHRAE/IESNA Compliance: Applicable requirements in ASHRAE/IESNA 90.1.
- C. ASME Compliance: Where ASME-code construction is indicated, fabricate and label commercial, domestic-water heater storage tanks to comply with ASME Boiler and Pressure Vessel Code: Section VIII, Division 1.
- D. NSF Compliance: Fabricate and label equipment components that will be in contact with potable water to comply with NSF 61 Annex G, "Drinking Water System Components - Health Effects."

1.8 COORDINATION

- A. Coordinate sizes and locations of concrete bases with actual equipment provided.

1.9 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of electric, domestic-water heaters that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Structural failures including storage tank and supports.
 - b. Faulty operation of controls.
 - c. Deterioration of metals, metal finishes, and other materials beyond normal use.
 - 2. Warranty Periods: From date of Substantial Completion.
 - a. Commercial, Electric, Storage, Domestic-Water Heaters:
 - 1) Storage Tank: Five years.
 - 2) Controls and Other Components: Five years.
 - b. Compression Tanks: Five years.

PART 2 - PRODUCTS

2.1 COMMERCIAL, ELECTRIC, DOMESTIC-WATER HEATERS

A. Commercial, Electric, Storage, Domestic-Water Heaters:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. A. O. Smith Corporation.
 - b. Bradford White Corporation.
 - c. Lochinvar, LLC.
 - d. Rheem Manufacturing Company.
 - e. HTP
2. Standard: UL 1453.
3. Storage-Tank Construction: Non-ASME-code, steel vertical arrangement.
 - a. Tappings: Factory fabricated of materials compatible with tank and piping connections. Attach tappings to tank before testing.
 - 1) NPS 2 and Smaller: Threaded ends according to ASME B1.20.1.
 - 2) NPS 2-1/2 and Larger: Flanged ends according to ASME B16.5 for steel and stainless-steel flanges, and according to ASME B16.24 for copper and copper-alloy flanges.
 - b. Pressure Rating: 150 psig.
 - c. Interior Finish: Comply with NSF 61 Annex G barrier materials for potable-water tank linings, including extending lining material into tappings.
4. Factory-Installed Storage-Tank Appurtenances:
 - a. Drain Valve: Corrosion-resistant metal complying with ASSE 1005.
 - b. Insulation: Comply with ASHRAE/IESNA 90.1.
 - c. Jacket: Steel with enameled finish.
 - d. Heating Elements: Electric, screw-in or bolt-on immersion type arranged in multiples of three.
 - e. Temperature Control: Adjustable thermostat.
 - f. Safety Controls: High-temperature-limit and low-water cutoff devices or systems.
 - g. Relief Valves: ASME rated and stamped for combination temperature-and-pressure relief valves. Include one or more relief valves with total relieving capacity at least as great as heat input, and include pressure setting less than domestic-water heater working-pressure rating. Select one relief valve with sensing element that extends into storage tank.

B. Capacity and Characteristics:

1. Capacity: 40.
2. Recovery: 18 gph at 100 deg F temperature rise.
3. Temperature Setting: 140 deg F.
4. Power Demand: 4.5 kilowatts.

5. Heating Elements:
 - a. Number of Elements: Two.
 - b. Kilowatts Each Element: 4.5 kilowatts.
 - c. Number of Stages: One.

6. Electrical Characteristics:
 - a. Volts: 240.
 - b. Phases: Single.
 - c. Hertz: 60.
 - d. Full-Load Amperes: 18.8 A.

2.2 DOMESTIC-WATER HEATER ACCESSORIES

A. Domestic-Water Compression Tanks:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. A. O. Smith Corporation.
 - b. AMTROL, Inc.
 - c. TACO Comfort Solutions, Inc.
 - d. Watts

2. Description: Steel pressure-rated tank constructed with welded joints and factory-installed butyl-rubber diaphragm. Include air precharge to minimum system-operating pressure at tank.

3. Construction:
 - a. Tappings: Factory-fabricated steel, welded to tank before testing and labeling. Include ASME B1.20.1 pipe thread.
 - b. Interior Finish: Comply with NSF 61 Annex G barrier materials for potable-water tank linings, including extending finish into and through tank fittings and outlets.
 - c. Air-Charging Valve: Factory installed.

4. Capacity and Characteristics:
 - a. Working-Pressure Rating: 150 psig.

B. Drain Pans: Corrosion-resistant metal with raised edge. Comply with ANSI/CSA LC 3. Include dimensions not less than base of domestic-water heater, and include drain outlet not less than NPS 3/4 with ASME B1.20.1 pipe threads or with ASME B1.20.7 garden-hose threads.

C. Heat-Trap Fittings: ASHRAE 90.2.

D. Combination Temperature-and-Pressure Relief Valves: ASME rated and stamped. Include relieving capacity at least as great as heat input, and include pressure setting less than domestic-water heater working-pressure rating. Select relief valves with sensing element that extends into storage tank.

- E. Pressure Relief Valves: ASME rated and stamped. Include pressure setting less than domestic-water heater working-pressure rating.
- F. Vacuum Relief Valves: ANSI Z21.22/CSA 4.4.
- G. Shock Absorbers: ASSE 1010 or PDI-WH 201, Size A water hammer arrester.

2.3 SOURCE QUALITY CONTROL

- A. Factory Tests: Test and inspect domestic-water heaters specified to be ASME-code construction, according to ASME Boiler and Pressure Vessel Code.
- B. Hydrostatically test commercial domestic-water heaters to minimum of one and one-half times pressure rating before shipment.
- C. Electric, domestic-water heaters will be considered defective if they do not pass tests and inspections.
- D. Prepare test and inspection reports.

PART 3 - EXECUTION

3.1 DOMESTIC-WATER HEATER INSTALLATION

- A. Commercial, Electric, Domestic-Water Heater Mounting: Install commercial, electric, domestic-water heaters on concrete base.
 - 1. Exception: Omit concrete bases for commercial, electric, domestic-water heaters if installation on stand, bracket, suspended platform, or directly on floor is indicated.
 - 2. Maintain manufacturer's recommended clearances.
 - 3. Arrange units so controls and devices that require servicing are accessible.
 - 4. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 18-inch centers around the full perimeter of concrete base.
 - 5. For supported equipment, install epoxy-coated anchor bolts that extend through concrete base and anchor into structural concrete floor.
 - 6. Place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 - 7. Install anchor bolts to elevations required for proper attachment to supported equipment.
 - 8. Anchor domestic-water heaters to substrate.
- B. Install electric, domestic-water heaters level and plumb, according to layout drawings, original design, and referenced standards. Maintain manufacturer's recommended clearances. Arrange units so controls and devices needing service are accessible.
 - 1. Install shutoff valves on domestic-water-supply piping to domestic-water heaters and on domestic-hot-water outlet piping.

- C. Install combination temperature-and-pressure relief valves in top portion of storage tanks. Use relief valves with sensing elements that extend into tanks. Extend commercial-water-heater relief-valve outlet, with drain piping same as domestic-water piping in continuous downward pitch, and discharge by positive air gap onto closest floor drain.
- D. Install water-heater drain piping as indirect waste to spill by positive air gap into open drains or over floor drains. Install hose-end drain valves at low points in water piping for electric, domestic-water heaters that do not have tank drains.
- E. Install thermometers on outlet piping of electric, domestic-water heaters.
- F. Install piping-type heat traps on inlet and outlet piping of electric, domestic-water heater storage tanks without integral or fitting-type heat traps.
- G. Fill electric, domestic-water heaters with water.
- H. Charge domestic-water compression tanks with air.

3.2 CONNECTIONS

- A. Drawings indicate general arrangement of piping, fittings, and specialties.
- B. Where installing piping adjacent to electric, domestic-water heaters, allow space for service and maintenance of water heaters. Arrange piping for easy removal of domestic-water heaters.

3.3 IDENTIFICATION

- A. Identify system components.

3.4 FIELD QUALITY CONTROL

- A. Perform tests and inspections.
 - 1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.
 - 2. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.
 - 3. Operational Test: After electrical circuitry has been energized, start units to confirm proper operation.
 - 4. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- B. Electric, domestic-water heaters will be considered defective if they do not pass tests and inspections.
- C. Prepare test and inspection reports.

3.5 DEMONSTRATION

- A. Train Owner's maintenance personnel to adjust, operate, and maintain commercial, electric, domestic-water heaters.

END OF SECTION 223300

SECTION 223400 - FUEL-FIRED, DOMESTIC-WATER HEATERS

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. Commercial, gas-fired, storage, domestic-water heaters.
 - 2. Domestic-water heater accessories.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type and size of domestic-water heater indicated. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.
- B. Shop Drawings:
 - 1. Wiring Diagrams: For power, signal, and control wiring.

1.4 INFORMATIONAL SUBMITTALS

- A. Product Certificates: For each type of commercial, gas-fired, domestic-water heater, from manufacturer.
- B. Domestic-Water Heater Labeling: Certified and labeled by testing agency acceptable to authorities having jurisdiction.
- C. Source quality-control reports.
- D. Field quality-control reports.
- E. Warranty: Sample of special warranty.

1.5 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For fuel-fired, domestic-water heaters to include in emergency, operation, and maintenance manuals.

1.6 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. ASHRAE/IESNA Compliance: Fabricate and label fuel-fired, domestic-water heaters to comply with ASHRAE/IESNA 90.1.
- C. ASME Compliance:
 - 1. Where ASME-code construction is indicated, fabricate and label commercial, domestic-water heater storage tanks to comply with ASME Boiler and Pressure Vessel Code: Section VIII, Division 1.
 - 2. Where ASME-code construction is indicated, fabricate and label commercial, finned-tube, domestic-water heaters to comply with ASME Boiler and Pressure Vessel Code: Section IV.
- D. NSF Compliance: Fabricate and label equipment components that will be in contact with potable water to comply with NSF 61 Annex G, "Drinking Water System Components - Health Effects."

1.7 COORDINATION

- A. Coordinate sizes and locations of concrete bases with actual equipment provided.

1.8 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of fuel-fired, domestic-water heaters that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Structural failures including storage tank and supports.
 - b. Faulty operation of controls.
 - c. Deterioration of metals, metal finishes, and other materials beyond normal use.
 - 2. Warranty Periods: From date of Substantial Completion.
 - a. Commercial, Gas-Fired, Storage, Domestic-Water Heaters:
 - 1) Storage Tank: Three years.
 - 2) Controls and Other Components: Two year(s).
 - b. Compression Tanks: Five years.

PART 2 - PRODUCTS

2.1 COMMERCIAL, GAS-FIRED, STORAGE, DOMESTIC-WATER HEATERS

A. Commercial, Gas-Fired, Storage, Domestic-Water Heaters:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Aldrich Company, Inc. (The).
 - b. Bock Water Heaters, Inc.
 - c. HESco Industries, Inc.
 - d. Precision Boilers, LLC.
 - e. PVI Industries, LLC.
 - f. RECO USA.
 - g. Sellers Engineering Co.
 - h. Smith, A. O. Corporation.
 - i. State Industries.
 - j. HTP
2. Standard: ANSI Z21.10.3/CSA 4.3.
3. Storage-Tank Construction: Non-ASME-code steel with 150-psig working-pressure rating.
 - a. Tappings: Factory fabricated of materials compatible with tank. Attach tappings to tank before testing.
 - 1) NPS 2 and Smaller: Threaded ends according to ASME B1.20.1.
 - 2) NPS 2-1/2 and Larger: Flanged ends according to ASME B16.5 for steel and stainless-steel flanges and according to ASME B16.24 for copper and copper-alloy flanges.
 - b. Interior Finish: Comply with NSF 61 Annex G barrier materials for potable-water tank linings, including extending finish into and through tank fittings and outlets.
 - c. Lining: 316L Stainless Steel complying with NSF 61 Annex G barrier materials for potable-water tank linings, including extending lining into and through tank fittings and outlets.
4. Factory-Installed Storage-Tank Appurtenances:
 - a. Dip Tube: Required unless cold-water inlet is near bottom of tank.
 - b. Drain Valve: Corrosion-resistant metal complying with ASSE 1005.
 - c. Insulation: Comply with ASHRAE/IESNA 90.1. Surround entire storage tank except connections and controls.
 - d. Jacket: Steel with enameled finish.
 - e. Burner: UL 795 for power-burner, gas-fired, domestic-water heaters and natural-gas fuel.
 - f. Automatic Ignition: ANSI Z21.20/CSA C22.2 No. 199, electric, automatic, gas-ignition system.
 - g. Temperature Control: Adjustable thermostat.

- h. Safety Controls: Automatic, high-temperature-limit and low-water cutoff devices or systems.
- i. Combination Temperature-and-Pressure Relief Valves: ANSI Z21.22/CSA 4.4-M. Include one or more relief valves with total relieving capacity at least as great as heat input, and include pressure setting less than domestic-water heater working-pressure rating. Select one relief valve with sensing element that extends into storage tank.

B. Capacity and Characteristics:

- 1. See drawing schedules

2.2 DOMESTIC-WATER HEATER ACCESSORIES

A. Domestic-Water Compression Tanks:

- 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. AMTROL, Inc.
 - b. Flexcon Industries.
 - c. Honeywell Water Controls.
 - d. Pentair Pump Group.
 - e. Smith, A. O. Corporation.
 - f. State Industries.
 - g. TACO Comfort Solutions, Inc.
- 2. Description: Steel, pressure-rated tank constructed with welded joints and factory-installed butyl-rubber diaphragm. Include air precharge to minimum system-operating pressure at tank.
- 3. Construction:
 - a. Tappings: Factory-fabricated steel, welded to tank before testing and labeling. Include ASME B1.20.1 pipe thread.
 - b. Interior Finish: Comply with NSF 61 Annex G barrier materials for potable-water tank linings, including extending finish into and through tank fittings and outlets.
 - c. Air-Charging Valve: Factory installed.
- 4. Capacity and Characteristics:
 - a. Working-Pressure Rating: 150 psig.

B. Drain Pans: Corrosion-resistant metal with raised edge. Comply with ANSI/CSA LC 3. Include dimensions not less than base of domestic-water heater, and include drain outlet not less than NPS 3/4 with ASME B1.20.1 pipe threads or with ASME B1.20.7 garden-hose threads.

C. Heat-Trap Fittings: ASHRAE 90.2.

- D. Gas Shutoff Valves: ANSI Z21.15/CSA 9.1-M, manually operated. Furnish for installation in piping.
- E. Gas Pressure Regulators: ANSI Z21.18/CSA 6.3, appliance type. Include 1/2-psig pressure rating as required to match gas supply.
- F. Automatic Gas Valves: ANSI Z21.21/CSA 6.5, appliance, electrically operated, on-off automatic valve.
- G. Combination Temperature-and-Pressure Relief Valves: Include relieving capacity at least as great as heat input, and include pressure setting less than domestic-water heater working-pressure rating. Select relief valves with sensing element that extends into storage tank.
 - 1. Gas-Fired, Domestic-Water Heaters: ANSI Z21.22/CSA 4.4-M.
- H. Pressure Relief Valves: Include pressure setting less than domestic-water heater working-pressure rating.
 - 1. Gas-Fired, Domestic-Water Heaters: ANSI Z21.22/CSA 4.4-M.
- I. Vacuum Relief Valves: ANSI Z21.22/CSA 4.4-M.
- J. Domestic-Water Heater Stands: Manufacturer's factory-fabricated steel stand for floor mounting, capable of supporting domestic-water heater and water. Provide dimension that will support bottom of domestic-water heater a minimum of 18 inches above the floor.
- K. Domestic-Water Heater Mounting Brackets: Manufacturer's factory-fabricated steel bracket for wall mounting, capable of supporting domestic-water heater and water.

2.3 SOURCE QUALITY CONTROL

- A. Factory Tests: Test and inspect assembled domestic-water heaters specified to be ASME-code construction, according to ASME Boiler and Pressure Vessel Code.
- B. Hydrostatically test commercial domestic-water heaters to minimum of one and one-half times pressure rating before shipment.
- C. Domestic-water heaters will be considered defective if they do not pass tests and inspections.
- D. Prepare test and inspection reports.

PART 3 - EXECUTION

3.1 DOMESTIC-WATER HEATER INSTALLATION

- A. Commercial, Domestic-Water Heater Mounting: Install commercial domestic-water heaters on concrete base.

1. Exception: Omit concrete bases for commercial domestic-water heaters if installation on stand, bracket, suspended platform, or directly on floor is indicated.
 2. Maintain manufacturer's recommended clearances.
 3. Arrange units so controls and devices that require servicing are accessible.
 4. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 18-inch centers around the full perimeter of concrete base.
 5. For supported equipment, install epoxy-coated anchor bolts that extend through concrete base and anchor into structural concrete floor.
 6. Place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 7. Install anchor bolts to elevations required for proper attachment to supported equipment.
 8. Anchor domestic-water heaters to substrate.
- B. Install domestic-water heaters level and plumb, according to layout drawings, original design, and referenced standards. Maintain manufacturer's recommended clearances. Arrange units so controls and devices needing service are accessible.
1. Install shutoff valves on domestic-water-supply piping to domestic-water heaters and on domestic-hot-water outlet piping.
- C. Install gas-fired, domestic-water heaters according to NFPA 54.
1. Install gas shutoff valves on gas supply piping to gas-fired, domestic-water heaters without shutoff valves.
 2. Install gas pressure regulators on gas supplies to gas-fired, domestic-water heaters without gas pressure regulators if gas pressure regulators are required to reduce gas pressure at burner.
 3. Install automatic gas valves on gas supplies to gas-fired, domestic-water heaters if required for operation of safety control.
- D. Install combination temperature-and-pressure relief valves in top portion of storage tanks. Use relief valves with sensing elements that extend into tanks. Extend commercial-water-heater relief-valve outlet, with drain piping same as domestic-water piping in continuous downward pitch, and discharge by positive air gap onto closest floor drain.
- E. Install water-heater drain piping as indirect waste to spill by positive air gap into open drains or over floor drains. Install hose-end drain valves at low points in water piping for domestic-water heaters that do not have tank drains.
- F. Install thermometer on outlet piping of domestic-water heaters.
- G. Install piping-type heat traps on inlet and outlet piping of domestic-water heater storage tanks without integral or fitting-type heat traps.
- H. Fill domestic-water heaters with water.
- I. Charge domestic-water compression tanks with air.

3.2 CONNECTIONS

- A. Comply with requirements for domestic-water piping specified in Section 221116 "Domestic Water Piping."
- B. Drawings indicate general arrangement of piping, fittings, and specialties.
- C. Where installing piping adjacent to fuel-fired, domestic-water heaters, allow space for service and maintenance of water heaters. Arrange piping for easy removal of domestic-water heaters.

3.3 IDENTIFICATION

- A. Identify system components.

3.4 FIELD QUALITY CONTROL

- A. Perform tests and inspections.
 - 1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.
 - 2. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.
 - 3. Operational Test: After electrical circuitry has been energized, start units to confirm proper operation.
 - 4. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- B. Domestic-water heaters will be considered defective if they do not pass tests and inspections.
- C. Prepare test and inspection reports.

3.5 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain commercial, gas-fired, storage, domestic-water heaters.

END OF SECTION 223400

SECTION 224213.13 - COMMERCIAL WATER CLOSETS

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. Flushometer valves.

1.3 DEFINITIONS

- A. Effective Flush Volume: Average of two reduced flushes and one full flush per fixture.
- B. Remote Water Closet: Located more than 30 feet from other drain line connections or fixture and where less than 1.5 drainage fixture units are upstream of the drain line connection.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for water closets.
 - 2. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.
- B. Shop Drawings: Include diagrams for power, signal, and control wiring.

1.5 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For flushometer valves[**and electronic sensors**] to include in operation and maintenance manuals.

1.6 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Flushometer-Valve Repair Kits: Equal to 10 percent of amount of each type installed, but no fewer than one of each type.

PART 2 - PRODUCTS

2.1 FLUSHOMETER VALVES

A. Solenoid-Actuator, Diaphragm Flushometer Valves:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Delany Products.
 - b. Gerber Plumbing Fixtures LLC.
 - c. Sloan Valve Company.
 - d. Zurn Industries, LLC.
2. Standard: ASSE 1037.
3. Minimum Pressure Rating: 125 psig.
4. Features: Include integral check stop and backflow-prevention device.
5. Material: Brass body with corrosion-resistant components.
6. Exposed Flushometer-Valve Finish: Chrome plated.
7. Panel Finish: Chrome plated or stainless steel.
8. Style: Exposed.
9. Actuator: Solenoid complying with UL 1951, and listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
10. Trip Mechanism: Hard-wired electronic sensor complying with UL 1951, and listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
11. Consumption: 1.6 gal. per flush.
12. Minimum Inlet: NPS 1.
13. Minimum Outlet: NPS 1-1/4.

B. Hard-Wired, Solenoid-Actuator, Piston Flushometer Valves:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Gerber Plumbing Fixtures LLC.
 - b. Moen Incorporated.
 - c. Sloan Valve Company.
 - d. TOTO USA, INC.
 - e. Zurn Industries, LLC.
2. Standard: ASSE 1037.
3. Minimum Pressure Rating: 125 psig.
4. Features: Include integral check stop and backflow-prevention device.
5. Material: Brass body with corrosion-resistant components.
6. Exposed Flushometer-Valve Finish: Chrome plated.
7. Panel Finish: Chrome plated or stainless steel.

8. Style: Exposed.
9. Actuator: Solenoid complying with UL 1951, and listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
10. Trip Mechanism: Hard-wired electronic sensor complying with UL 1951, and listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
11. Consumption: 1.6 gal. per flush.
12. Minimum Inlet: NPS 1.
13. Minimum Outlet: NPS 1-1/4.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine roughing-in of water supply and sanitary drainage and vent piping systems to verify actual locations of piping connections before water-closet installation.
- B. Examine walls and floors for suitable conditions where water closets will be installed.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Flushometer-Valve Installation:
 1. Install flushometer-valve, water-supply fitting on each supply to each water closet.
 2. Attach supply piping to supports or substrate within pipe spaces behind fixtures.
- B. Wall Flange and Escutcheon Installation:
 1. Install wall flanges or escutcheons at piping wall penetrations in exposed, finished locations and within cabinets and millwork.
 2. Install deep-pattern escutcheons if required to conceal protruding fittings.
 3. Comply with escutcheon requirements specified in Section 220518 "Escutcheons for Plumbing Piping."

3.3 CONNECTIONS

- A. Connect water closets with water supplies and soil, waste, and vent piping. Use size fittings required to match water closets.
- B. Comply with water piping requirements specified in Section 221116 "Domestic Water Piping."
- C. Where installing piping adjacent to water closets, allow space for service and maintenance.

3.4 ADJUSTING

- A. Operate and adjust water closets and controls. Replace damaged and malfunctioning water closets, fittings, and controls.
- B. Adjust water pressure at flushometer valves to produce proper flow.

3.5 CLEANING AND PROTECTION

- A. Clean water closets and fittings with manufacturers' recommended cleaning methods and materials.
- B. Install protective covering for installed water closets and fittings.
- C. Do not allow use of water closets for temporary facilities unless approved in writing by Owner.

END OF SECTION 224213.13

SECTION 224213.16 - COMMERCIAL URINALS

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. Flushometer valves.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for urinals.
 - 2. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.
- B. Shop Drawings: Include diagrams for power, signal, and control wiring.

1.4 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For flushometer valves and electronic sensors to include in operation and maintenance manuals.

1.5 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Flushometer-Valve Repair Kits: Equal to 10 percent of amount of each type installed, but no fewer than one of each type.

PART 2 - PRODUCTS

2.1 URINAL FLUSHOMETER VALVES

- A. Solenoid-Actuator, Diaphragm Flushometer Valves:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Delany Products.
 - b. Gerber Plumbing Fixtures LLC.
 - c. Sloan Valve Company.
 - d. Stern Engineering Ltd.
 - e. Zurn Industries, LLC.
2. Standard: ASSE 1037.
3. Minimum Pressure Rating: 125 psig.
4. Features: Include integral check stop and backflow-prevention device.
5. Material: Brass body with corrosion-resistant components.
6. Exposed Flushometer-Valve Finish: Chrome plated.
7. Panel Finish: Chrome plated or stainless steel.
8. Style: Exposed.
9. Actuator: Solenoid complying with UL 1951; listed and labeled as defined in NFPA 70, by a qualified testing agency; and marked for intended location and application.
10. Trip Mechanism: Hard-wired electronic sensor complying with UL 1951; listed and labeled as defined in NFPA 70, by a qualified testing agency; and marked for intended location and application.
11. Consumption: 0.5 gal. per flush.
12. Minimum Inlet: NPS 3/4.
13. Minimum Outlet: NPS 3/4.

B. Hard-Wired, Solenoid-Actuator, Piston Flushometer Valves:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Gerber Plumbing Fixtures LLC.
 - b. Moen Incorporated.
 - c. Sloan Valve Company.
 - d. TOTO USA, INC.
 - e. Zurn Industries, LLC.
2. Standard: ASSE 1037.
3. Minimum Pressure Rating: 125 psig.
4. Features: Include integral check stop and backflow-prevention device.
5. Material: Brass body with corrosion-resistant components.
6. Exposed Flushometer-Valve Finish: Chrome plated.
7. Panel Finish: Chrome plated or stainless steel.
8. Style: Exposed.
9. Actuator: Solenoid complying with UL 1951; listed and labeled as defined in NFPA 70, by a qualified testing agency; and marked for intended location and application.
10. Trip Mechanism: Hard-wired electronic sensor complying with UL 1951; listed and labeled as defined in NFPA 70, by a qualified testing agency; and marked for intended location and application.
11. Consumption: 0.5 gal. per flush.

12. Minimum Inlet: NPS 3/4.
13. Minimum Outlet: NPS 3/4.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine roughing-in of water supply and sanitary drainage and vent piping systems to verify actual locations of piping connections before urinal installation.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Flushometer-Valve Installation:

1. Install flushometer-valve water-supply fitting on each supply to each urinal.
2. Attach supply piping to supports or substrate within pipe spaces behind fixtures.

B. Wall Flange and Escutcheon Installation:

1. Install wall flanges or escutcheons at piping wall penetrations in exposed, finished locations.
2. Install deep-pattern escutcheons if required to conceal protruding fittings.
3. Comply with escutcheon requirements specified in Section 220518 "Escutcheons for Plumbing Piping."

3.3 CONNECTIONS

- A. Connect urinals with water supplies and soil, waste, and vent piping. Use size fittings required to match urinals.
- B. Comply with water piping requirements specified in Section 221116 "Domestic Water Piping."
- C. Where installing piping adjacent to urinals, allow space for service and maintenance.

3.4 ADJUSTING

- A. Operate and adjust urinals and controls. Replace damaged and malfunctioning urinals, fittings, and controls.
- B. Adjust water pressure at flushometer valves to produce proper flow.

3.5 CLEANING AND PROTECTION

- A. Clean urinals and fittings with manufacturers' recommended cleaning methods and materials.

- B. Install protective covering for installed urinals and fittings.
- C. Do not allow use of urinals for temporary facilities unless approved in writing by Owner.

END OF SECTION 224213.16

SECTION 224216.13 - COMMERCIAL LAVATORIES

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. Faucets.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for lavatories.
 - 2. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.
- B. Shop Drawings: Include diagrams for power, signal, and control wiring of automatic faucets.

1.4 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Counter cutout templates for mounting of counter-mounted lavatories.

1.5 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For lavatories and faucets to include in operation and maintenance manuals.
 - 1. In addition to items specified in Section 017823 "Operation and Maintenance Data," include the following:
 - a. Servicing and adjustments of automatic faucets.

1.6 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Faucet Washers and O-Rings: Equal to 10 percent of amount of each type and size installed.
2. Faucet Cartridges and O-Rings: Equal to 5 percent of amount of each type and size installed.

PART 2 - PRODUCTS

2.1 SOLID-BRASS, AUTOMATICALLY OPERATED LAVATORY FAUCETS

- A. NSF Standard: Comply with NSF/ANSI 61 Annex G, "Drinking Water System Components - Health Effects," for faucet materials that will be in contact with potable water.
- B. Lavatory Faucets: Automatic-type, hard-wired, electronic-sensor-operated, solid-brass valve.
 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. American Standard America.
 - b. Bradley Corporation.
 - c. Chicago Faucets; Geberit Company.
 - d. Gerber Plumbing Fixtures LLC.
 - e. GROHE America, Inc.
 - f. Hydrotek International, Inc.
 - g. Kohler Co.
 - h. Moen Incorporated.
 - i. Sloan Valve Company.
 - j. Speakman Company.
 - k. Stern Engineering Ltd.
 - l. T & S Brass and Bronze Works, Inc.
 - m. TOTO USA, INC.
 - n. Zurn Industries, LLC.
 2. Standards: ASME A112.18.1/CSA B125.1 and UL 1951.
 3. 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.
 4. General: Include hot- and cold-water indicators; coordinate faucet inlets with supplies and fixture hole punchings; coordinate outlet with spout and fixture receptor.
 5. Body Material: Commercial, solid brass.
 6. Finish: Polished chrome plate.
 7. Maximum Flow Rate: 0.5 gpm.
 8. Mounting Type: Deck, concealed.
 9. Spout: Rigid type.
 10. Spout Outlet: Aerator.

2.2 SUPPLY FITTINGS

- A. NSF Standard: Comply with NSF/ANSI 61 Annex G, "Drinking Water System Components - Health Effects," for supply-fitting materials that will be in contact with potable water.
- B. Standard: ASME A112.18.1/CSA B125.1.
- C. Supply Piping: Chrome-plated-brass pipe or chrome-plated copper tube matching water-supply piping size. Include chrome-plated-brass or stainless-steel wall flange.
- D. Supply Stops: Chrome-plated-brass, one-quarter-turn, ball-type or compression valve with inlet connection matching supply piping.
- E. Operation: Loose key.
- F. Risers:
 - 1. NPS 3/8.
 - 2. ASME A112.18.6, braided- or corrugated-stainless-steel, flexible hose riser.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine roughing-in of water supply and sanitary drainage and vent piping systems to verify actual locations of piping connections before lavatory installation.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Install wall flanges or escutcheons at piping wall penetrations in exposed, finished locations. Use deep-pattern escutcheons if required to conceal protruding fittings. Comply with escutcheon requirements specified in Section 220518 "Escutcheons for Plumbing Piping."
- B. Install protective shielding pipe covers and enclosures on exposed supplies and waste piping of accessible lavatories. Comply with requirements in Section 220719 "Plumbing Piping Insulation."

3.3 CONNECTIONS

- A. Connect fixtures with water supplies, stops, and risers, and with traps, soil, waste, and vent piping. Use size fittings required to match fixtures.
- B. Comply with water piping requirements specified in Section 221116 "Domestic Water Piping."

3.4 ADJUSTING

- A. Operate and adjust lavatories and controls. Replace damaged and malfunctioning lavatories, fittings, and controls.
- B. Adjust water pressure at faucets to produce proper flow.

3.5 CLEANING AND PROTECTION

- A. After completing installation of lavatories, inspect and repair damaged finishes.
- B. Clean lavatories, faucets, and other fittings with manufacturers' recommended cleaning methods and materials.
- C. Provide protective covering for installed lavatories and fittings.
- D. Do not allow use of lavatories for temporary facilities unless approved in writing by Owner.

END OF SECTION 224216.13

SECTION 224216.16 - COMMERCIAL SINKS

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. Sink faucets.
 - 2. Supply fittings.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for sinks.
 - 2. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.

1.4 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Counter cutout templates for mounting of counter-mounted lavatories.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For sinks to include in maintenance manuals.

1.6 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Faucet Washers and O-Rings: Equal to 10 percent of amount of each type and size installed.
 - 2. Faucet Cartridges and O-Rings: Equal to 5 percent of amount of each type and size installed.

PART 2 - PRODUCTS

2.1 SINK FAUCETS

- A. NSF Standard: Comply with NSF/ANSI 61 Annex G, "Drinking Water System Components - Health Effects," for faucet-spout materials that will be in contact with potable water.
- B. Sink Faucets: Manual type, two-lever-handle
 - 1. Commercial, Solid-Brass Faucets.
 - a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1) American Standard America.
 - 2) Bradley Corporation.
 - 3) Chicago Faucets; Geberit Company.
 - 4) Delta Faucet Company.
 - 5) Elkay Manufacturing Co.
 - 6) GROHE America, Inc.
 - 7) Just Manufacturing.
 - 8) Kohler Co.
 - 9) Moen Incorporated.
 - 10) Sloan Valve Company.
 - 11) Speakman Company.
 - 12) T & S Brass and Bronze Works, Inc.
 - 13) Zurn Industries, LLC.
 - 2. Standard: ASME A112.18.1/CSA B125.1.
 - 3. General: Include hot- and cold-water indicators; coordinate faucet inlets with supplies and fixture hole punchings; coordinate outlet with spout and sink receptor.
 - 4. Body Material: Commercial, solid brass.
 - 5. Finish: Polished chrome plate.
 - 6. Maximum Flow Rate: 2.2 gpm.
 - 7. Handle(s): Wrist blade, 4 inches.
 - 8. Mounting Type: Deck, concealed.
 - 9. Spout Type: Rigid, solid brass.
 - 10. Spout Outlet: Aerator.

2.2 SUPPLY FITTINGS

- A. NSF Standard: Comply with NSF/ANSI 61 Annex G, "Drinking Water System Components - Health Effects," for supply-fitting materials that will be in contact with potable water.
- B. Standard: ASME A112.18.1/CSA B125.1.
- C. Supply Piping: Chrome-plated brass pipe or chrome-plated copper tube matching water-supply piping size. Include chrome-plated brass or stainless-steel wall flange.

- D. Supply Stops: Chrome-plated brass, one-quarter-turn, ball-type or compression valve with inlet connection matching supply piping.
- E. Operation: Loose key.
- F. Risers:
 - 1. NPS 3/8.
 - 2. ASME A112.18.6, braided or corrugated stainless-steel flexible hose.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine roughing-in of water supply and sanitary drainage and vent piping systems to verify actual locations of piping connections before sink installation.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Install water-supply piping with stop on each supply to each sink faucet.
 - 1. Install stops in locations where they can be easily reached for operation.
- B. Install wall flanges or escutcheons at piping wall penetrations in exposed, finished locations. Use deep-pattern escutcheons if required to conceal protruding fittings. Comply with escutcheon requirements specified in Section 220518 "Escutcheons for Plumbing Piping."
- C. Install protective shielding pipe covers and enclosures on exposed supplies and waste piping of accessible sinks. Comply with requirements in Section 220719 "Plumbing Piping Insulation."

3.3 CONNECTIONS

- A. Connect sinks with water supplies, stops, and risers, and with traps, soil, waste, and vent piping. Use size fittings required to match fixtures.
- B. Comply with water piping requirements specified in Section 221116 "Domestic Water Piping."

3.4 ADJUSTING

- A. Operate and adjust sinks and controls. Replace damaged and malfunctioning sinks, fittings, and controls.
- B. Adjust water pressure at faucets to produce proper flow.

3.5 CLEANING AND PROTECTION

- A. Clean sinks, faucets, and other fittings with manufacturers' recommended cleaning methods and materials.
- B. Provide protective covering for installed sinks and fittings.
- C. Do not allow use of sinks for temporary facilities unless approved in writing by Owner.

END OF SECTION 224216.16

SECTION 224233 - WASH FOUNTAINS

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. Semicircular wash fountains.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for wash fountains.
 - 2. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.
- B. Shop Drawings: For each type of wash fountain.
 - 1. Include plans, elevations, sections, and mounting attachment details.
 - 2. Include details of equipment assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
 - 3. Include diagrams for power, signal, and control wiring.

1.4 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For wash fountains and components to include in operation and maintenance manuals.

1.5 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Faucet Washers and O-Rings: Equal to 10 percent of quantities of each type and size installed.

2. Faucet Cartridges and O-Rings: Equal to 5 percent of quantities of each type and size installed.

PART 2 - PRODUCTS

2.1 SOLID-SURFACE, SEMICIRCULAR WASH FOUNTAINS

A. Wash Fountains: Off-floor, solid-surface, semicircular receptor.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Acorn Engineering Company.
 - b. Bradley Corporation.
 - c. Intersan Manufacturing Company.
 - d. Sloan Valve Company.
 - e. Willoughby Industries.
2. Color: New materials to match existing color, as selected by Architect from manufacturer's full range of standard colors.
3. Standard: IAPMO IGC 156.
4. 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.
5. Receptor:
 - a. Standard: ICPA SS-1 for solid-surface receptor.
 - b. Height to Rim: 34 inches above floor.
6. Spray Head:
 - a. Material: Stainless steel or integral part of receptor back.
 - b. Number of User Stations: Three.
 - c. Spray Nozzles: Chrome-plated brass or stainless steel complying with NSF 61 Annex G and ASME A112.18.1/CSA B125.1.
 - d. Control: Individual, hardwired sensor actuation with thermostatic mixing valve complying with ASSE 1016 and having check stops; comply with NSF 61 Annex G.
 - e. Sensor: ASME A112.18.1/CSA B125.1 and UL 1951.
7. Liquid-Soap Dispensers: Hardwired, sensor actuated, for each user station.
 - a. Sensor: ASME A112.18.1/CSA B125.1 and UL 1951.
8. Supply Fittings:
 - a. Piping: NPS 1/2 copper tubing.

- b. Valves: Shutoff valve on each supply.
 - c. Supply Piping: From wall.
9. Waste Fittings:
- a. Standard: ASME A112.18.2/CSA B125.2.
 - b. Trap and Drain Piping: NPS 1-1/2.
10. Shroud: Stainless steel of size to cover supply and vent piping.
11. Off-Floor Mounting: Wall bracket and ASME A112.6.1M, Type II urinal carrier.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine roughing-in of water-supply, sanitary drainage, and vent piping systems to verify actual locations of piping connections before wash-fountain installation.
- B. Examine walls and floors for suitable conditions where wash fountains will be installed.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Install wash fountains level and plumb according to roughing-in drawings.
- B. Install off-floor carrier supports, affixed to building substrate, for wall-mounted wash fountains.
- C. Install accessible, wall-mounted wash fountains at mounting height for handicapped/elderly according to ICC A117.1.
- D. Install water-supply piping with shutoff valve on each supply to each wash fountain to be connected to domestic-water distribution piping. Use ball or gate valve. Install valves in locations where they can be easily reached for operation. Valves are specified in Section 220523.12 "Ball Valves for Plumbing Piping"
- E. Install trap and waste piping on each drain outlet of each wash fountain to be connected to sanitary drainage system.
- F. Install wall flanges or escutcheons at piping wall penetrations in exposed, finished locations. Use deep-pattern escutcheons if required to conceal protruding fittings. Comply with escutcheon requirements specified in Section 220518 "Escutcheons for Plumbing Piping."
- G. Seal joints between fixtures and walls using sanitary-type, one-part, mildew-resistant, silicone sealant. Match sealant color to fixture color.

3.3 CONNECTIONS

- A. Connect wash fountains with water supplies, stops, and risers, and with traps, soil, waste, and vent piping. Use size fittings required to match fixtures.
- B. Comply with requirements for water piping specified in Section 221116 "Domestic Water Piping."
- C. Install protective-shielding pipe covers and enclosures on exposed supplies and waste piping of accessible wash fountains. Comply with requirements in Section 220719 "Plumbing Piping Insulation."

3.4 ADJUSTING

- A. Operate and adjust wash fountains and controls. Replace damaged and malfunctioning wash fountains, fittings, and controls.
- B. Adjust water pressure at faucets to produce proper flow.

3.5 CLEANING AND PROTECTION

- A. After installing wash fountains, inspect and repair damaged finishes.
- B. Clean wash fountains, faucets, and other fittings with manufacturers' recommended cleaning methods and materials.
- C. Provide protective covering for installed wash fountains and fittings.
- D. Do not allow use of wash fountains for temporary facilities unless approved in writing by Owner.

END OF SECTION 224233

SECTION 224716 - PRESSURE WATER COOLERS

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 pressure water coolers and related components.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of pressure water cooler.
 - 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
 - 2. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.
- B. Shop Drawings: Include diagrams for power, signal, and control wiring.

1.4 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For pressure water coolers to include in maintenance manuals.

1.5 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Filter Cartridges: Equal to 10 percent of quantity installed for each type and size indicated, but no fewer than 1 of each.

PART 2 - PRODUCTS

2.1 PRESSURE WATER COOLERS WITH BOTTLE FILLER STATION

- A. Pressure Water Coolers: Wall mounted, standard, wheelchair accessible.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Elkay Manufacturing Co.
 - b. Halsey Taylor.
 - c. Haws Corporation.
 - d. Larco Inc.
 - e. Tri Palm International, LLC.
2. Cabinet: Single and Bi-level with two attached cabinets and with a bi-level skirt kit, all stainless steel.
3. Bubbler: One, with adjustable stream regulator, located on each cabinet deck.
4. Bottle Filler Station: One, touch less activation, LED filter monitor, LED bottle counter, located on lower cabinet deck.
5. Control: Push button.
6. Drain: Grid with NPS 1-1/4 tailpiece.
7. Supply: NPS 3/8 with shutoff valve.
8. Waste Fitting: ASME A112.18.2/CSA B125.2, NPS 1-1/4 brass P-trap.
9. Filter: One or more water filters complying with NSF 42 and NSF 53 for cyst and lead reduction to below EPA standards; with capacity sized for unit peak flow rate.
10. Cooling System: Electric, with hermetically sealed compressor, cooling coil, air-cooled condensing unit, corrosion-resistant tubing, refrigerant, corrosion-resistant-metal storage tank, and adjustable thermostat.
 - a. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
11. Capacities and Characteristics:
 - a. Cooled Water: 8 gph.
 - b. Ambient-Air Temperature: 90 deg F.
 - c. Inlet-Water Temperature: 80 deg F.
 - d. Cooled-Water Temperature: 50 deg F.
12. Water Cooler Mounting Height: Handicapped/elderly according to ICC A117.1.

2.2 SUPPORTS

A. Type I Water Cooler Carrier:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Jay R. Smith Mfg. Co.
 - b. Josam Company.
 - c. MIFAB, Inc.
 - d. Wade Drains.
 - e. Watts; a Watts Water Technologies company.
 - f. Zurn Industries, LLC.

2. Standard: ASME A112.6.1M.
- B. Type II Water Cooler Carrier:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Jay R. Smith Mfg. Co.
 - b. Josam Company.
 - c. MIFAB, Inc.
 - d. Wade Drains.
 - e. Watts; a Watts Water Technologies company.
 - f. Zurn Industries, LLC.
 2. Standard: ASME A112.6.1M.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine roughing-in for water-supply and sanitary drainage and vent piping systems to verify actual locations of piping connections before fixture installation.
- B. Examine walls and floors for suitable conditions where fixtures will be installed.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Install fixtures level and plumb according to roughing-in drawings. For fixtures indicated for children, install at height required by authorities having jurisdiction.
- B. Install off-the-floor carrier supports, affixed to building substrate, for wall-mounted fixtures.
- C. Install mounting frames, affixed to building construction, and attach recessed, pressure water coolers to mounting frames.
- D. Install water-supply piping with shutoff valve on supply to each fixture to be connected to domestic-water distribution piping. Use ball or gate valve. Install valves in locations where they can be easily reached for operation. Valves are specified in Section 220523.12 "Ball Valves for Plumbing Piping"
- E. Install trap and waste piping on drain outlet of each fixture to be connected to sanitary drainage system.
- F. Install wall flanges or escutcheons at piping wall penetrations in exposed, finished locations. Use deep-pattern escutcheons where required to conceal protruding fittings. Comply with escutcheon requirements specified in Section 220518 "Escutcheons for Plumbing Piping."

- G. Seal joints between fixtures and walls using sanitary-type, one-part, mildew-resistant, silicone sealant. Match sealant color to fixture color.

3.3 CONNECTIONS

- A. Connect fixtures with water supplies, stops, and risers, and with traps, soil, waste, and vent piping. Use size fittings required to match fixtures.
- B. Comply with water piping requirements specified in Section 221116 "Domestic Water Piping."
- C. Install ball or gate shutoff valve on water supply to each fixture. Install valve upstream from filter for water cooler. Comply with valve requirements specified in Section 220523.12 "Ball Valves for Plumbing Piping"

3.4 ADJUSTING

- A. Adjust fixture flow regulators for proper flow and stream height.
- B. Adjust pressure water-cooler temperature settings.

3.5 CLEANING

- A. After installing fixture, inspect unit. Remove paint splatters and other spots, dirt, and debris. Repair damaged finish to match original finish.
- B. Clean fixtures, on completion of installation, according to manufacturer's written instructions.
- C. Provide protective covering for installed fixtures.
- D. Do not allow use of fixtures for temporary facilities unless approved in writing by Owner.

END OF SECTION 224716

SECTION 26 05 00 - COMMON WORK RESULTS FOR ELECTRICAL

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. Electrical equipment coordination and installation.
2. Sleeves for raceways and cables.
3. Sleeve seals.
4. Grout.
5. Common electrical installation requirements.

1.3 DEFINITIONS

- A. EPDM: Ethylene-propylene-diene terpolymer rubber.
- B. NBR: Acrylonitrile-butadiene rubber.

1.4 SUBMITTALS

- A. Product Data: For sleeve seals.

1.5 COORDINATION

- A. Coordinate arrangement, mounting, and support of electrical equipment:
 1. To allow maximum possible headroom unless specific mounting heights that reduce headroom are indicated.
 2. To provide for ease of disconnecting the equipment with minimum interference to other installations.
 3. To allow right of way for piping and conduit installed at required slope.
 4. So connecting raceways, cables, wireways, cable trays, and busways will be clear of obstructions and of the working and access space of other equipment.
- B. Coordinate installation of required supporting devices and set sleeves in cast-in-place concrete, masonry walls, and other structural components as they are constructed.

- C. Coordinate location of access panels and doors for electrical items that are behind finished surfaces or otherwise concealed. Access doors and panels are specified in Division 08 Section "Access Doors and Frames."
- D. Coordinate sleeve selection and application with selection and application of firestopping specified in Division 07 Section "Penetration Firestopping."

PART 2 - PRODUCTS

2.1 SLEEVES FOR RACEWAYS AND CABLES

- A. Steel Pipe Sleeves: ASTM A 53/A 53M, 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.
 - 1. Minimum Metal Thickness:
 - a. For sleeve cross-section rectangle perimeter less than 50 inches and no side more than 16 inches, thickness shall be 0.052 inch.
 - b. For sleeve cross-section rectangle perimeter equal to, or more than, 50 inches and 1 or more sides equal to, or more than, 16 inches, thickness shall be 0.138 inch.

2.2 SLEEVE SEALS

- A. Description: Modular sealing device, designed for field assembly, to fill annular space between sleeve and raceway or cable.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following into the Work include, but are not limited to, the following:
 - 2. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
 - a. Advance Products & Systems, Inc.
 - b. Calpico, Inc.
 - c. Metraflex Co.
 - d. Pipeline Seal and Insulator, Inc.
 - 3. Sealing Elements: EPDM or NBR interlocking links shaped to fit surface of cable or conduit. Include type and number required for material and size of raceway or cable.
 - 4. Pressure Plates: Plastic, Carbon steel, Stainless steel. Include two for each sealing element.

5. Connecting Bolts and Nuts: Carbon steel with corrosion-resistant coating, of length required to secure pressure plates to sealing elements. Include one for each sealing element.

2.3 GROUT

- A. Nonmetallic, Shrinkage-Resistant Grout: ASTM C 1107, factory-packaged, nonmetallic aggregate grout, noncorrosive, non-staining, mixed with water to consistency suitable for application and a 30-minute working time.

PART 3 - EXECUTION

3.1 COMMON REQUIREMENTS FOR ELECTRICAL INSTALLATION

- A. Comply with NECA 1.
- B. Measure indicated mounting heights to bottom of unit for suspended items and to top of unit for wall-mounting items.
- C. Headroom Maintenance: If mounting heights or other location criteria are not indicated, arrange and install components and equipment to provide maximum possible headroom consistent with these requirements.
- D. Equipment: Install to facilitate service, maintenance, and repair or replacement of components of both electrical equipment and other nearby installations. Connect in such a way as to facilitate future disconnecting with minimum interference with other items in the vicinity.
- E. Right of Way: Give to piping systems installed at a required slope.

3.2 SLEEVE INSTALLATION FOR ELECTRICAL PENETRATIONS

- A. Electrical penetrations occur when raceways, cables, wireways, cable trays, or busways penetrate concrete slabs, concrete or masonry walls, or fire-rated floor and wall assemblies.
- 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. 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 surfaces of walls.
- F. Extend sleeves installed in floors 2 inches above finished floor level.

- G. Size pipe sleeves to provide 1/2-inch annular clear space between sleeve and raceway or cable, unless indicated otherwise.
- H. Seal space outside of sleeves with grout for penetrations of concrete and masonry
 - 1. Promptly pack grout solidly between sleeve and wall so no voids remain. Tool exposed surfaces smooth; protect grout while curing.
- I. Interior Penetrations of Non-Fire-Rated Walls and Floors: Seal annular space between sleeve and raceway or cable, using joint sealant appropriate for size, depth, and location of joint. Comply with requirements in Division 07 Section "Joint Sealants".
- J. Fire-Rated-Assembly Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at raceway and cable penetrations. Install sleeves and seal raceway and cable penetration sleeves with firestop materials. Comply with requirements in Division 07 Section "Penetration Firestopping".
- K. Roof-Penetration Sleeves: Seal penetration of individual raceways and cables with flexible boot-type flashing units applied in coordination with roofing work.
- L. Aboveground, Exterior-Wall Penetrations: Seal penetrations using steel pipe 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.
- M. Underground, Exterior-Wall Penetrations: Install cast-iron pipe sleeves. Size sleeves to allow for 1-inch annular clear space between raceway or cable and sleeve for installing mechanical sleeve seals.

3.3 SLEEVE-SEAL INSTALLATION

- A. Install to seal exterior wall penetrations.
- B. Use type and number of sealing elements recommended by manufacturer for raceway or cable material and size. Position raceway or cable in center of sleeve. Assemble mechanical sleeve seals and install in annular space between raceway or cable and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

3.4 FIRESTOPPING

- A. Apply firestopping to penetrations of fire-rated floor and wall assemblies for electrical installations to restore original fire-resistance rating of assembly. Firestopping materials and installation requirements are specified in Division 07 Section "Penetration Firestopping."

END OF SECTION 260500

SECTION 26 05 19 - 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.
- B. Related Sections include the following:
 - 1. Division 26 Section "Common Work Results for Electrical" for sleeves, seals and firestopping.

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. 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.
- C. Perform testing as identified in Part 3 of this specification.

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 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.
- B. Copper Conductors: Comply with NEMA WC 70.
- C. Conductor Insulation: Comply with NEMA WC 70 for Types THHN-THWN and XHHW.

2.2 CONNECTORS AND SPLICES

- A. Manufacturers: Subject to compliance with requirements, provide products by one 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.

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 or XHHW, 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 XHHW, single conductors in raceway.
- E. Branch Circuits Concealed in Ceilings, Walls, and Partitions: Type THHN-THWN, single conductors in raceway.
- F. Branch Circuits Concealed in Concrete, below Slabs-on-Grade, and Underground: Type XHHW, single conductors in raceway.
- G. Branch circuits with an ampacity greater than 100 amps shall be installed in a method meeting the feeder requirements.
- H. Class 1 Control Circuits: Type THHN-THWN, in method meeting branch circuit requirements.
- I. 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 Division 26 Section "Hangers and Supports for Electrical Systems."
- F. Identify and color-code conductors and cables according to Division 26 Section "Identification for Electrical Systems."

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.
- 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.
- C. Wiring at Outlets: Install conductor at each outlet, with at least 12 inches of slack.

3.5 FIELD QUALITY CONTROL

- A. Perform tests and inspections and prepare test reports.
- B. Tests and Inspections:
 - 1. After installing conductors and cables and before electrical circuitry has been energized, test service entrance and feeder conductors 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 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 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.
 - 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.
- C. 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.
- D. Remove and replace malfunctioning units and retest as specified above.

END OF SECTION 260519

SECTION 26 05 26 - 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.
- B. Section includes grounding systems and equipment:

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Informational Submittals: Plans showing dimensioned as-built locations of grounding features specified in "Field Quality Control" Article, including the following:
 - 1. Ground rods.
 - 2. Ground rings.
- C. Field quality-control reports.
- D. Operation and Maintenance Data: For grounding to include in emergency, operation, and maintenance manuals. In addition to items specified in Division 01 Section "Operation and Maintenance Data," 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. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

- B. Comply with UL 467 for grounding and bonding materials and equipment.

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, 1/4 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.

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 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.

PART 3 - EXECUTION

3.1 APPLICATIONS

- A. Conductors: Install solid conductor for No. 8 AWG and smaller, and stranded conductors for No. 6 AWG and larger unless otherwise indicated.
- B. Conductor Terminations and Connections:
 - 1. Pipe and Equipment Grounding Conductor Terminations: Bolted connectors.
 - 2. Connections to Structural Steel: Welded connectors.

3.2 EQUIPMENT GROUNDING

- A. Install insulated equipment grounding conductors with all feeders and branch circuits.
- B. 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 1/4-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 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.

3.4 LABELING

- A. Comply with requirements in Division 26 Section "Identification for Electrical Systems" Article for instruction signs. The label or its text shall be green.
- B. Install labels at the telecommunications bonding conductor and grounding equalizer and at the grounding electrode conductor where exposed.
 - 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: 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 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.
 - 4. Prepare dimensioned Drawings locating each test well, ground rod and ground-rod assembly, and other grounding electrodes. Identify each by letter in alphabetical order, and key to the record of tests and observations. Include the number of rods driven and their depth at each location and include observations of weather and other phenomena that may affect test results. Describe measures taken to improve test results.
- 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:
 - 1. Power and Lighting Equipment or System with Capacity of 500 kVA and Less: 10 ohms.

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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 260526

SECTION 26 05 29 - 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.
- B. Related Sections include the following:
 - 1. Division 26 Section "Vibration and Seismic Controls for Electrical Systems" for products and installation requirements necessary for compliance with seismic criteria.

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 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 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: 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.
 - 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/D1.1M, "Structural Welding Code - Steel."
- B. Comply with NFPA 70.

1.7 COORDINATION

- A. Coordinate size and location of concrete bases. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified in Division 03.
- B. Coordinate installation of roof curbs, equipment supports, and roof penetrations. These items are specified in Division 07 Section "Roof Accessories."

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 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:
 - 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. Use only malleable-iron clamps with clamp backs in all Garage areas.
- 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. 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.
 - 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 Division 05 Section "Metal Fabrications" 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 its Table 1 lists maximum spacings less than stated in NFPA 70. Minimum rod size shall be 1/4 inch in diameter.
- C. Multiple Raceways or Cables: Install trapeze-type supports fabricated with steel slotted support system, sized so capacity can be increased by at least 25 percent 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 action for retention in support channel.
- D. Spring-steel clamps designed for supporting single conduits without bolts may be used for 1-1/2-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.
- E. Drill holes for expansion anchors in concrete at locations and to depths that avoid reinforcing bars.

3.3 INSTALLATION OF FABRICATED METAL SUPPORTS

- A. Comply with installation requirements in Division 05 Section "Metal Fabrications" for site-fabricated metal supports.
- B. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor electrical materials and equipment.
- C. Field Welding: Comply with AWS D1.1/D1.1M.

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, 28-day compressive-strength concrete. Concrete materials, reinforcement, and placement requirements are specified in Division 03 Section "Cast-in-Place 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 manufacturers 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. Touchup: Comply with requirements in Division 09 painting Sections and Section "High-Performance Coatings" for cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint on miscellaneous metal.
- C. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.

END OF SECTION 260529

SECTION 26 05 33 - 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 monomer 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 (where required on 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. Manufacturer Seismic Qualification Certification: Submit certification that enclosures and cabinets and their mounting provisions, including those for internal components, will withstand seismic forces defined in Division 26 Section "Vibration and Seismic Controls for Electrical Systems." Include the following:
 - 1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
 - a. The term "withstand" means "the cabinet or enclosure will remain in place without separation of any parts when subjected to the seismic forces specified and the unit will retain its enclosure characteristics, including its interior accessibility, after the seismic event."
 - 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.

- E. Source quality-control test reports.

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. 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. 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. Aluminum Rigid Conduit: ANSI C80.5.
- D. IMC: ANSI C80.6.
- E. PVC-Coated Steel Conduit: PVC-coated rigid steel conduit and IMC.
1. Comply with NEMA RN 1.
 2. Coating Thickness: 0.040 inch, minimum.
- F. EMT: ANSI C80.3.
- G. FMC: Zinc-coated steel or aluminum.
- H. LFMC: Flexible steel conduit with PVC jacket.
- I. 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.
 3. Coating for Fittings for PVC-Coated Conduit: Minimum thickness, 0.040 inch, with overlapping sleeves protecting threaded joints.
- J. 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. 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. AFC Cable Systems, Inc.
 2. Anamet Electrical, Inc.; Anaconda Metal Hose.
 3. Aruco 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 OPTICAL FIBER/COMMUNICATIONS CABLE RACEWAY AND FITTINGS

- 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. Arco Corporation.
 2. Endot Industries Inc.
 3. IPEX Inc.
 4. Lamson & Sessions; Carlon Electrical Products.
- B. Description: Comply with UL 2024; flexible type, approved for plenum, riser, general-use installation.

2.4 METAL WIREWAYS

- 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.
 2. Hoffman.
 3. Square D; Schneider Electric.
- B. Description: Sheet metal sized and shaped as indicated, NEMA 250, Type 3R, unless otherwise indicated.
- 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.

2.5 NONMETALLIC WIREWAYS

- 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:
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Hoffman.
 - 2. Lamson & Sessions; Carlon Electrical Products.
- C. Description: Fiberglass polyester, extruded and fabricated to size and shape indicated, with no holes or knockouts. Cover is gasketed with oil-resistant gasket material and fastened with captive screws treated for corrosion resistance. Connections are flanged, with stainless-steel screws and oil-resistant gaskets.
- D. Description: PVC plastic, extruded and fabricated to size and shape indicated, with snap-on cover and mechanically coupled connections with plastic fasteners.
- E. 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.

2.6 SURFACE RACEWAYS

- A. Surface Metal Raceways: Galvanized steel with snap-on covers. Manufacturer's standard enamel finish in color selected by Architect.
 - 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. 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 from manufacturer's standard or custom colors.
 - 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. 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.

2.7 BOXES, ENCLOSURES, AND CABINETS

- 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 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.
 - 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. Metal Floor Boxes: Cast iron or sheet metal, fully adjustable, rectangular.
- E. Nonmetallic Floor Boxes: Nonadjustable, round.
- F. Small Sheet Metal Pull and Junction Boxes: NEMA OS 1.
- G. Cast-Metal Access, Pull, and Junction Boxes: NEMA FB 1, galvanized cast iron with gasketed cover.
- H. 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.
- I. 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.

- a. Nordic Fiberglass, Inc.

2.8 SLEEVES FOR RACEWAYS

- A. Steel Pipe Sleeves: ASTM A 53/A 53M, 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.
- D. Coordinate sleeve selection and application with selection and application of firestopping specified in Division 07 Section "Penetration Firestopping."

2.9 SLEEVE SEALS

- A. Basis-of-Design Product: Subject to compliance with requirements, provide the product indicated on Drawings or a comparable product by one 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 for each sealing element.
 - 3. Connecting Bolts and Nuts: Stainless steel of length required to secure pressure plates to sealing elements. Include one for each sealing element.

PART 3 - EXECUTION

3.1 RACEWAY APPLICATION

- A. Outdoors: Apply raceway products as specified below, unless otherwise indicated:
 - 1. Exposed Conduit: Rigid steel conduit, IMC.
 - 2. Concealed Conduit, Aboveground: Rigid steel conduit, IMC.
 - 3. Underground Conduit: Rigid steel conduit, RNC, Type EPC-40-PVC, direct buried unless concrete encasement is indicated on Drawings.
 - 4. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): LFMC (maximum length 5').

5. Boxes and Enclosures, Aboveground: NEMA 250, Type 4.
- B. Comply with the following indoor applications, unless otherwise indicated. All Garage areas shall be treated as Outdoor locations.
1. Exposed, Not Subject to Severe Physical Damage: EMT.
 2. 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.
 3. Concealed in Ceilings and Interior Walls and Partitions: EMT.
 4. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): FMC, except use LFMC in damp or wet locations (maximum length 5').
 5. Damp or Wet Locations: Rigid steel conduit, IMC.
 6. Raceways for Optical Fiber or Communications Cable in Spaces Used for Environmental Air: Plenum-type, optical fiber/communications cable raceway, EMT.
 7. Raceways for Optical Fiber or Communications Cable Risers in Vertical Shafts: Riser-type, optical fiber/communications cable raceway, EMT.
 8. 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.
 9. Boxes and Enclosures: NEMA 250, Type 1, except use NEMA 250, Type 4, stainless steel or nonmetallic in damp or wet locations.
- C. Minimum Raceway Size: 3/4-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. Install nonferrous conduit or tubing for circuits operating above 60 Hz. Where aluminum raceways are installed for such circuits and pass through concrete, install in nonmetallic sleeve.
- F. 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 Division 26 Section "Hangers and Supports for Electrical Systems."
- E. Arrange stub-ups so curved portions of bends are not visible above the finished slab.
- F. Install no more than the equivalent of three 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 RNC, Type EPC-40-PVC to 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. 3/4-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 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:

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 RMC and IMC: Install in each run of aboveground conduit at structural expansion joints and where otherwise required by NFPA 70. Materials shall comply with UL Standard 5148. Furnish with grounding strap and clamps. Use Crouse-Hinds Model XJ_81 or equal.
- O. Expansion-Joint Fittings for RNC: Install in each run of aboveground conduit that is located where environmental temperature change may exceed 30 deg F, 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 temperature change.
 - b. Outdoor Locations Exposed to Direct Sunlight: 155 deg F temperature change.
 - c. Indoor Spaces: Connected with the Outdoors without Physical Separation: 125 deg F 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 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.
- P. Flexible Conduit Connections: Use maximum of 60 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.
- Q. 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.
- R. Set metal floor boxes level and flush with finished floor surface.
- S. 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 specified in Division 07 Section "Penetration Firestopping."
 - 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 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 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 Division 07 Section "Joint Sealants" 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. Comply with Division 07 Section "Penetration Firestopping."
- 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.

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. Firestopping materials and installation requirements are specified in Division 07 Section "Penetration Firestopping."

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 260533

SECTION 26 05 48 - 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 260529 "Hangers and Supports for Electrical Systems" for commonly used electrical supports and installation requirements.

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:

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).

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/D1.1M, "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 of the following:
 - 1. Ace Mountings Co., Inc.
 - 2. Amber/Booth Company, Inc.
 - 3. California Dynamics Corporation.
 - 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 80 percent of the compressed height of the spring at rated load.
 2. Minimum Additional Travel: 50 percent of the required deflection at rated load.
 3. Lateral Stiffness: More than 80 percent of rated vertical stiffness.
 4. Overload Capacity: Support 200 percent of rated load, fully compressed, without deformation or failure.
 5. Baseplates: Factory drilled for bolting to structure and bonded to 1/4-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 1/4-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 80 percent of the compressed height of the spring at rated load.
 4. Minimum Additional Travel: 50 percent of the required deflection at rated load.
 5. Lateral Stiffness: More than 80 percent of rated vertical stiffness.
 6. Overload Capacity: Support 200 percent 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 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 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 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 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.
- 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 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.
- 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.

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: Engage a qualified testing agency to perform tests and inspections and prepare test reports.
- B. Perform tests and inspections.
- C. 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 post connection testing has been approved), and with at least seven days' advance notice.
 3. Obtain Architect's approval before transmitting test loads to structure. Provide temporary load-spreading members.
 4. Test at least four of each type and size of installed anchors and fasteners selected by Architect.
 5. Test to 90 percent 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.
- D. Remove and replace malfunctioning units and retest as specified above.

- E. 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.

END OF SECTION 260548

SECTION 260553 - IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. 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

IDENTIFICATION FOR ELECTRICAL SYSTEMS

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.

- 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.
- 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. 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.
- D. Self-Adhesive Vinyl Tape: Colored, heavy duty, waterproof, fade resistant; 2 inches wide; compounded for outdoor use.

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.
- 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 FLOOR MARKING TAPE

- A. 2-inch-wide, 5-mil pressure-sensitive vinyl tape, with black and white stripes and clear vinyl overlay.

2.6 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:
 - 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."

2.7 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.

2.8 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.
- E. Stenciled Legend: In nonfading, waterproof, black ink or paint. Minimum letter height shall be 1-inch.

2.9 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.

2.10 MISCELLANEOUS IDENTIFICATION PRODUCTS

- A. Paint: Comply with requirements in Division 09 painting Sections for paint materials and application requirements. Select paint system applicable for surface material and location (exterior or interior).

- B. 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.
- I. Underground-Line Warning Tape: During backfilling of trenches install continuous underground-line warning tape directly above line at 6 to 8 inches below finished grade. Use multiple tapes where width of multiple lines installed in a common trench or concrete envelope exceeds 16 inches overall.
- J. Painted Identification: Comply with requirements in Division 09 painting Sections for surface preparation and paint application.

3.2 IDENTIFICATION SCHEDULE

- A. 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.
- B. Accessible Raceways and Cables within Buildings: Identify the covers of each junction and pull box of the following systems with self-adhesive vinyl labels with the wiring system legend and system voltage. System legends shall be as follows:
 - 1. Emergency Power.
 - 2. Power.
- C. 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 240/120-V Circuits:
 - 1) Phase A: Black.
 - 2) Phase B: Red.
 - 3) Phase C: Blue.
 - c. 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.
- D. Install instructional sign including the color-code for grounded and ungrounded conductors using adhesive-film-type labels.
- E. Conductors to Be Extended in the Future: Attach marker tape to conductors and list source.

- F. 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.
- G. Locations of Underground Lines: Identify with underground-line warning tape for power, lighting, communication, and control wiring and optical fiber cable.
1. Limit use of underground-line warning tape to direct-buried cables.
 2. Install underground-line warning tape for both direct-buried cables and cables in raceway.
- H. 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.
- I. 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.
- J. 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.
- K. 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.
- L. 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:

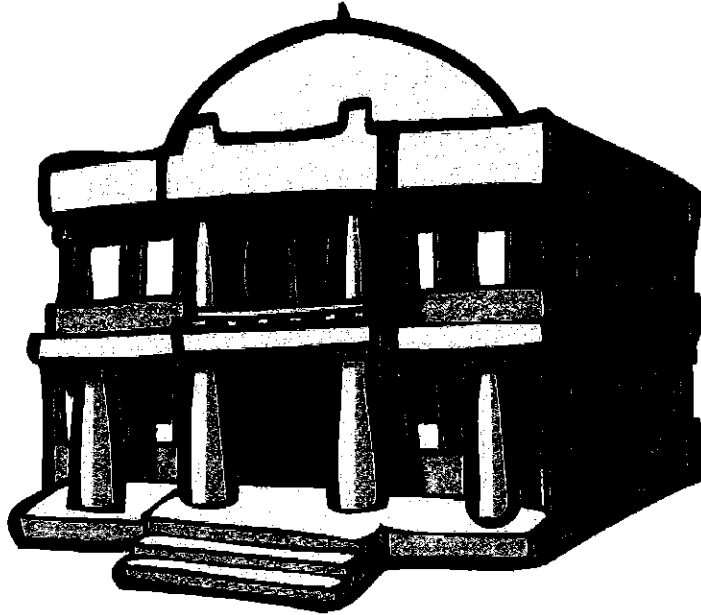
IDENTIFICATION FOR ELECTRICAL SYSTEMS

- 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.
 - 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. Emergency system boxes and enclosures.
 - e. Variable-speed controllers.
 - f. Power transfer equipment.
 - g. Contactors.
 - h. Remote-controlled switches, dimmer modules, and control devices.
 - i. Power-generating units.
 - j. Monitoring and control equipment.

END OF SECTION 260553

APPENDIX

**ASBESTOS MANAGEMENT PLAN
&
Three Year Update**



JULY 2017

**Hebron Elementary School
92 Church Street
Hebron, Connecticut 06248**



**SERVICES AND REPORT PERFORMED BY:
MYSTIC AIR QUALITY CONSULTANTS, INC.
1204 NORTH ROAD
GROTON, CONNECTICUT 06340**

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Certificate of Training

This program was presented at the
Courtyard Marriott in Cromwell, CT.
For asbestos Designated Persons this
course was approved for this site
by the CT DPH Asbestos Program.

Awarded to

WAYNE DUROCHER

*For successful completion of 4 hours of
Asbestos Awareness Training
Designed for L.E.A. Designated Persons
APRIL 5, 2017*

Recommended by EPA for AHERA Designated Persons
in Schools and required by State of Connecticut
Statute 19a-333-2 (h) (1-5)

Presented by

**Mystic Air Quality Consultants, Inc.
1204 North Road, Groton, CT 06340 (800) 247-7746**

Certificate Number: ADPAT25891

Exam Grade: 100

Expiration Date: 04/05/2018

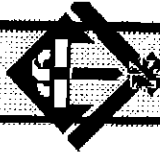
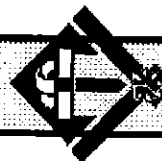
Exam Date: 04/05/2017



George Williamson, Training Director
Richard Hafley, Training Director



Christopher J. Eident, CIH, CSP, RS



Current Notification of Management Plan Availability



HEBRON PUBLIC SCHOOLS
High Expectations, Bright Futures

[MENU](#) [SCHOOLS](#)

DISTRICT OFFICE // ENVIRONMENTAL / PEST MANAGEMENT

ASBESTOS MANAGEMENT PLANS

This notification is required by the Asbestos Hazard Emergency Response Act (AHERA, 40 CFR Part 763 of Title II of the Toxic Substance Control Act).

Asbestos management plans have been developed for:

Gilead Hill School
580 Gilead St
Hebron, CT 06248

Hebron Elementary School
92 Church St
Hebron, CT 06248

These plans are available and accessible to the public at each individual facility as well as the Hebron Administrative Office.

INDOOR AIR QUALITY (IAQ) MANAGEMENT PLAN

The health, comfort, and learning environment of students and staff are important aspects of Hebron Public School's mission. Working with EPA and their IAQ Tools for Schools Program, we developed an IAQ Management Plan that will help monitor and improve the quality of air in school buildings. The objective of this IAQ Management Plan are:

- Reduce the levels of indoor air pollutants through preventive measure such as routine maintenance activities, periodic building evaluations and inspections, and IAQ-specific policies.
- Provide and maintain adequate airflow by repairing and maintaining ventilation equipment, which will promote a comfortable and healthy learning and working environment.
- Respond to IAQ-related concerns and problems in a prompt and thorough manner, and effectively communicate the progress of investigations and their resolution to all interested parties.

HAZARD COMMUNICATION PROGRAM

I. INTRODUCTION

It is the intention of Hebron Public Schools to comply fully in a prudent manner with all occupational safety and health standards/regulations. Consequently, this program to comply with the Department of Labor, Occupational Safety and Health Administration's Hazard Communication Standard 29 CFR 1910.1200 will be implemented and enforced.

The program applies to any hazardous chemicals, which are known to be present on the premises, to which employees may be exposed under normal conditions of use or in a foreseeable emergency. This written Hazard Communication Program will be available to all employees in the school office for review at all times.

II. HAZARDOUS CHEMICALS LIST

Hebron Public Schools has established and will maintain a list of all the hazardous chemicals used on the premises. Administration/Maintenance Foreman will be responsible for the maintenance of this list. This master list can be found in the school office.

III. LABELING OF HAZARDOUS CHEMICALS

Administration/Foreman will verify that all hazardous chemical containers that are received for use are labeled with the: a) Product Identifier; b) Signal Word; c) Hazard Statement(s); d) Pictograms(s); e) Precautionary Statement(s) and f) Name, address and telephone number of the chemical manufacturer, importer or other responsible party. In addition Administration/Foreman will verify that all solid materials, not exempted due to their downstream use, are initially delivered with the required label.

Administration/Foreman will ensure that all secondary containers are labeled with either an extra copy of the original manufacturer's label or with our company's own labels. These labels will have the product identifier and words, pictures, symbols, or a combination thereof, which provide at least general information regarding the hazards of the chemicals.

IV. SAFETY DATA SHEETS (SDS)

Copies of the SDSs for all hazardous chemicals to which employees of this company may be exposed will be in the school offices. These

SDSs will be available to all employees for review during each work shift.

When ordering a new hazardous chemical, it is the responsibility of Administration/Foreman to assure that the SDS file is kept up to date.

Employees who would like a copy of a SDS for specific chemical(s) should contact Administration/Foreman.

V. INFORMATION & TRAINING

It is the policy of Hebron Public Schools to provide a hazard communication information and training program to all employees at the time of a new employee's initial assignment, and whenever a new hazard is introduced into the workplace. This information and training program will include:

- An overview of the requirements contained in the Hazard Communication Standard, 1910.1200
- Chemicals present in workplace operations
- Location and availability of our written hazard communication program, including our list of hazardous chemicals and safety data sheets
- Physical, health, simple asphyxiation, combustible dust, pyrophoric gas hazards, as well as hazards not otherwise classified, of the chemicals in the work area
- Methods and observation techniques used to determine the presence or release of hazardous chemicals in the work area
- How to lessen or prevent exposure to these hazardous chemicals through usage of control/work practices and personal protective equipment
- Steps the company has taken to lessen or prevent exposure to these chemicals
- Safety emergency procedures to follow if they are exposed to these chemicals
- How to read labels on shipped containers and an explanation of the workplaces' labeling system.
- How to read and obtain information from a SDS and how to understand the order of information presented on a SDS

It will be the responsibility of Administration/Foreman to implement the training program and maintain the training records.

VI. CONTRACTOR WORK

When it is necessary for an outside contractor to perform work at Hebron Public Schools, it shall be the responsibility of Administration/Foreman to inform the contractor of the identity of any hazardous chemicals to which the contractor may be exposed. The procedure for informing the contractor will include the following:

1. Making the hazardous chemicals inventory of any designated work area where contract work is being performed available to the contractor and advise the contractor of the labeling system.
2. Making the SDS's of the identified hazardous chemicals in a designated work area available to the contractor.
3. Making the contractor aware of the appropriate protective measures taken by Hebron Public Schools employees in a designated work area.

It is also the responsibility of Administration/Foreman to determine if the contractor will be using any hazardous chemicals and, if so, to take appropriate actions to assure the protection of the Hebron Public Schools employees.

VII. HAZARDS OF NON ROUTINE TASKS

Prior to starting work on hazardous non routine tasks, every affected employee will be given information by Administration/Foreman about the hazardous chemical(s) to which they may be exposed. Such information will include, but not be limited to the specific hazards associated with the chemical(s), protective measures (i.e. personal protective equipment, work practices, engineering controls etc.) and emergency procedures.

PESTICIDE MANAGEMENT

The Hebron Board of Education has developed an Integrated Pest Management (IPM) plan based on the guidelines in Public Act 99-165.

The goal of IPM is to deliver effective pest control while at the same time reducing the volume and toxicity of pesticide used as well as human and environmental exposure to pesticides. Each school will contract monthly monitoring to aid in the early detection of pest problems. Both physical and cultural solution will be employed to decrease our reliance on pesticides. When chemical treatments are required, pesticidal baits will be utilized first whenever practical. Problems requiring further treatments or situations when baits are not practical will be treated using products from an established hierarchy starting with the least toxic products first.

All pesticides will be applied by licensed applicators with either a supervisory certification or an operational certification under the direction of a supervisor. Emergency applications may be made by staff providing they are not restricted use pesticides.

Staff, parents, and guardians may register at the school to be notified 24 hours prior to the application of a pesticide (excluding baits). Emergency applications to correct an immediate threat to the health of students or staff will be notified by any means practical on or before the day of the application.

Additional Resources:

- Hebron Board of Education policy 1003
- Hebron Elementary Integrated Pest Management Plan
- Gilead Hill Integrated Pest Management Plan

WATER QUALITY MONITORING

Results of the Connecticut Department of Public Health Drinking Water Section routine inspections.

HEBRON SCHOOLS

580 GILEAD STREET
HEBRON, CT 06248
PH (860) 228-2577
FAX (860) 228-2235

GILEAD HILL

580 GILEAD STREET
HEBRON, CT 06248
PH (860) 228-9458
FAX (860) 228-1106
HEALTH ROOM (860) 228-4933

HEBRON ELEMENTARY

92 CHURCH STREET
HEBRON, CT 06248
PH (860) 228-9465
FAX (860) 228-1378
HEALTH ROOM (860) 228-8420

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ROSTER OF ACM AND ASSUMED ACM

**ROSTER OF ASBESTOS CONTAINING
& ASSUMED ASBESTOS CONTAINING MATERIALS**
3 Year Reinspection – August 2017

Inspector: Lois D. Taylor - MAQC

School Building Name: Hebron Elementary School

Street/City/Zip: Route 85/Church St. Hebron, CT

FLOOR TILE & MASTIC ACCESSIBLE	LOCATION	AMOUNT	MATERIAL ABATED	
			(check) Yes (date)	No
1x1 gray speck floor tile and mastic beneath	Hall to 1988 wing and basement	600 sq. ft.		
9x9 pink floor tile and mastic beneath (lite brown)	Classrooms 11 and 13. 1963 wing (see diagram)	1600 sq. ft.		
9x9 dark brown tile and mastic beneath	Classrooms, 12, 14, 15, and 9. 1963 wing (see diagram)	3700 sq. ft.		
9x9 pink & 9x9 brown tile and mastic	Storerooms of 1963 wing	1800 sq. ft.		
Areas where 9x9 tile underlays Replacement tile	Teacher's lounge and Health room	1250 sq. ft.		
9x9 green tile and mastic beneath	Classroom 10, 16 and side exit 1963 wing (see diagram)	1800 sq. ft.		

Please add comments or details concerning areas of partial abatement in a particular area:

If materials were abated please note on periodic surveillance forms also!!

**ROSTER OF ASBESTOS CONTAINING
& ASSUMED ASBESTOS CONTAINING MATERIALS**

3 Year Reinspection – August 2017

Inspector: Lois D. Taylor - MAQC

School Building Name: Hebron Elementary School

Street/City/Zip: Route 85/ Church St. Hebron, CT

MATERIAL	LOCATION	AMOUNT	MATERIAL ABATED Yes (date)/ No
Transite boards on bookshelves	Classrooms 10, 11, 13, 15 1963 wing only	700 sq. ft.	
Sheetrock/Wallboard	Areas throughout building (some inaccessible)	Unknown	
Fire doors - insulation inaccessible	All doors throughout building	Unknown	
Window caulking & glazing compound	All windows front offices	Unknown	

Please add comments or details concerning areas of partial abatement in a particular area:

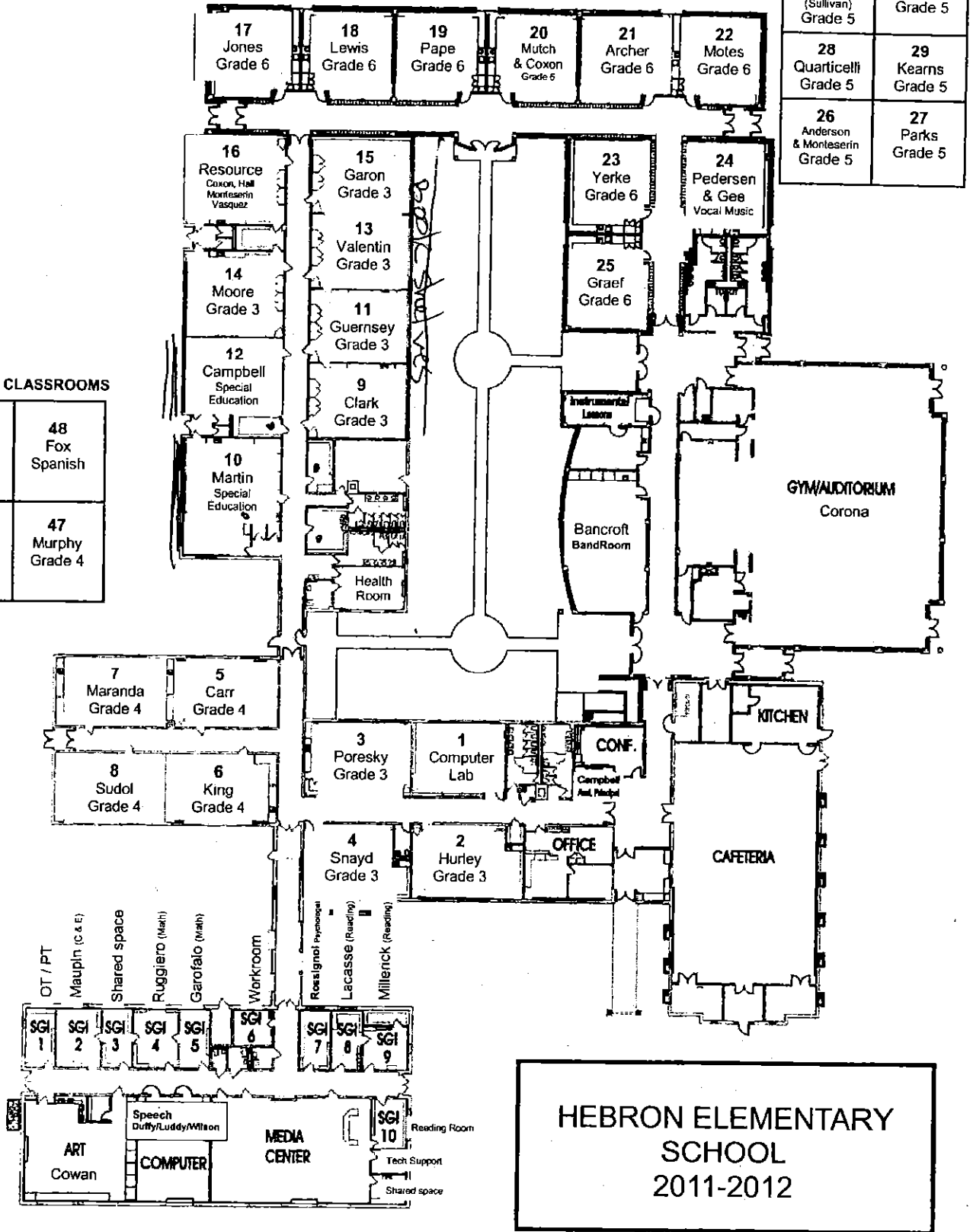
If materials were abated please note on periodic surveillance forms also!!

**DIAGRAMS OF FLOOR COVERINGS AND OTHER
ACBM LOCATIONS**

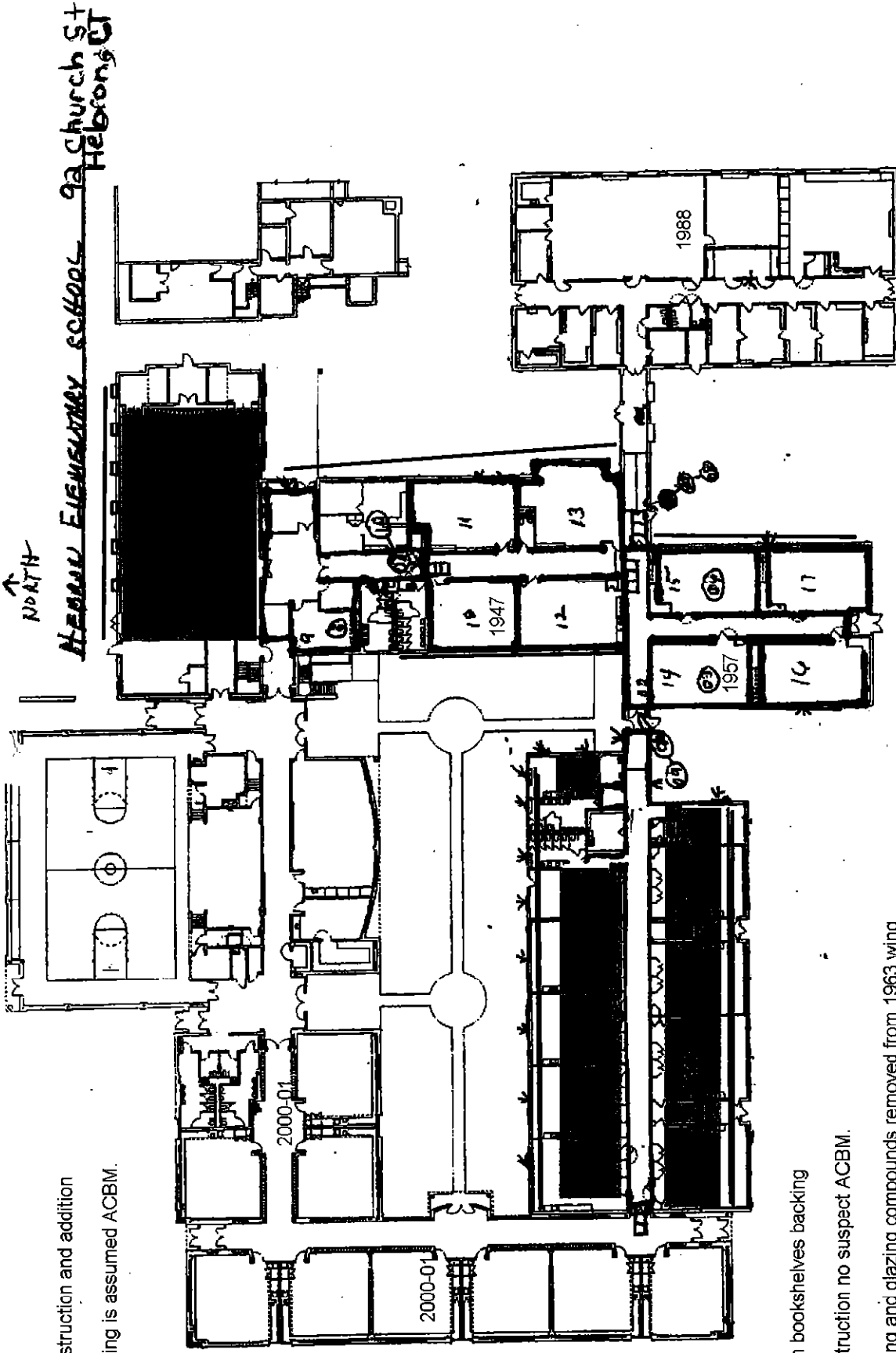
30 Costa (Sullivan) Grade 5	31 Green Grade 5
28 Quarticelli Grade 5	29 Kearns Grade 5
26 Anderson & Monteserin Grade 5	27 Parks Grade 5

MODULAR CLASSROOMS

50 VanCamp Grade 4	48 Fox Spanish
49 Wales (Hand) Grade 4	47 Murphy Grade 4



**HEBRON ELEMENTARY
 SCHOOL
 2011-2012**



NORTH ↑

HEBRON ELEMENTARY SCHOOL 92 Church St Hebron, CT

New construction and addition

Cove molding is assumed ACBM.



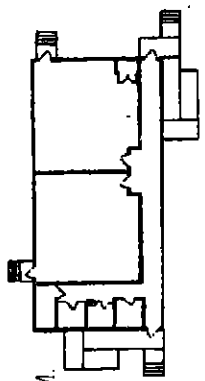
— Transite in bookshelves backing

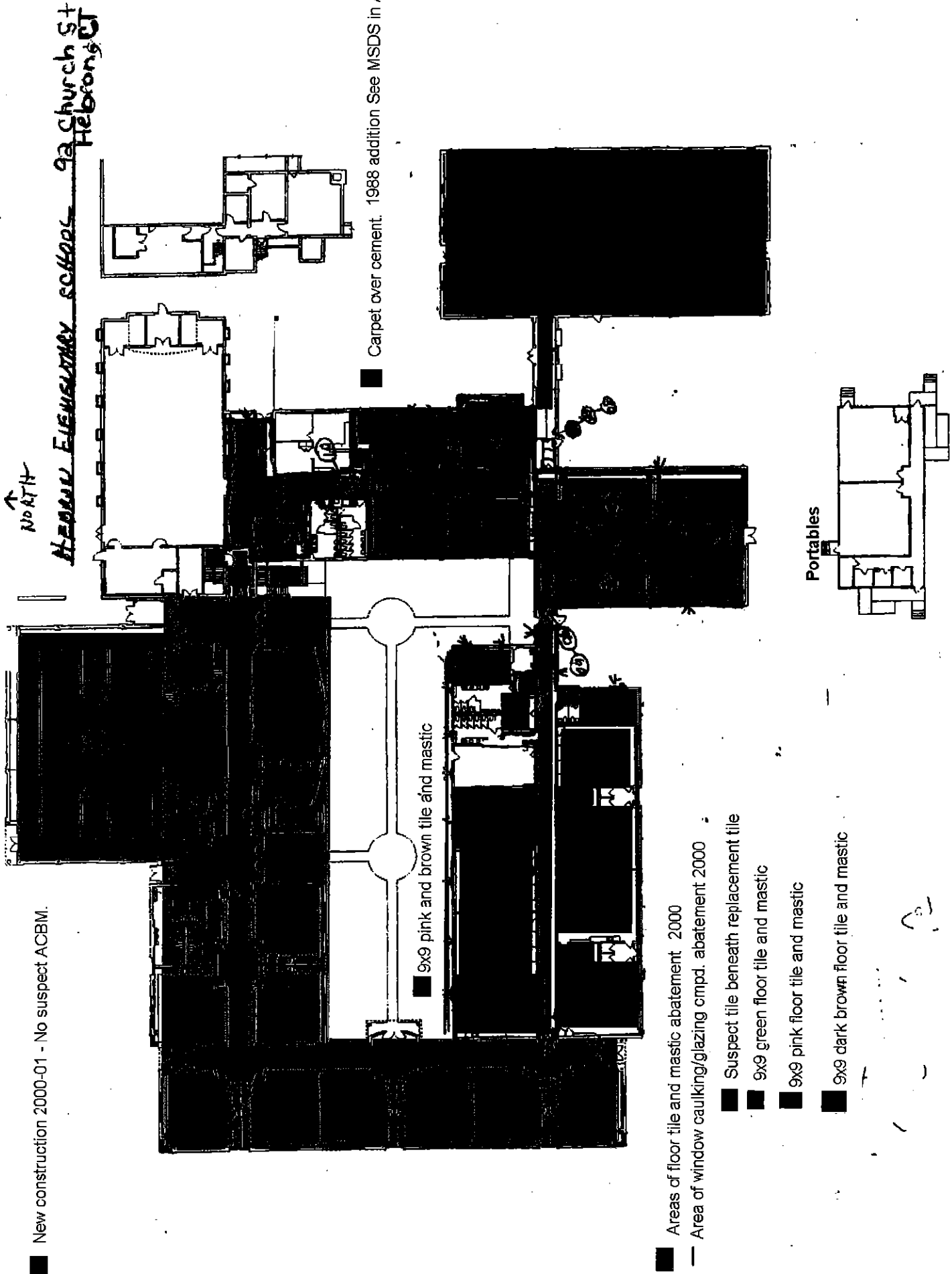
New Construction no suspect ACBM.

Window caulking and glazing compounds removed from 1963 wing.

— Window caulking and glazing compounds in 1947 & 1957 wings.

ALL SHEETROCK AND FIRE DOORS EXCEPT NEW CONSTRUCTION IS ASSUMED ACBM.





**REASSESSMENT OF KNOWN
OR
ASSUMED ACBM**

**ASBESTOS HAZARD EMERGENCY RESPONSE ACT
THREE YEAR REINSPECTION AND
MANAGEMENT PLAN UPDATE
REASSESSMENT OF KNOWN OR ASSUMED ACBM**

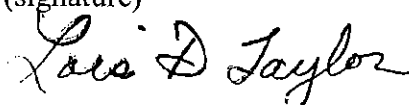
SCHOOL NAME: Hebron Elementary School
SCHOOL ADDRESS: Church Street
Hebron, Connecticut

DATE: 7/19/17

INSPECTOR: (print) Lois D. Taylor (signature)

MANAGEMENT PLANNER: (print) Lois D. Taylor (signature)

STATE OF ACCREDITATION: CT
ACCREDITATION NUMBER: 000211



.....
AREA: 1) 9x9 and 12x12 Vinyl Floor Tiles and Mastic and Linoleum- See diagram
Abatement and tile replacement took place in the central main hall in 2004 and abatement in
the main office (previously under carpet) also.

SAMPLE #'S: Assumed

TYPE: MISC

QUANTITY: 8000 sq. ft.

CONDITION/FRIABILITY: UD/NF

DAMAGE POTENTIAL: P

RESPONSE ACTION/SCHEDULE: Place material in operations and maintenance
program.

Do not sand, grind nor abrade.

If tiles become damaged or disturbance of tiles are
anticipated, the specific areas should be sampled
and analyzed by state of the art technology and
treated accordingly.

RATIONALE/COMMENTS: Reduce the likelihood of fiber release.

Protect human health and the environment.

.....
LEGEND: Types - TSI = Thermal System Insulation, SURF = Surfacing

MISC = Miscellaneous

Condition - UD = Undamaged, D = Damaged, SD = Signif. Damage

F = Friable, NF = Not Friable

Damage - P = Potential, SP = Significant Potential

**ASBESTOS HAZARD EMERGENCY RESPONSE ACT
THREE YEAR REINSPECTION AND
MANAGEMENT PLAN UPDATE
REASSESSMENT OF KNOWN OR ASSUMED ACBM**

SCHOOL NAME: Hebron Elementary School
SCHOOL ADDRESS: Church Street
Hebron, Connecticut

DATE: 7/19/17

INSPECTOR: (print) Lois D. Taylor (signature)

MANAGEMENT PLANNER: (print) Lois D. Taylor (signature)

STATE OF ACCREDITATION: CT
ACCREDITATION NUMBER: 000211



.....

AREA: 2) Transite Bookshelves - Backing - 1963 wing Classrooms 10, 11, 13, 15

SAMPLE #'S: Not Sampled - Assumed

TYPE: MISC

QUANTITY: 700sq. ft.

CONDITION/FRIABILITY: UD/NF

DAMAGE POTENTIAL: P

RESPONSE ACTION/SCHEDULE: Place material in operations and maintenance program.

RATIONALE/COMMENTS: Reduce the likelihood of fiber release.

Protect human health and the environment.

.....
LEGEND: Types - TSI = Thermal System Insulation, SURF = Surfacing
MISC = Miscellaneous
Condition - UD = Undamaged, D = Damaged, SD = Signif. Damage
F = Friable, NF = Not Friable
Damage - P = Potential, SP = Significant Potential

**ASBESTOS HAZARD EMERGENCY RESPONSE ACT
THREE YEAR REINSPECTION AND
MANAGEMENT PLAN UPDATE
REASSESSMENT OF KNOWN OR ASSUMED ACBM**

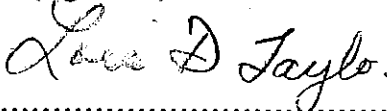
SCHOOL NAME: Hebron Elementary School
SCHOOL ADDRESS: 95 Church Street
Hebron, Connecticut

DATE: 7/19/17

INSPECTOR: (print) Lois D. Taylor (signature)

MANAGEMENT PLANNER: (print) Lois D. Taylor (signature)

STATE OF ACCREDITATION: CT
ACCREDITATION NUMBER: 000211



.....
AREA: 3) Sheetrock/Wallboard - Various areas throughout the school, many areas are inaccessible.

SAMPLE #'S: Not Sampled

TYPE: MISC

QUANTITY: Unknown

CONDITION/FRIABILITY: UD/F

DAMAGE POTENTIAL: P

RESPONSE ACTION/SCHEDULE: Place material in operations and maintenance plan.

RATIONALE/COMMENTS: Since there may be a number of different homogeneous areas of wallboard, all wallboard must be assumed to contain asbestos. If any specific areas are going to be disturbed, the material in that area should be sampled and analyzed for asbestos content.

.....
LEGEND: Types - TSI = Thermal System Insulation, SURF = Surfacing
MISC = Miscellaneous
Condition - UD = Undamaged, D = Damaged, SD = Signif. Damage
F = Friable, NF = Not Friable
Damage - P = Potential, SP = Significaht Potential
Potential

**ASBESTOS HAZARD EMERGENCY RESPONSE ACT
THREE YEAR REINSPECTION AND
MANAGEMENT PLAN UPDATE
REASSESSMENT OF KNOWN OR ASSUMED ACBM**

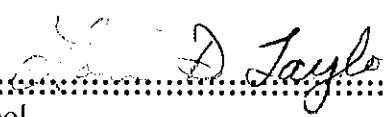
SCHOOL NAME: Hebron Elementary School
SCHOOL ADDRESS: Church Street
Hebron, Connecticut

DATE: 7/19/17

INSPECTOR: (print) Lois D. Taylor (signature)

MANAGEMENT PLANNER: (print) Lois D. Taylor (signature)

STATE OF ACCREDITATION: CT
ACCREDITATION NUMBER: 000211



.....
AREA: 4) Fire Doors - All doors throughout school

SAMPLE #'S: Not Sampled

TYPE: MISC

QUANTITY: Unknown

CONDITION/FRIABILITY: UD/F

DAMAGE POTENTIAL: P

RESPONSE ACTION/SCHEDULE: Place material in operations and maintenance plan.

RATIONALE/COMMENTS:

Since there may be a number of different types of fire doors throughout all buildings, all doors must be considered asbestos containing. The suspect asbestos containing material in the doors is typically inaccessible. Samples taken from any one door may not be representative of other doors in the school. Prior to performing any maintenance on any door (lock changes, planing, sanding or drilling, etc.) the specific door should be sampled by qualified personnel to determine composition.

.....
LEGEND: Types - TSI = Thermal System Insulation, SURF = Surfacing
MISC = Miscellaneous
Condition - UD = Undamaged, D = Damaged, SD = Signif. Damage
F = Friable, NF = Not Friable
Damage - P = Potential, SP = Significant Potential
Potential

**ASBESTOS HAZARD EMERGENCY RESPONSE ACT
THREE YEAR REINSPECTION AND
MANAGEMENT PLAN UPDATE
REASSESSMENT OF KNOWN OR ASSUMED ACBM**

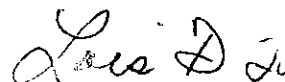
SCHOOL NAME: Hebron Elementary School
SCHOOL ADDRESS: 95 Church Street
Hebron, Connecticut

DATE: 7/19/17

INSPECTOR: (print) Lois D. Taylor (signature)

MANAGEMENT PLANNER: (print) Lois D. Taylor (signature)

STATE OF ACCREDITATION: CT
ACCREDITATION NUMBER: 000211



.....
AREA: 5) Cove molding and mastic – 1960 wing in Storeroom and Equipment room and the Cafeteria and Kitchen area.

SAMPLE #'S: Not Sampled - Assumed

TYPE: MISC

QUANTITY: 400 linear ft.

CONDITION/FRIABILITY: UD/NF

DAMAGE POTENTIAL: P

RESPONSE ACTION/SCHEDULE: Place material in operations and maintenance program.

RATIONALE/COMMENTS: Reduce the likelihood of fiber release.

Protect human health and the environment.

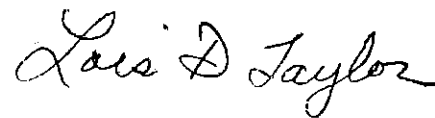
.....
LEGEND: Types - TSI = Thermal System Insulation, SURF = Surfacing
MISC = Miscellaneous
Condition - UD = Undamaged, D = Damaged, SD = Signif. Damage
F = Friable, NF = Not Friable
Damage - P = Potential, SP = Significant Potential
Potential

**ASBESTOS HAZARD EMERGENCY RESPONSE ACT
THREE YEAR REINSPECTION AND
MANAGEMENT PLAN UPDATE
REASSESSMENT OF KNOWN OR ASSUMED ACBM**

SCHOOL NAME: Hebron Elementary School
SCHOOL ADDRESS: 85 Church Street
Hebron, Connecticut

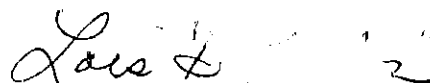
DATE: 7/17/17

INSPECTOR: (print) Lois D. Taylor (signature)



MANAGEMENT PLANNER: (print) Lois D. Taylor (signature)

STATE OF ACCREDITATION: CT
ACCREDITATION NUMBER: 000211



.....

AREA: 6) All window caulking and glazing compound- Main office wing only

SAMPLE #'S: Not Sampled - Assumed

TYPE: MISC

QUANTITY: unknown

CONDITION/FRIABILITY: UD/NF

DAMAGE POTENTIAL: P

RESPONSE ACTION/SCHEDULE: Place material in operations and maintenance Program

RATIONALE/COMMENTS: Since there may be a number of different types of caulking on windows throughout the buildings, all caulking and glazing compounds must be considered asbestos containing. The suspect asbestos containing material in the doors is typically inaccessible. Samples taken from any one window may not be representative of other windows in the school. Prior to performing any maintenance on any window (lock changes, planing, sanding or drilling, etc.) the specific window should be sampled by qualified personnel to determine composition.

.....

LEGEND: Types - TSI = Thermal System Insulation, SURF = Surfacing
MISC = Miscellaneous

Condition - UD = Undamaged, D = Damaged, SD = Signif. Damage
F = Friable, NF = Not Friable

Damage - P = Potential, SP = Significant Potential

NOTES

Replacement Materials – Floor coverings

Since the original AHERA inspection and management plan formulation this school has had replacement materials installed, such as but not limited to new vinyl floor tile and mastic.

The material safety data sheets for these replacement materials should be obtained and included in the updated management plan to verify that the replacement materials are not asbestos containing.

NOTES

The following is a list of suspect asbestos containing materials that may contain asbestos. Unless samples of the materials prove negative, these items need to be considered asbestos containing. If any specific area is going to be disturbed, the material should be sampled and analyzed for asbestos content.

- Cement pipes
- Cement wallboard
- Cement siding
- Asphalt Floor tile
- Vinyl floor tile
- Vinyl sheet flooring
- Flooring backing
- Construction Mastics (floor tile, carpet, ceiling tile)
- Acoustical Plaster
- Decorative Plaster
- Textured paints and coatings
- Ceiling tiles and Lay-in panels
- Spray Applied Insulation
- Blown-in Insulation
- Fireproofing materials
- Taping compounds (thermal)
- Packing materials (for wall and floor penetrations)
- High Temperature Gaskets
- Laboratory Hoods/Table tops
- Laboratory Gloves
- Fire Blankets
- Fire Curtains
- Elevator Equipment Panels
- Elevator brake shoes
- HVAC Duct insulation
- Boiler Insulation
- Breeching Insulation
- Ductwork flexible fabric connectors
- Cooling towers
- Pipe insulation (corrugated aircell, block, etc)
- Heating and electrical ducts
- Electrical Panel partitions
- Electrical cloth
- Electrical wiring insulation
- Chalkboards
- Roofing shingles and felt
- Base flashing
- * Thermal paper products
- * Fire doors
- * Caulking and Putties
- * Adhesives
- * Wallboard
- * Joint compounds
- * Vinyl wall coverings
- * Spackling Compounds

Glue Daubs & Acoustical Ceiling tile & behind blackboards

Please note that acoustical ceiling tile is located in various places throughout the school. While the tiles and blackboards themselves did not reveal regulated levels of asbestos in the original inspection, it is unknown in that in some areas whether suspect asbestos containing glue daubs are attached to the tiles. If the glue exists, it is currently inaccessible. Prior to the tiles or chalkboards ever having to be disturbed they should be selectively demolished to determine if any glue or other suspect materials associated with the glue are revealed. All suspect asbestos containing materials must be handled accordingly. Additionally, any spaces above the acoustical ceiling tiles are currently inaccessible. If renovations involve areas above the ceiling, selective demolition should also occur prior to the renovations to determine if in fact there are any suspect asbestos containing materials present.

Replacement Materials -- Floor coverings

Since the original AHERA inspection and management plan formulation this school has had replacement materials installed, such as but not limited to new vinyl floor tile and mastic.

The material safety data sheets for these replacement materials should be obtained and included in the updated management plan to verify that the replacement materials are not asbestos containing.

**Standard Maintenance Procedures for ACM including
Preventative Measures**

Standard Procedures for Maintenance of Asbestos-Containing Materials, including Preventative Measures

These asbestos containing or assumed asbestos containing building materials commonly found in schools may or may not be in this particular building. For those which apply, the following maintenance procedures and preventative measures will be implemented. Note that the materials in the beginning of the list tend to be more accessible and those at the end of the list tend to be inaccessible materials. This list is not all inclusive – see the roster of materials in this specific management plan for these or other materials.

“Proper asbestos operations” referenced below require: (a) review of AMP to determine sampling results, (b) collection of samples by a licensed inspector if sample results are not available, (c) disturbance of less than 3 square feet of asbestos-containing material conducted only by a person trained in O&M operations (16 hr training), (d) disturbance or removal of more than 3 square feet of asbestos-containing material conducted only by 32 hour trained abatement workers and 40 hour trained asbestos abatement supervisors employed by a state licensed asbestos abatement contractor.

This information will be presented as part of the asbestos awareness 2 hour training program given to employees at hire and annual refreshers as well as to outside contractors.

This section complies with CT schools rule regulation 19a-333-6 (d)(6) requiring a list of “preventative measures which might eliminate the reasonable likelihood of undamaged ACM from becoming damaged or significantly damaged.”

Resilient flooring (tiles, linoleum and mastic)

Asbestos containing and assumed asbestos containing resilient floor coverings, including floor tiles and linoleum products, should be kept in good repair. The acceptable OSHA recommended maintenance procedures include the following: When stripping floors use only wet methods and use buffer speeds under 300 rpm. Never cause flooring to be abraded, chipped, drilled, gouged, or sanded. Resilient floors should be kept well polished to protect against fiber release and not be allowed to be removed from floors without proper asbestos operations.

Vinyl cove base moldings and adhesives

Asbestos containing and assumed asbestos containing wall baseboard vinyl cove molding products and their adhesives (mastics) should be kept in good repair and not be allowed to be cut into, abraded, or peeled off walls without proper asbestos operations.

Standard Procedures for Maintenance of Asbestos-Containing Materials, including Preventative Measures

Floor and cove molding substrates

The same is true of working with resilient floorings and cove moldings that have a non-asbestos designation. The adjacent and underlying floor mastics and adhesives and wall substrates (especially plaster or sheet rock) must also be reviewed for asbestos content considerations before they are disturbed by the activity on the resilient flooring and cove molding themselves, including possibilities of multiple layers of flooring or molding adhesives.

Carpeting

Though carpeting is not a suspect asbestos containing material, there are asbestos related preventative measures associated with carpeting. Carpets may be adhered to asbestos containing floorings and have asbestos containing carpet adhesives. Additionally carpeting placed directly onto cement floors may be contaminated with floor tile mastics from previous flooring applications. In either case, carpet removal will only be performed after appropriate review of potential disturbance of underlying asbestos containing or suspect asbestos containing materials has been performed and without proper asbestos operations.

Wall and ceiling plaster and sheet rock and joint compound

Asbestos containing and assumed asbestos containing wall and ceiling plasters, sheetrock and joint compound should be kept in good repair and not be allowed to be cut into, abraded, drilled, nailed or screwed into, without proper asbestos operations. This includes, but is not limited to, brackets for hanging items, settings for anchoring cable or wire trays, mounting or insertion of electrical wire, conduit, junction boxes, light fixtures or outlets, mounting or inserting thermostats, fire suppression system mounting, etc.

In addition, accessing areas above fixed ceilings or behind walls through access panels and hatchways is an activity likely to disturb potentially present asbestos or suspect asbestos containing materials in the plenum above the tiles such as but not limited to spray-on fireproofing, pipe and pipe fitting insulations, duct insulations, roof drain insulation, etc. Before accessing these areas by opening access panels or hatches, the AMP will be reviewed to identify areas considered restricted for such access. Also labels signifying the presence of asbestos containing materials will be proactively sought out adjacent to or on the face of or on the underside of such panels.

Standard Procedures for Maintenance of Asbestos-Containing Materials, including Preventative Measures

Ceiling tiles and materials overhead

There are two designations for ceiling tiles commonly used in AMPs: suspended or lay-in tiles and acoustical tiles. Suspended or lay-in ceiling tiles rest in a grid work attached at the walls with channels and hung by wires from the overhead above the grid. Acoustical tiles are affixed by a variety of means, including but not limited to, sliding into a metal channel right at the overhead (so-called spline ceiling), nailing, adhering with glue daubs, adhering with a troweled on adhesive.

Asbestos containing and assumed asbestos containing ceiling tiles should be kept in good repair and not be allowed to be cut into, abraded, drilled, nailed or screwed into, without proper asbestos operations. This includes, but is not limited to, installing or replacing light bulbs; hanging decorative or instructional materials from tiles; using the grid work for supporting materials; cutting or drilling to make access for electrical, computer, cable TV, security, phone lines, etc. This also applies to acoustical ceiling tiles mounted to walls for sound proofing in areas such as but not limited to band rooms, language labs, computer or typing labs, remedial reading or speech therapy rooms, etc.

In addition, accessing areas above suspended ceiling tiles is an activity likely to disturb potentially present asbestos or suspect asbestos containing materials in the plenum above the tiles such as but not limited to spray-on fireproofing, pipe and pipe fitting insulations, duct insulations, roof drain insulation, etc. Before accessing these areas by removing tiles, the AMP will be reviewed to identify areas considered restricted for such access.

The same is true of working with acoustical tiles that have a non-asbestos designation. The adjacent associated substrates and adhesives (glue daubs, troweled on adhesive or mastic, plaster or sheet rock) must also be reviewed for appropriate proper asbestos operations considerations before they are disturbed by the activity on the tiles themselves.

Black boards, bulletin boards and substrates

Black boards, white erase boards, and bulletin boards are seldom suspect asbestos containing materials (some black board slates are). The adjacent associated substrates and adhesives (glue daubs, troweled on adhesive or mastic, plaster or sheet rock) must also be reviewed for appropriate proper asbestos operations considerations before these wall hung and affixed boards are removed or renovated so as to prevent asbestos substrate disturbance by the activity on the boards themselves.

Standard Procedures for Maintenance of Asbestos-Containing Materials, including Preventative Measures

Pipe insulation

Asbestos containing and assumed asbestos containing pipe insulation should be kept in good repair, labelled, and not be allowed to be stepped on, climbed on, cut into, drilled, or disturbed in any other way, without proper asbestos operations. This includes preventative measures to prevent insulation deterioration by contact or water damage, such as, but not limited to, not hanging decorative or instructional materials from pipe insulations; storing maintenance materials (ladders, fire extinguishers, protective clothing, tools, etc.) away from pipe insulations; placing protective metal caging or shields between insulations and sources of physical impact (insulations in storage areas, insulations in gym and locker areas, insulations in access lanes in mechanical spaces, etc.) as long as the shields do not themselves come in contact with the insulation and their installation does not disturb the insulation. Any methods of protecting pipe insulation from damage that involves physical contact with the insulation itself must be conducted only as activities employing proper asbestos operations.

Flex connectors in duct work & duct insulation

The identical maintenance and preventative measures apply to duct insulation as those noted above for pipe insulation. Additionally, woven cloth flex connectors that are located between sections of ductwork are usually assumed to be asbestos containing because sampling them for your AMP could compromise their integrity and perhaps cause a fiber release inside the ductwork. Operations involving installation of sensors for measuring temperature, humidity, flow rate or air quality within the ducts and any duct cleaning operations can not disturb these insulations without proper asbestos controls.

Boiler packings & interior mechanical and HVAC component insulation

Within HVAC and mechanical system components there may be asbestos containing interior insulations, packings and/or gaskets not listed in your AMP because access to them under normal conditions is not feasible. Whenever systems or system component interiors are going to be maintained or when these components are extracted from the system, these asbestos containing or assumed asbestos containing materials must only be handled as proper asbestos operations. This includes, but is not limited to, boiler packing between tubes, boiler door gaskets, fire brick and lining insulations in fireboxes. Since it is not uncommon to leave interior components intact when exterior boiler insulations are removed, it is essential to examine the details of boiler insulation abatements in the AMP records before proceeding with any interior boiler (or other HVAC component) activity.

Standard Procedures for Maintenance of Asbestos-Containing Materials, including Preventative Measures

Not necessarily to the exclusion of materials listed previously in this section, many of the following materials may not be listed in your AMP (Asbestos management Plan). This is because they are (a) usually not sampled and are carried automatically as other or inaccessible suspect materials, or (b) they are not required by asbestos in schools rules to be included in the inspection and management plan protocol.

Nevertheless they are potential sources of asbestos fiber release episodes and are for that reason included in this section of your Asbestos management Plan dealing with maintenance of asbestos containing materials and preventative measures.

Insulation inside fire doors

Fire doors are sometimes marked with an embossed metal plaque located on the door jamb or on the inside edge of the door that closes against the jamb nearest the hinges. There is no guarantee that such an identification exists on every door. Universal precautions apply as a key preventative measure for disturbing these interior, inaccessible materials. They may be in the form of a loose powder, as a honeycombed fireproofing material or as a sheet product placed within the door.

Preventative measures for these products include removing doors only by loosening the hinges and closing restraints by removing pins or by extracting screws in the door jamb only. Doors requiring servicing should be physically removed to a controlled area so the servicing can be performed as a proper asbestos operation. Such servicing includes any activity that compromises the integrity of the outer seal of the door, such as, but not limited to, changing out locks or door hardware for normal repair or for handicap access codes, resizing doors so they fit over newly installed floor coverings or carpeting, installing viewing ports through doors, drilling holes for attaching newly placed hinges or door closing restraints.

Cafeteria vent hoods & interior kitchen/cooking component insulation

Within cafeteria cooking vent hoods and inside kitchen service or cooking components (such as dish washers and dryers or stoves and ovens or freezers and refrigerators) there may be asbestos containing interior insulations, packings and/or gaskets not listed in your AMP because access to them under normal conditions is not feasible. Whenever these systems or system component interiors are going to be maintained or when these components are extracted from the building, these asbestos containing or assumed asbestos containing materials must only be handled as proper asbestos operations. This includes, but is not limited to, degreasing operations, sanitizing operations, appliance maintenance and replacement.

Standard Procedures for Maintenance of Asbestos-Containing Materials, including Preventative Measures

Lab hoods and counter tops

Asbestos containing and assumed asbestos containing lab fume hoods and lab counter tops should be kept in good repair and not be allowed to be cut into, drilled, or disturbed in any other way, without proper asbestos operations. This includes, but is not limited to, disturbance caused by refitting sink openings; adding, replacing, removing or adjusting ports for water, gas, venting or sensor equipment; refacing hoods with new protective shields; or maintaining surfaces that have been damaged.

Safes and fireproof filing cabinets

Safes and file cabinets are sometimes lined with asbestos filler for fire proofing purposes. Asbestos containing and assumed asbestos containing safe or file cabinet insulation should be kept in good repair and not be allowed to be abraded cut into, drilled, or disturbed in any other way, without proper asbestos operations. This includes, but is not limited to, installation of new locking mechanisms, procedures required to open a device whose keys or combinations have been lost, salvaging materials after a fire, or overfilling storage areas past their capacity etc. A common indication that the insulation integrity has been compromised and that an asbestos response may be appropriate is the presence of otherwise unexplainable powder or dust on the contents of the safes or filing cabinets.

Window caulking and glazing compounds

As exterior materials asbestos containing and assumed asbestos containing window caulking and window glazing compounds are often times not cited in school AMPs. They tend to be added at times of three year reinspections. Window caulking is the term used for weatherproofing materials applied between the outer frame of a window and the exterior frame of the building component into which the window cavity is made (wood, brick, stone, metal, etc.). Window glazing compound is the putty-like material used to hold the glass (glazing) of the window pane in the frame of the window against the outside edge of the window sash and the mullions or against the frame of a one pane window. In some cases, these materials may be on the inside of the window as well (casement windows, wire reinforced metal sash and mullion windows. These caulking and glazing compounds should be kept in good repair and not be allowed to be chipped, picked at, cut into, scraped off, discarded or disturbed in any other way, without proper asbestos operations. This includes, but is not limited to, general painting and maintenance activities to ensure weatherproofing on windows, replacing broken windows or window panes, and most essentially, during window replacement projects.

Caution: It is typical to find leaded paint on these exterior components.

Standard Procedures for Maintenance of Asbestos-Containing Materials, including Preventative Measures

Exterior transite panels

Asbestos containing and assumed asbestos containing transite panels should be kept in good repair and not be allowed to be broken, abraded, cut into, drilled, or disturbed in any other way, without proper asbestos operations. These materials are often found in areas not required to be examined for school inspections and may therefore not be in your AMP including, but not limited to, soffits, window walls and curtain walls (sometimes with a matching panel on the interior of the building frame and inaccessible behind heating components or other wall finishes).

Common activities performed that require preventative measures so as not to disturb or erode these transite panels include, but are not limited to, exterior painting and wall finish maintenance; power washing; placement of ladders to access roof edges, eaves and soffits, and windows; or placing exterior brackets and fixtures associated with outdoor lighting, security cameras, utility lines, cable access, telephone lines, etc.

For major renovation projects such as new building additions or window replacement or roof replacement it is imperative to augment your AMP inspection with a NESHAPS inspection and sampling of these materials if they are not specifically already listed as sampled in your program. Materials found to be asbestos containing or asbestos contaminated (in the case of soffit or parapet transite in contact with ACM roof flashing) must only be handled as part of a proper asbestos operation.

Roofing materials and roof flashing

Asbestos containing and assumed asbestos containing roofing materials and roof flashings should be kept in good repair and not be allowed to become deteriorated, cut into, drilled, or disturbed in any other way, without proper asbestos operations. These materials are generally not required to be examined for school inspections and may therefore not be in your AMP.

General roof leak repair and common activities for other building systems that can disturb roofing can not be performed without proper asbestos operations. These activities include, but are not limited to, resealing penetrations, installing antennas, dishes or other similar communications equipment, repairing obstructed roof drains or roof mounted HVAC vents or components.

Standard Procedures for Maintenance of Asbestos-Containing Materials, including Preventative Measures

Roofing materials and roof flashing

(continued)

For major renovation projects such as installation of skylights or HVAC equipment requiring roof penetrations, new building additions or roof replacement it is imperative to augment your AMP inspection with a NESHAPS inspection and sampling of these materials if they are not specifically already listed as sampled in your program. Activities for materials found to be asbestos containing or asbestos contaminated (in the case of layered or built up roofing) must only be handled as part of a proper asbestos operation.

Standard Procedures for Maintenance of Asbestos-Containing Materials, including Preventative Measures

Exterior transite panels

Asbestos containing and assumed asbestos containing transite panels should be kept in good repair and not be allowed to be broken, abraded, cut into, drilled, or disturbed in any other way, without proper asbestos operations. These materials are often found in areas not required to be examined for school inspections and may therefore not be in your AMP including, but not limited to, soffits, window walls and curtain walls (sometimes with a matching panel on the interior of the building frame and inaccessible behind heating components or other wall finishes).

Common activities performed that require preventative measures so as not to disturb or erode these transite panels include, but are not limited to, exterior painting and wall finish maintenance; power washing; placement of ladders to access roof edges, eaves and soffits, and windows; or placing exterior brackets and fixtures associated with outdoor lighting, security cameras, utility lines, cable access, telephone lines, etc.

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General roof leak repair and common activities for other building systems that can disturb roofing can not be performed without proper asbestos operations. These activities include, but are not limited to, resealing penetrations, installing antennas, dishes or other similar communications equipment, repairing obstructed roof drains or roof mounted HVAC vents or components.

Standard Procedures for Maintenance of Asbestos-Containing Materials, including Preventative Measures

Roofing materials and roof flashing

(continued)

For major renovation projects such as installation of skylights or HVAC equipment requiring roof penetrations, new building additions or roof replacement it is imperative to augment your AMP inspection with a NESHAPS inspection and sampling of these materials if they are not specifically already listed as sampled in your program. Activities for materials found to be asbestos containing or asbestos contaminated (in the case of layered or built up roofing) must only be handled as part of a proper asbestos operation.

**SELECTION OF SAMPLING LOCATIONS
FOR 3 YEAR REINSPECTIONS**

SURVEY LIMITATIONS

Every attempt was made to accurately reassess all accessible and known ACBM. There can not be a guarantee that all asbestos containing materials have been located or identified. Some of the reasons for this are:

1. Sampling was performed on a random basis and the material was assumed to be homogeneous. The possibility does exist that the material composition may differ where the samples were taken.
2. Only exposed materials have been sampled. Some concealed or difficult to reach suspect ACBM has been included in the survey based on certain assumptions. Examples would be the glue behind ceiling tiles.
3. Multiple samples were collected to minimize error. The chance of laboratory or human error is small but real.
4. The NOTES section of this report includes a general EPA roster of suspect ACBM. These materials if present in this building should be considered ACBM unless sampling proves otherwise.

SELECTION OF SAMPLING LOCATIONS

Sampling procedures were accomplished in accordance with AHERA regulations. Each homogeneous area of material whether it was surfacing, thermal system insulation, or miscellaneous was sampled in a statistically random fashion. The area was gridded into 9 equal units and random number generation scheme employed to locate a sample area.

Where such a random method would cause noticeable damage to the sampled material and/or create the potential for a fiber release, one or more of the following non-destructive sampling schemes was substituted:

1. A representative area of material that was damaged was sampled.
2. A replacement material known to be the same material as the material in place was sampled.
3. Areas that would be representative of the homogeneous are, but which were concealed to normal vision were sampled.

In cases where one of these non-destructive sampling techniques was employed, the summary report specifies the sample with the label "NDS".

**BULK SAMPLING REPORTS COLLECTED DURING
REINSPECTION OR INTERIM PERIOD**



Environmental Hazards Services, L.L.C.
 7469 Whitepine Rd
 Richmond, VA 23237
 Telephone: 800.347.4010

Asbestos Bulk Analysis Report

Report Number: 17-07-02578

Client: Mystic Air Quality Consultants
 1204 North Road Rt. 117
 Groton, CT 06340

Received Date: 07/20/2017
Analyzed Date: 07/23/2017
Reported Date: 07/25/2017

Project/Test Address: Hebron Elem; 85 Church St; Hebron, CT

Client Number:
 07-2564

Laboratory Results

Fax Number:
 860-449-8860

Lab Sample Number	Client Sample Number	Layer Type	Lab Gross Description	Asbestos	Other Materials
17-07-02578-001	1		Beige Fibrous; White Powder; Inhomogeneous	NAD	45% Cellulose 25% Fibrous Glass 30% Non-Fibrous
17-07-02578-002	2		Beige Fibrous; White Powder; Inhomogeneous	NAD	45% Cellulose 25% Fibrous Glass 30% Non-Fibrous
17-07-02578-003	3		Beige Fibrous; White Powder; Inhomogeneous	NAD	45% Cellulose 25% Fibrous Glass 30% Non-Fibrous
17-07-02578-004	4		Beige Fibrous; White Powder; Inhomogeneous	NAD	50% Cellulose 15% Fibrous Glass 35% Non-Fibrous
17-07-02578-005	5		Beige Fibrous; White Powder; Inhomogeneous	NAD	50% Cellulose 15% Fibrous Glass 35% Non-Fibrous

Environmental Hazards Services, L.L.C

Client Number: 07-2564

Report Number: 17-07-02578

Project/Test Address: Hebron Elem; 85 Church St; Hebron, CT

Lab Sample Number	Client Sample Number	Layer Type	Lab Gross Description	Asbestos	Other Materials
17-07-02578-006	6		Beige Fibrous; White Powder; Inhomogeneous	NAD	50% Cellulose 15% Fibrous Glass 35% Non-Fibrous
17-07-02578-007	7		Gray Powder; Fibrous; Inhomogeneous	NAD	1% Cellulose 30% Fibrous Glass 69% Non-Fibrous
17-07-02578-008	8		Gray Powder; Fibrous; Inhomogeneous	NAD	1% Cellulose 30% Fibrous Glass 69% Non-Fibrous
17-07-02578-009	9		Gray Powder; Fibrous; Inhomogeneous	NAD	1% Cellulose 30% Fibrous Glass 69% Non-Fibrous
17-07-02578-010	10		Gray Powder; Fibrous; Inhomogeneous	NAD	1% Cellulose 30% Fibrous Glass 69% Non-Fibrous
17-07-02578-011	11		Gray Powder; Fibrous; Inhomogeneous	NAD	1% Cellulose 30% Fibrous Glass 69% Non-Fibrous

Environmental Hazards Services, L.L.C

Client Number: 07-2564
 Project/Test Address: Hebron Elem; 85 Church St; Hebron, CT

Report Number: 17-07-02578

Lab Sample Number	Client Sample Number	Layer Type	Lab Gross Description	Asbestos	Other Materials
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QC Sample: 85-M22013-2
 QC Blank: SRM 1866 Fiberglass
 Reporting Limit: 1% Asbestos
 Method: EPA Method 600/R-93/116, EPA Method 600/M4-82-020
 Analyst: Vickie Holmes

Reviewed By Authorized Signatory:

Melissa Kanode

Missy Kanode
 QA/QC Clerk

The condition of the samples analyzed was acceptable upon receipt per laboratory protocol unless otherwise noted on this report. Each distinct component in an inhomogeneous sample was analyzed separately and reported as a composite. Results represent the analysis of samples submitted by the client. Sample location, description, area, volume, etc., was provided by the client. This report cannot be used by the client to claim product endorsement by NVLAP or any agency of the U.S. Government. This report shall not be reproduced except in full, without the written consent of the Environmental Hazards Service, L.L.C. California Certification #2319 NY ELAP #11714 NVLAP #101882-0 VELAP 460172. All information concerning sampling location, date, and time can be found on Chain-of-Custody. Environmental Hazards Services, L.L.C. does not perform any sample collection.

Environmental Hazards Services, L.L.C. recommends reanalysis by point count (for more accurate quantification) or Transmission Electron Microscopy (TEM), (for enhanced detection capabilities) for materials regulated by EPA NESHAP (National Emission Standards for Hazardous Air Pollutants) and found to contain less than ten percent (<10%) asbestos by polarized light microscopy (PLM). Both services are available for an additional fee.

400 Point Count Analysis, where noted, performed per EPA Method 600/R-93/116 with a Reporting Limit of 0.25%.

* All California samples analyzed by Polarized Light Microscopy, EPA Method 600/M4-82-020, Dec. 1982.

LEGEND: NAD = no asbestos detected

PERIODIC SURVEILLANCE FORMS

Periodic surveillance.

EPA and AHERA Asbestos program management requires that the in-place accessible ACM and suspect ACM will be inspected every six months to look for any signs of changes in the condition of the asbestos-containing materials.

A minimum of 2 hours awareness training is required to conduct periodic surveillance if there is no change in condition. If there is a change in condition a certified asbestos inspector will need to assess and reevaluate the materials. The person or persons performing these re-inspections will be familiar with the asbestos program. The following pages are pre-dated copies of the periodic inspection forms to cover the next five such periodic surveillances. These should be completed and re-inserted in this section of both the school and administrative office copies of the management plan.

Upon completion of a periodic surveillance, copies should be submitted to the LEA Designated person within a week's time of the inspection. If, however, the periodic surveillance detects a change in the condition of some asbestos-containing materials since the prior inspection, reinspection and periodic surveillance, the LEA Designated person will be notified within one working day from the time of the inspection which sets into motion the appropriate response actions, carried out by EPA certified and State licensed inspectors, management planners, project designers, abatement supervisors and workers, and/or O&M personnel, as applicable.

Additionally, one blank copy of a form is provided at the end of this section for the licensed inspector to use when assessing materials reported with changes in condition.

**PERIODIC SURVEILLANCE FORM
US EPA AHERA PROGRAM COMPLIANCE ACTIVITY**

Date: 4-2-18 **Surveillance conducted by (name):** Wayne Durakes
School Building Name: Hebron Elementary
Street/City/Zip:

FLOOR TILE & MASTIC ACCESSIBLE	LOCATION	AMOUNT	CONDITION (check)	
			Change	No change
1x1 gray speck floor tile and mastic beneath	Hall to 1988 wing and basement	600 sq. ft.		✓
9x9 pink floor tile and mastic beneath (lite brown)	Classrooms 11 and 13. 1963 wing (see diagram)	1600 sq. ft.		✓
9x9 dark brown tile and mastic beneath	Classrooms 16,12,14,15,and 9. 1963 wing (see diagram)	3700 sq. ft.		✓
9x9 pink & 9x9 brown tile and mastic	Storerooms of 1963 wing	1800 sq. ft.		✓
Areas where 9x9 tile underlays Replacement tile	Teacher's lounge and Health room	1250 sq. ft.		✓
9x9 green tile and mastic beneath	Classroom 10, 16 and side exit 1963 wing (see diagram)	1800 sq. ft.		✓

Areas of carpet and linoleum may overlay inaccessible asbestos containing tile please comment on carpet condition relative to the tile in this space:

The purpose of this periodic surveillance to ensure that the asbestos-containing materials identified in the school's Asbestos Management Plan are intact and undamaged and do not present a hazard. The condition is to be indicated in relative terms to the condition of the materials as of the last surveillance.

If there is a change in condition notify the LEA Designated person within 1 working day or an accredited Building Inspector (3-day training certification) can assess the condition of materials that are changed since the last surveillance using forms attached. Only a certified asbestos Management Planner can select a response action to changed conditions.

**PERIODIC SURVEILLANCE FORM
US EPA AHERA PROGRAM COMPLIANCE ACTIVITY**

Date: 4-2-18

Surveillance conducted by (name): Wayne D. Orcher

School Building Name: Hebron Elementary

Street/City/Zip:

MATERIAL	LOCATION	AMOUNT	CONDITION Change/No Change
Transite boards on bookshelves	Classrooms 10, 11, 13, 15 1963 wing only	700 sq. ft.	✓
Sheetrock/Wallboard	Areas throughout building (some inaccessible)	Unknown	✓
Fire doors - insulation inaccessible	All doors throughout building	Unknown	✓
Window caulking & glazing compound	All windows main front offices	Unknown	✓

The purpose of this periodic surveillance is to ensure that the asbestos-containing materials identified in the school's Asbestos Management Plan are intact and undamaged and do not present a hazard. The condition is to be indicated in relative terms to the condition of the materials as of the last surveillance.

If there is a change in condition notify the LEA Designated person within 1 working day or notify an accredited Building Inspector (3-day training certification) who can assess the condition of materials that are changed since the last surveillance using forms attached. Only a certified asbestos Management Planner can select a response action to changed conditions.

NOTES : Should a newly discovered suspect homogeneous area be found during surveillance or reinspection please add material location and quantity to list above. In this instance a licensed inspector will need to review the new material to assess its condition. Likewise if the material has been removed or cannot be located please note that also. The licensed management planner will need to review documentation of response actions and enter the condition change subsequent to a response action. Such an updated entry should be made on the periodic surveillance forms pre-dated for all following surveillances.

**PERIODIC SURVEILLANCE FORM
US EPA AHERA PROGRAM COMPLIANCE ACTIVITY**

Date: **10-18-18** Surveillance conducted by (name): **Wayne Durocher**
 School Building Name: **Hebron Elementary**
 Street/City/Zip:

FLOOR TILE & MASTIC ACCESSIBLE	LOCATION	AMOUNT	CONDITION (check)	
			Change	No change
1x1 gray speck floor tile and mastic beneath	Hall to 1988 wing and basement	600 sq. ft.		✓
9x9 pink floor tile and mastic beneath (lite brown)	Classrooms 11 and 13. 1963 wing (see diagram)	1600 sq. ft.		✓
9x9 dark brown tile and mastic beneath	Classrooms 16,12,14,15,and 9. 1963 wing (see diagram)	3700 sq. ft.		✓
9x9 pink & 9x9 brown tile and mastic	Storerooms of 1963 wing	1800 sq. ft.		✓
Areas where 9x9 tile underlays Replacement tile	Teacher's lounge and Health room	1250 sq. ft.		✓
9x9 green tile and mastic beneath	Classroom 10, 16 and side exit 1963 wing (see diagram)	1800 sq. ft.		✓

Areas of carpet and linoleum may overlay inaccessible asbestos containing tile please comment on carpet condition relative to the tile in this space:

The purpose of this periodic surveillance to ensure that the asbestos-containing materials identified in the school's Asbestos Management Plan are intact and undamaged and do not present a hazard. The condition is to be indicated in relative terms to the condition of the materials as of the last surveillance.

If there is a change in condition notify the LEA Designated person within 1 working day or an accredited Building Inspector (3-day training certification) can assess the condition of materials that are changed since the last surveillance using forms attached. Only a certified asbestos Management Planner can select a response action to changed conditions.

**PERIODIC SURVEILLANCE FORM
US EPA AHERA PROGRAM COMPLIANCE ACTIVITY**

Date: 10-18-18

Surveillance conducted by (name): Wayne Durocher

School Building Name: Hebron Elementary

Street/City/Zip:

MATERIAL	LOCATION	AMOUNT	CONDITION Change/No Change
Transite boards on bookshelves	Classrooms 10, 11, 13, 15 1963 wing only	700 sq. ft.	✓
Sheetrock/Wallboard	Areas throughout building (some inaccessible)	Unknown	✓
Fire doors - insulation inaccessible	All doors throughout building	Unknown	✓
Window caulking & glazing compound	All windows main front offices	Unknown	✓

The purpose of this periodic surveillance is to ensure that the asbestos-containing materials identified in the school's Asbestos Management Plan are intact and undamaged and do not present a hazard. The condition is to be indicated in relative terms to the condition of the materials as of the last surveillance.

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NOTES : Should a newly discovered suspect homogeneous area be found during surveillance or reinspection please add material location and quantity to list above. In this instance a licensed inspector will need to review the new material to assess its condition. Likewise if the material has been removed or cannot be located please note that also. The licensed management planner will need to review documentation of response actions and enter the condition change subsequent to a response action. Such an updated entry should be made on the periodic surveillance forms pre-dated for all following surveillances.

**PERIODIC SURVEILLANCE FORM
US EPA AHERA PROGRAM COMPLIANCE ACTIVITY**

Date: _____ **Surveillance conducted by (name):** _____

School Building Name: Hebron Elementary

Street/City/Zip: _____

FLOOR TILE & MASTIC ACCESSIBLE	LOCATION	AMOUNT	CONDITION (check)	
			Change	No change
1x1 gray speck floor tile and mastic beneath	Hall to 1988 wing and basement	600 sq. ft.		
9x9 pink floor tile and mastic beneath (lite brown)	Classrooms 11 and 13. 1963 wing (see diagram)	1600 sq. ft.		
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**PERIODIC SURVEILLANCE FORM
US EPA AHERA PROGRAM COMPLIANCE ACTIVITY**

Date: _____ **Surveillance conducted by (name):** _____

School Building Name: Hebron Elementary

Street/City/Zip: _____

MATERIAL	LOCATION	AMOUNT	CONDITION Change/No Change
Transite boards on bookshelves	Classrooms 10, 11, 13, 15 1963 wing only	700 sq. ft.	
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Window caulking & glazing compound	All windows main front offices	Unknown	

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US EPA AHERA PROGRAM COMPLIANCE ACTIVITY**

Date: _____ **Surveillance conducted by (name):** _____

School Building Name: Hebron Elementary

Street/City/Zip: _____

FLOOR TILE & MASTIC ACCESSIBLE	LOCATION	AMOUNT	CONDITION (check)	
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US EPA AHERA PROGRAM COMPLIANCE ACTIVITY**

Date: _____ **Surveillance conducted by (name):** _____

School Building Name: Hebron Elementary

Street/City/Zip: _____

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US EPA AHERA PROGRAM COMPLIANCE ACTIVITY**

Date: _____ **Surveillance conducted by (name):** _____

School Building Name: Hebron Elementary

Street/City/Zip: _____

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**PERIODIC SURVEILLANCE FORM
US EPA AHERA PROGRAM COMPLIANCE ACTIVITY**

Date: _____ **Surveillance conducted by (name):** _____

School Building Name: Hebron Elementary

Street/City/Zip: _____

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PERIODIC SURVEILLANCE FORM
{Certified Asbestos Inspector's Assessment Report
On ACM With Changed Condition Noticed in Periodic Surveillance}

Date: _____ **Inspector:** _____

School:
Street/City/Zipcode: _____

Type & Location of ACM _____

Quantity of Materials Affected _____

Assessment:

1. Evidence of physical damage: _____

2. Evidence of water damage: _____

3. Evidence of delamination or other deterioration: _____

4. Degree of accessibility of the material: (check one)

High _____ Medium _____ Low _____

5. Degree of activity near the material: (check one)

High _____ Medium _____ Low _____

6. Location in an air plenum, air shaft, or air stream: _____

7. Other observations (including the condition of the encapsulant or enclosure, if any): _____

Action Taken: _____

Action Approved by: _____ Date _____
(Asbestos Designated Person)

**INSPECTOR AND MANAGEMENT PLANNER
CERTIFICATIONS**

Certificate of Training

Awarded to
Lois Taylor
(DOB 7/6/62)

For successful completion of a 24 Hour, 3 Day
**Asbestos Building Inspector
Initial Training Course**
April 7 - 9, 1997

Required by OSHA and the EPA Revised MAP
for accreditation under the TSCA Title II
as self-certified by Trainer 4/9/94

Presented by
Mystic Air Quality Consultants, Inc.
1204 North Road, Groton, Connecticut

Certificate Number: 342AK
Exam Grade: 100%
Exam Date: 4/9/97
Expiration Date: 4/9/98
George Williamson
George Williamson, Training Director

Certificate of Training

Awarded to
LOIS TAYLOR
(DOB 07/06/1962)

For successful completion of a 16 Hour, 2 Day
**Asbestos Management Planner
Initial Training Course**
MAY 7 & 8, 2001

This training was approved and given in accordance with
Department of Health Standards established pursuant to section
through 19a-332-23 of the Connecticut General Statutes and meets the
requirements of the EPA Revised MAP under TSCA Title II of 4/4/94.

Presented by
Mystic Air Quality Consultants, Inc.
1204 North Road, Groton, CT 06340 (800) 247-7746

Certificate Number: IMPR170
Exam Grade: 98%
Exam Date: 05/08/2001
Expiration Date: 05/08/2002
George Williamson
George Williamson, Training Director

Certificate of Training

Awarded to
LOIS TAYLOR

For successful completion of an 8 Hour, 1 Day
**Asbestos Inspector & Management Planner
Annual Refresher Training**
APRIL 6, 2017

This training was approved and given in accordance with
Regulations for Connecticut State Agencies
RCSA 20-440 - 1-9 and RCSA 20-441 and meets the
requirements of the EPA Revised MAP under TSCA Title II of 4/4/94

Presented by
Mystic Air Quality Consultants, Inc.
1204 North Road, Groton, CT 06340 (800) 247-7746

Certificate Number: IMPR5801
Exam Grade: 100
Exam Date: 04/06/2017
Expiration Date: 04/06/2018
Richard Hatley
Richard Hatley, Training Director

STATE OF CONNECTICUT DEPARTMENT OF PUBLIC HEALTH

PERMITTED TO THE PROVISIONS OF THE GENERAL STATUTES CONCERNING THE
THE INDIVIDUAL NAMED BELOW IS CERTIFIED
BY THE DEPARTMENT AREA

ASBESTOS CONSULTANT-INSPI/MGMT PLANNER

LOIS D. TAYLOR

CERTIFICATE NO
000211
EXPIRES THROUGH
07/31/18
VALIDATION NO
03-601290

Lois D. Taylor
SECRETARY

COMMISSIONER

Certificate of Training

Awarded to
Lois Taylor
(DOB 7/6/62)

For successful completion of a 24 Hour, 3 Day
**Asbestos Building Inspector
Initial Training Course**
April 7 - 9, 1997

Required by OSHA and the EPA Revised MAP
for accreditation under the TSCA Title II
as self-certified by Trainer 4/4/94

Presented by
Mystic Air Quality Consultants, Inc.
1204 North Road, Groton, Connecticut

Certificate Number: 342AIC
Exam Grant: 100%
Exam Date: 4/9/97
Expiration Date: 4/9/98
Christopher J. Eiden
Christopher J. Eiden, CH, CSP, RS
George Williamson
George Williamson, Training Director

Certificate of Training

Awarded to
LOIS TAYLOR
(DOR 07/06/1962)

For successful completion of a 16 Hour, 2 Day
**Asbestos Management Planner
Initial Training Course**
MAY 7 & 8, 2001

This training was approved and given in accordance with
Department of Health Standards established pursuant to section
through 19a-532-23 of the Connecticut General Statutes and meets the
requirements of the EPA Revised MAP under TSCA Title II of 4/4/94.

Presented by
Mystic Air Quality Consultants, Inc.
1204 North Road, Groton, CT 06340 (800) 247-7746

Certificate Number: IMPR170
Exam Date: 05/08/2001
Expiration Date: 05/08/2002
Christopher J. Eiden
Christopher J. Eiden, CH, CSP, RS
George Williamson
George Williamson, Training Director

Certificate of Training

Awarded to
LOIS TAYLOR

For successful completion of an 8 Hour, 1 Day
**Asbestos Inspector & Management Planner
Annual Refresher Training**
March 10, 2015

This training was approved and given in accordance with
Regulations for Connecticut State Agencies
RCSA 20-440 - 1-9 and RCSA 20-441 and meets the
requirements of the EPA Revised MAP under TSCA Title II of 4/4/94

Presented by
Mystic Air Quality Consultants, Inc.
1204 North Road, Groton, CT 06340 (800) 247-7746

Certificate Number: IMPR21828
Exam Date: 03/10/2015
Expiration Date: 03/10/2016
Richard Hatley
Richard Hatley, Training Director
George Williamson
George Williamson, Training Director

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-INSP/MGMT PLANNER

LOIS D. TAYLOR

CERTIFICATE NO
000211
CURRENT THROUGH
07/31/16
VALIDATION NO
03-236133

Lois D. Taylor
LOIS D. TAYLOR
George Williamson
GEORGE WILLIAMSON

Certificate of Training

Awarded to

Lois Taylor

(DOB 7/6/62)

For successful completion of a 24 Hour, 3 Day
**Asbestos Building Inspector
Initial Training Course**
April 7 - 9, 1997

Required by OSHA and the EPA Revised MAP
for accreditation under the TSCA Title II
as self-certified by Trainer 4/4/94

Presented by

Mystic Air Quality Consultants, Inc.
1204 North Road, Groton, Connecticut

Certificate Number: 342AIC

Exam Grade: 100%

Exam Date: 4/9/97

Expiration Date: 4/9/98

C. J. Eiden
Christopher J. Eiden, CIH, CSP, RS

George Williamson
George Williamson, Training Director

Certificate of Training

Awarded to

LOIS TAYLOR

(DOB 07/06/1962)

For successful completion of a 16 Hour, 2 Day
**Asbestos Management Planner
Initial Training Course**
MAY 7 & 8, 2001

This training was approved and given in accordance with
Department of Health Standards established pursuant to section
through 19a-332-23 of the Connecticut General Statutes and meets the
requirements of the EPA Revised MAP under TSCA Title II of 40 CFR.

Presented by

Mystic Air Quality Consultants, Inc.
1204 North Road, Groton, CT 06340 (800) 247-7746

Certificate Number: IMPR170

Exam Grade: 98%

Exam Date: 05/08/2001

Expiration Date: 05/08/2002

C. J. Eiden
Christopher J. Eiden, CIH, CSP, RS

George Williamson
George Williamson, Training Director

Certificate of Training

Awarded to

LOIS TAYLOR

For successful completion of an 8 Hour, 1 Day
**Asbestos Inspector & Management Planner
Annual Refresher Training**
MAY 12, 2014

This training was approved and given in accordance with
Regulations for Connecticut State Agencies
RCSA 20-440 - 1-9 and RCSA 20-441 and meets the
requirements of the EPA Revised MAP under TSCA Title II of 40 CFR

Presented by

Mystic Air Quality Consultants, Inc.
1204 North Road, Groton, CT 06340 (800) 247-7746

Certificate Number: IMPR23106

Exam Grade: 100

Exam Date: 05/12/2014

Expiration Date: 05/12/2015

C. J. Eiden
Christopher J. Eiden, CIH, CSP, RS

Richard Hatley
George Williamson, Training Director
Richard Hatley, Training Director

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-INSP/MGMT PLANNER

LOIS D. TAYLOR

CERTIFICATE NO.

000211

CURRENT THROUGH

07/31/15

VALIDATION NO.

03-912334

Lois D Taylor

SIGNATURE

George Williamson
COMMISSIONER

Certificate of Training

Awarded to

Lois Taylor
(DOB 7/6/62)

For successful completion of a 40 Hour, 5 Day
Principles and Practices of Asbestos Abatement Course
for **Asbestos Supervisors**
November 30 - December 4, 1998

Required by OSHA and the EPA Revised MAP
for accreditation under the TSCA Title II
as self-certified by Trainer 4/4/94

Presented by

Mystic Air Quality Consultants, Inc.
1204 North Road, Groton, CT 06340 (800) 247-7746

Certificate Number: 1259 P&P

Exam Grade: 98%
Exam Date: 12/4/98

Expiration Date: 12/4/99



Christopher J. Eiden, CH, CSP, RS
George Williamson, Training Director

Certificate of Training

Awarded to

LOIS TAYLOR

For successful completion of an 8 (eight) hour
Asbestos Project Monitor Refresher Course

September 16, 2014

This training was approved and given in accordance with
Regulations for Connecticut State Agencies
RCSA 20-440 - J-9 and RCSA 20-44 land meets the
requirements for the EPA Revised MAP under TSCA Title II of 4/4/94

Presented by


Mystic Air Quality Consultants, Inc.
1204 North Road, Groton, CT 06340 (800) 247-7746

Certificate Number: APM/RC3359

Exam Grade: 100

Exam Date: 09/16/2014

Expiration Date: 09/16/2015



George Williamson, Training Director
Richard Hattley, Training Director

STATE OF CONNECTICUT DEPARTMENT OF PUBLIC HEALTH

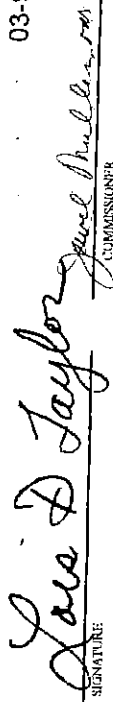
PURSUANT TO THE PROVISIONS OF THE GENERAL STATUTES OF CONNECTICUT

THE INDIVIDUAL NAMED BELOW IS CERTIFIED
BY THIS DEPARTMENT AS A

ASBESTOS CONSULTANT-PROJECT MONITOR

LOIS D. TAYLOR

CERTIFICATE NO
000339
CURRENT THROUGH
07/31/15
VALIDATION NO
03-912335


SIGNATURE
COMMISSIONER

This certifies that
LOIS TAYLOR

DOB 7/6/62

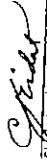
faithfully attended and successfully completed an
intensive course of instruction and practical examination in

Mystic Air Quality Consultants
1204 North Road, Groton, Ct 06340

ASBESTOS SAMPLING AND ANALYSIS
(NIOSH-582 COURSE)



Frederick C. Davis, Instructor



Christopher J. Eiden, CH, President

November 7, 10, & 11, 1997

Certificate Number:
582/97/208

Laboratory Certifications



AIHA Laboratory Accreditation Programs, LLC

Mystic Air Quality Consultants, Inc.

1204 North Road, Groton, CT 06340
Laboratory ID: 100129

acknowledges that

along with all premises from which key activities are performed, as listed above, has fulfilled the requirements of the AIHA Laboratory Accreditation Programs (AIHA-LAP), LLC accreditation to the ISO/IEC 17025:2005 international standard, *General Requirements for the Competence of Testing and Calibration Laboratories* in the following:

LABORATORY ACCREDITATION PROGRAMS

- INDUSTRIAL HYGIENE
 - ENVIRONMENTAL LEAD
 - ENVIRONMENTAL MICROBIOLOGY
 - FOOD
 - UNIQUE SCOPES
- Accreditation Expires: 03/01/2018
 - Accreditation Expires:
 - Accreditation Expires:
 - Accreditation Expires:
 - Accreditation Expires:

Specific Field(s) of Testing (FoT)/Method(s) within each Accreditation Program for which the above named laboratory maintains accreditation is outlined on the attached **Scope of Accreditation**. Continued accreditation is contingent upon successful on-going compliance with ISO/IEC 17025:2005 and AIHA-LAP, LLC requirements. This certificate is not valid without the attached **Scope of Accreditation**. Please review the AIHA-LAP, LLC website (www.aihaaccreditedlabs.org) for the most current Scope.

Gerald R. Schultz

Gerald Schultz, CHH
Chairperson, Analytical Accreditation Board

Revision 14: 03/26/2014

Cheryl O. Morton

Cheryl O. Morton
Managing Director, AIHA Laboratory Accreditation Programs, LLC

Date Issued: 01/29/2016

AIHA Laboratory Accreditation Programs, LLC
 SCOPE OF ACCREDITATION

Mystic Air Quality Consultants, Inc.
 1204 North Road, Groton, CT 06340

Laboratory ID: **100129**
 Issue Date: 01 29 2016

The laboratory is approved for those specific field(s) of testing methods listed in the table below. Clients are urged to verify the laboratory's current accreditation status for the particular field(s) of testing Methods, since these can change due to proficiency status, suspension and or withdrawal of accreditation.

Industrial Hygiene Laboratory Accreditation Program (IHLAP)

Initial Accreditation Date: 10/01/1992

IHLAP Scope Category	Field of Testing (FoT) (FoTs cover all relevant IH matrices)	Technology sub-type/ Detector	Published Reference Method/Title of In-house Method	Method Description or Analyte (for internal methods only)
Asbestos/Fiber Microscopy Core	Phase Contrast Microscopy (PCM)		NIOSH 7400	SOP M-1

A complete listing of currently accredited Industrial Hygiene laboratories is available on the AIHA-LAP, LLC website at: <http://www.aihaaccreditedlabs.org>



AIHA Laboratory Accreditation Programs, LLC

acknowledges that

Environmental Hazards Services, LLC

7469 White Pine Road, Richmond, VA 23237
Laboratory ID: 100420

along with all premises from which key activities are performed, as listed above, has fulfilled the requirements of the AIHA Laboratory Accreditation Programs (AIHA-LAP), LLC accreditation to the ISO/IEC 17025:2005 international standard, *General Requirements for the Competence of Testing and Calibration Laboratories* in the following:

LABORATORY ACCREDITATION PROGRAMS

- INDUSTRIAL HYGIENE
 - ENVIRONMENTAL LEAD
 - ENVIRONMENTAL MICROBIOLOGY
 - FOOD
 - UNIQUE SCOPES
- Accreditation Expires: 05/01/2016
 - Accreditation Expires: 05/01/2016
 - Accreditation Expires: 05/01/2016
 - Accreditation Expires:
 - Accreditation Expires:

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Gerald R. Schultz

Gerald Schultz, CHH
Chairperson, Analytical Accreditation Board

Revision 14: 03/26/2014

Cheryl O. Morton

Cheryl O. Morton
Managing Director, AIHA Laboratory Accreditation Programs, LLC

Date Issued: 04/30/2014



AIHA Laboratory Accreditation Programs, LLC

SCOPE OF ACCREDITATION

Environmental Hazards Services, LLC

7469 White Pine Road, Richmond, VA 23237

Laboratory ID: **100420**

Issue Date: 04/30/2014

The laboratory is approved for those specific field(s) of testing methods listed in the table below. Clients are urged to verify the laboratory's current accreditation status for the particular field(s) of testing Methods, since these can change due to proficiency status, suspension and or withdrawal of accreditation.

Industrial Hygiene Laboratory Accreditation Program (IHLAP)

Initial Accreditation Date: 03/01/1990

IHLAP Scope Category	Field of Testing (FoT)	Technology sub-type/ Detector	Published Reference Method/ Title of In-house Method	Method Description or Analyte <i>(for internal methods only)</i>
Spectrometry Core	Atomic Absorption	CVAA	NIOSH 6009	
			OSHA ID-145	
	Inductively-Coupled Plasma	ICP AES	NIOSH 7082 Modified	
			NIOSH 7300	
Asbestos/Fiber Microscopy Core	Phase Contrast Microscopy (PCM)		OSHA ID-125	
			NIOSH 7400	
Miscellaneous Core	Gravimetric		NIOSH 0500	
			NIOSH 0600	

A complete listing of currently accredited Industrial Hygiene laboratories is available on the AIHA-I.L.A.P. LLC website at: <http://www.aihaaccreditedlabs.org>



Friday, August 05, 2016

Attn: Mr. Wayne Durocher
Hebron Elementary School
92 Church Street
Hebron, CT 06248
PWS #0670112

Project ID: WQP
Sample ID#: BN84206 - BN84207

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.

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 black ink that reads "Phyllis Shiller". The signature is written in a cursive style.

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) 645-0823

Analysis Report
 August 05, 2016

FOR: Attn: Mr. Wayne Durocher
 Hebron Elementary School
 92 Church Street
 Hebron, CT 06248
 PWS #0670112

Sample Information

Matrix: DRINKING WATER
 Location Code: HEBRON
 Rush Request: Standard
 P.O.#:

Custody Information

Collected by: PHOENIX
 Received by: LB
 Analyzed by: see "By" below

Date

08/02/16
 08/02/16

Time

8:15
 12:44

Laboratory Data

SDG ID: GBN84206
 Phoenix ID: BN84206

Project ID: WQP
 Client ID: TEACHERS LOUNGE

Parameter	Result	RL/ PQL	DIL	Units	DW MCL	Sec Goal	Date/Time	By	Reference
Alkalinity-CaCO3	72	20.0	1	mg/L			08/02/16	RR/EG	SM2320B-97
Conductivity	189	5.00	1	umhos/cm			08/02/16	RR/EG	SM2510B-97
Calcium	23.6	0.01	1	mg/L			08/04/16	EK	E200.7
Field Services	Completed						08/02/16		
Total Metal Digestion	Completed						08/02/16	AG	E200.5/E200.7
pH	7.5	0.10	1	pH Units		6.5-8.5	08/02/16	*	FIELD
Temperature; Field Analysis	24.7		1	deg. C			08/02/16	PHOENIX	E170.1

Parameter	Result	RL/ PQL	DIL	Units	DW MCL	Sec Goal	Date/Time	By	Reference
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RL/PQL=Reporting/Practical Quantitation Level DIL=Dilution (analysis required diluting to evaluate) ND=Not Detected
BRL=Below Reporting Level (less than the reporting level, the lowest amount the laboratory can detect and report.)
MCL = Maximum Contaminant Level MCLG = Maximum Contaminant Level Goal

Comments:

Maximum Contaminant Level (Lower of): 40 CFR Part 141; CT Public Health Code 19-13-B102. The highest level of a contaminant that is allowed in drinking water. MCLs are enforceable standards.

Secondary DW Maximum Contaminant Level Goal (MCLG): (Lower of): 40 CFR Part 143; CT Public Health Code 19-13-B102. The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs are non-enforceable public health goals.

The temperature was performed at time of sample collection.

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

August 05, 2016

Reviewed and Released by: Deb Lawrie, Project Manager



Environmental Laboratories, Inc.
 587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
 Tel. (860) 645-1102 Fax (860) 645-0823

Analysis Report
 August 05, 2016

FOR: Attn: Mr. Wayne Durocher
 Hebron Elementary School
 92 Church Street
 Hebron, CT 06248
 PWS #0670112

Sample Information

Matrix: DRINKING WATER
 Location Code: HEBRON
 Rush Request: Standard
 P.O.#:

Custody Information

Collected by: PHOENIX
 Received by: LB
 Analyzed by: see "By" below

Date

08/02/16
 08/02/16

Time

8:25
 12:44

Laboratory Data

SDG ID: GBN84206
 Phoenix ID: BN84207

Project ID: WQP
 Client ID: ENTRY POINT

Parameter	Result	RL/ PQL	DIL	Units	DW MCL	Sec Goal	Date/Time	By	Reference
Alkalinity-CaCO3	72	20.0	1	mg/L			08/02/16	RR/EG	SM2320B-97
Conductivity	210	5.00	1	umhos/cm			08/02/16	RR/EG	SM2510B-97
Calcium	28.8	0.01	1	mg/L			08/04/16	EK	E200.7
Total Metal Digestion	Completed						08/02/16	AG	E200.5/E200.7
pH	7.2	0.10	1	pH Units		6.5-8.5	08/02/16	*	FIELD
Temperature; Field Analysis	20.0		1	deg. C			08/02/16	PHOENIX	E170.1

RL/PQL=Reporting/Practical Quantitation Level DIL=Dilution (analysis required diluting to evaluate) ND=Not Detected
 BRL=Below Reporting Level (less than the reporting level, the lowest amount the laboratory can detect and report.)
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Phyllis Shiller, Laboratory Director

August 05, 2016

Reviewed and Released by: Deb Lawrie, Project Manager

Sample Criteria Exceedences Report

GBN84206 - HEBRON

Criteria: None

State: CT

SampNo Acode Phoenix Analyte

Criteria

Result

RL

Criteria

RL Analysis
Criteria 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.



Thursday, August 11, 2016

Attn: Mr. Wayne Durocher
Hebron Elementary School
92 Church Street
Hebron, CT 06248
PWS #0670112

Project ID: WQP
Sample ID#: BN88209 - BN88210

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.

A scanned version of the COC form accompanies the analytical report and is an exact duplicate of the original.

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Sincerely yours,

A handwritten signature in black ink that reads "Phyllis Shiller". The signature is written in a cursive style.

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) 645-0823

Analysis Report
 August 11, 2016

FOR: Attn: Mr. Wayne Durocher
 Hebron Elementary School
 92 Church Street
 Hebron, CT 06248
 PWS #0670112

Sample Information

Matrix: DRINKING WATER
 Location Code: HEBRON
 Rush Request: Standard
 P.O.#:

Custody Information

Collected by: PHOENIX
 Received by: SW
 Analyzed by: see "By" below

Date

08/08/16
 08/08/16

Time

9:25
 15:12

Laboratory Data

SDG ID: GBN88209
 Phoenix ID: BN88209

Project ID: WQP
 Client ID: TEACHERS LOUNGE

Parameter	Result	RL/ PQL	DIL	Units	DW MCL	Sec Goal	Date/Time	By	Reference
Alkalinity-CaCO3	71	20.0	1	mg/L			08/09/16	RR/EG	SM2320B-97
Conductivity	196	5.00	1	umhos/cm			08/09/16	RR/EG	SM2510B-97
Calcium	26.1	0.01	1	mg/L			08/11/16	EK	E200.7
Field Services	Completed						08/08/16		
Total Metal Digestion	Completed						08/09/16	AG	E200.5/E200.7
pH	7.4	0.10	1	pH Units		6.5-8.5	08/08/16	*	FIELD
Temperature; Field Analysis	25.4		1	deg. C			08/08/16	PHOENIX	E170.1

Parameter	Result	RL/ PQL	DIL	Units	DW MCL	Sec Goal	Date/Time	By	Reference
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RL/PQL=Reporting/Practical Quantitation Level DIL=Dilution (analysis required diluting to evaluate) ND=Not Detected
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The temperature was performed at time of sample collection.

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Phyllis Shiller, Laboratory Director

August 11, 2016

Reviewed and Released by: Deb Lawrie, Project Manager



Environmental Laboratories, Inc.
 587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
 Tel. (860) 645-1102 Fax (860) 645-0823

Analysis Report
 August 11, 2016

FOR: Attn: Mr. Wayne Durocher
 Hebron Elementary School
 92 Church Street
 Hebron, CT 06248
 PWS #0670112

Sample Information

Matrix: DRINKING WATER
 Location Code: HEBRON
 Rush Request: Standard
 P.O.#:

Custody Information

Collected by: PHOENIX
 Received by: SW
 Analyzed by: see "By" below

Date

08/08/16
 08/08/16

Time

9:17
 15:12

Laboratory Data

SDG ID: GBN88209
 Phoenix ID: BN88210

Project ID: WQP
 Client ID: ENTRY POINT

Parameter	Result	RL/ PQL	DIL	Units	DW MCL	Sec Goal	Date/Time	By	Reference
Alkalinity-CaCO3	72	20.0	1	mg/L			08/09/16	RR/EG	SM2320B-97
Conductivity	226	5.00	1	umhos/cm			08/09/16	RR/EG	SM2510B-97
Calcium	31.3	0.01	1	mg/L			08/11/16	EK	E200.7
Copper	0.033	0.002	1	mg/L	1.3		08/10/16	LK	E200.7
Lead	< 0.001	0.001	1	mg/L	0.015		08/10/16	LK	E200.5
Total Metal Digestion	Completed						08/09/16	AG	E200.5/E200.7
pH	7.5	0.10	1	pH Units		6.5-8.5	08/08/16	*	FIELD
Temperature; Field Analysis	19.5		1	deg. C			08/08/16		PHOENIXE170.1

Parameter	Result	RL/ PQL	DIL	Units	DW MCL	Sec Goal	Date/Time	By	Reference
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Comments:

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The temperature was performed at time of sample collection.

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Phyllis Shiller, Laboratory Director

August 11, 2016

Reviewed and Released by: Deb Lawrie, Project Manager

Sample Criteria Exceedences Report

GBN88209 - HEBRON

Criteria: None

State: CT

SampNo Acode Phoenix Analyte

Criteria

Result

RL

Criteria

RL Analysis
Criteria Units

*** No Data to Display ***

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6 of 12 Pg of

CHAIN OF CUSTODY RECORD

587 East Middle Turnpike, P.O. Box 370, Manchester, CT 06040
 Email: service@phoenixlabs.com Fax (860) 645-0823
Client Services (860) 645-8726



Customer: Hebron Elementary School
 Address: 580 Gilead Street
 Hebron, CT 06248

Project: WQP
 Report to: Wayne Durocher
 Invoice to: Accounts Payable-Hebron BOE

PWS ID#: CT0670112
 Phone #: 860-228-9458
 Fax #:

Sampler's Signature: *Colby* Date: 8/8

Client Sample - Information - Identification

Matrix Code:
 WW=wastewater S=soil/solid O=other
 DW=drinking water A=air
 GW=groundwater SL=sludge

Phoenix Sample #: 88209
 Customer Sample Identification: Teacher's Lounge
 Date Sampled: 8/8
 Time Sampled: 9:25

88210
 Customer Sample Identification: Entry Point
 Date Sampled: 8/8
 Time Sampled: 1:17

Analysis Request	Alkalinity	Calcium	Conductivity	pH (in field)	Water Temp C (in field)	Lead, Copper	Sample Type	Sampling Point ID	Repeat Location	Duration
	X	X	X	7.4	25.4°		40 ml VOA Val	As is [HCl]	1	1
	X	X	X	7.5	19.5°	X	PL H2SO4 [250ml]	As is [H2SO4]	1	1
							PL HNO3 250ml			
							Bacteria Bottle			

Relinquished by: *Colby* Accepted by: *CPanadine*
 Date: 8/8/16 Time: 1512

Turnaround:
 1 Day*
 2 Days*
 3 Days*
 Standard
 Other

Sample Type: RT-Compliance Routine, RP-Repeat, SP-Special
 O-Other
 Sampling Point ID: Assigned by DWD or 4-Generic Distribution
 3-Generic Entry Point, 2-Generic Raw Well
 WSPID: Assigned or 00600-Distribution, 00700-Entry Point
 Duration: M-Monthly, Q-Quarterly, A-Annual, 3-Triannual
 Repeat Location: O-Original, D-Downstream, U-Upstream, OT-Other

Comments, Special Requirements or Regulations:

* Surcharge Applies



Thursday, September 15, 2016

Attn: Mr. Wayne Durocher
Hebron Elementary School
92 Church Street
Hebron, CT 06248
PWS #0670112

Project ID: WQP
Sample ID#: BV13037 - BV13038

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.

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 black ink that reads "Phyllis Shiller". The signature is written in a cursive style.

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) 645-0823

Analysis Report
 September 15, 2016

FOR: Attn: Mr. Wayne Durocher
 Hebron Elementary School
 92 Church Street
 Hebron, CT 06248
 PWS #0670112

Sample Information

Matrix: DRINKING WATER
 Location Code: HEBRON
 Rush Request: Standard
 P.O.#:

Custody Information

Collected by: PHOENIX
 Received by: SW
 Analyzed by: see "By" below

Date

09/12/16
 09/12/16

Time

15:10
 16:04

Laboratory Data

SDG ID: GBV13037
 Phoenix ID: BV13037

Project ID: WQP
 Client ID: BEFORE FILTERS

Parameter	Result	RL/ PQL	DIL	Units	DW MCL	Sec Goal	Date/Time	By	Reference
Alkalinity-CaCO3	70	20.0	1	mg/L			09/14/16	RR/EG	SM2320B-97
Conductivity	224	5.00	1	umhos/cm			09/14/16	RR/EG	SM2510B-97
Calcium	28.8	0.01	1	mg/L			09/14/16	TH	E200.7
Total Metal Digestion	Completed						09/13/16	AG	E200.5/E200.7
pH	7.5	0.10	1	pH Units	6.5-8.5		09/12/16	*	FIELD

RL/PQL=Reporting/Practical Quantitation Level DIL=Dilution (analysis required diluting to evaluate) ND=Not Detected
 BRL=Below Reporting Level (less than the reporting level, the lowest amount the laboratory can detect and report.)
 MCL = Maximum Contaminant Level MCLG = Maximum Contaminant Level Goal

Comments:

Maximum Contaminant Level (Lower of): 40 CFR Part 141; CT Public Health Code 19-13-B102. The highest level of a contaminant that is allowed in drinking water. MCLs are enforceable standards.

Secondary DW Maximum Contaminant Level Goal (MCLG): (Lower of): 40 CFR Part 143; CT Public Health Code 19-13-B102. The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs are non-enforceable public health goals.

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Phyllis Shiller, Laboratory Director

September 15, 2016

Reviewed and Released by: Deb Lawrie, Project Manager



Environmental Laboratories, Inc.
 587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
 Tel. (860) 645-1102 Fax (860) 645-0823

Analysis Report
 September 15, 2016

FOR: Attn: Mr. Wayne Durocher
 Hebron Elementary School
 92 Church Street
 Hebron, CT 06248
 PWS #0670112

Sample Information

Matrix: DRINKING WATER
 Location Code: HEBRON
 Rush Request: Standard
 P.O.#:

Custody Information

Collected by: PHOENIX
 Received by: SW
 Analyzed by: see "By" below

Date

09/12/16
 09/12/16

Time

15:15
 16:04

Laboratory Data

SDG ID: GBV13037
 Phoenix ID: BV13038

Project ID: WQP
 Client ID: WELL 1 & 2

Parameter	Result	RL/ PQL	DIL	Units	DW MCL	Sec Goal	Date/Time	By	Reference
Alkalinity-CaCO3	73	20.0	1	mg/L			09/14/16	RR/EG	SM2320B-97
Conductivity	209	5.00	1	umhos/cm			09/14/16	RR/EG	SM2510B-97
Calcium	27.2	0.01	1	mg/L			09/14/16	TH	E200.7
Total Metal Digestion	Completed						09/13/16	AG	E200.5/E200.7
pH	7.5	0.10	1	pH Units	6.5-8.5		09/12/16	*	FIELD

RL/PQL=Reporting/Practical Quantitation Level DIL=Dilution (analysis required diluting to evaluate) ND=Not Detected
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Comments:

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Phyllis Shiller, Laboratory Director

September 15, 2016

Reviewed and Released by: Deb Lawrie, Project Manager

Sample Criteria Exceedences Report

GBV13037 - HEBRON

Criteria: None

State: CT

SampNo Acode Phoenix Analyte

Criteria

Result

RL

Criteria

RL Analysis
Criteria Units

*** No Data to Display ***

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Temp Pg of

CHAIN OF CUSTODY RECORD

587 East Middle Turnpike, P.O. Box 370, Manchester, CT 06040
 Email: service@phoenixlabs.com Fax (860) 645-0823

Client Services (860) 645-8726



Customer: Hebron Elementary School
 Address: 580 Gillead Street
 Hebron, CT 06248

Project: WQP
 Report to: Wayne Durocher
 Invoice to: Accountants Payable-Hebron BOE

PWS ID#: CT0670112
 Phone #: 860-228-9458
 Fax #:

Sampler's Signature: *Colin...* Date: _____

Client Sample - Information - Identification

Matrix Code: WW=wastewater S=soil/solid O=other
 DW=drinking water SL=sludge A=air

Phoenix Sample #	Customer Sample Identification	Sample Matrix	Date Sampled	Time Sampled
13037	Before Filters	DW		3:10
13038	Well 1 & 2	DW		3:15
	Well 2	DW		

Analysis Request	Alkalinity	Calcium	Conductivity	pH (In Field)	Water Temp C (In Field)	Sample Type	WSFID	Repeat Location	Duration
	X	X	X	7.5		40 ml VOA Vial [As is] [HCl]			1
	X	X	X	7.5		PL H2SO4 [250ml X] 500ml [1000ml]			1
	X	X	X			PL H2SO4 [250ml] 500ml [1000ml]			1
						PL HNO3 250ml			
						Bacteria Bottle			

Relinquished by: *Colin...* Accepted by: *Parvative* Date: 9/2/16 Time: 1604

Turnaround:
 1 Day*
 2 Days*
 3 Days*
 Standard
 Other

Comments, Special Requirements or Regulations:

Sample Type: RT-Compliance Routine, RP-Repeat, SP-Special
 Sampling Point ID: Assigned by DWD or 4-Generic Distribution
 WSFID: Assigned or 00600-Distribution, 00700-Entry Point
 Duration: M-Monthly, Q-Quarterly, A-Annual, 3-Triannual
 Repeat Location: O-Original, D-Downstream, U-Upstream, OT-Other

* Surcharge Applies



Tuesday, January 09, 2018

Attn: Mr. Wayne Durocher
Hebron Elementary School
92 Church Street
Hebron, CT 06248
PWS #0670112

Project ID: IN-HOUSE-SAMPLING
Sample ID#: BZ66372 - BZ66374

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. This report is incomplete unless all pages indicated in the pagination at the bottom of the page are included.

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 black ink that reads "Phyllis Shiller". The signature is fluid and cursive, with the first name being more prominent.

Phyllis Shiller
Laboratory Director

NELAC - #NY11301
CT Lab Registration #PH-0618
MA Lab Registration #M-CT007
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) 645-0823

Analysis Report
 January 09, 2018

FOR: Attn: Mr. Wayne Durocher
 Hebron Elementary School
 92 Church Street
 Hebron, CT 06248
 PWS #0670112

<u>Sample Information</u>		<u>Custody Information</u>		<u>Date</u>	<u>Time</u>
Matrix:	DRINKING WATER	Collected by:	WD	12/28/17	9:30
Location Code:	HEBRON	Received by:	SW	12/28/17	11:27
Rush Request:	Standard	Analyzed by:	see "By" below		
P.O.#:					

Laboratory Data

SDG ID: GBZ66372
 Phoenix ID: BZ66372

Project ID: IN-HOUSE-SAMPLING
 Client ID: HES LC 022 RM 15

Parameter	Result	RL/ PQL	DIL	Units	AL	MCL	MCLG	Date/Time	By	Reference
Copper	0.215	0.004	1	mg/L	1.3			01/09/18	MA	E200.7
Lead	0.129	0.001	1	mg/L	0.015			01/09/18	MA	E200.5
*** Lead exceeds Action Level of 0.015 ***										
Total Metal Digestion	Completed							12/29/17		E200.5/E200.7
Potable Water Digestion	Completed							12/29/17		E200.8

RL/PQL=Reporting/Practical Quantitation Level DIL=Dilution (analysis required diluting to evaluate) ND=Not Detected
 BRL=Below Reporting Level (less than the reporting level, the lowest amount the laboratory can detect and report.)
 AL = Action Level MCL = Maximum Contaminant Level MCLG = Maximum Contaminant Level Goal

Comments:

Maximum Contaminant Level (MCL) (Lower of): 40 CFR Part 141; CT Public Health Code 19-13-B102. The highest level of a contaminant that is allowed in drinking water. MCLs are enforceable standards.

Action Level (AL): 40 CFR Part 141.80.

Secondary DW Maximum Contaminant Level Goal (MCLG): (Lower of): 40 CFR Part 141; 40 CFR Part 143; CT Public Health Code 19-13-B102. The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs are non-enforceable public health goals.

If there are any questions regarding this data, please call Phoenix Client Services.
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Phyllis Shiller, Laboratory Director

January 09, 2018

Reviewed and Released by: Deb Lawrie, Project Manager



Environmental Laboratories, Inc.
 587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
 Tel. (860) 645-1102 Fax (860) 645-0823

Analysis Report
 January 09, 2018

FOR: Attn: Mr. Wayne Durocher
 Hebron Elementary School
 92 Church Street
 Hebron, CT 06248
 PWS #0670112

Sample Information

Matrix: DRINKING WATER
 Location Code: HEBRON
 Rush Request: Standard
 P.O.#:

Custody Information

Collected by: WD
 Received by: SW
 Analyzed by: see "By" below

Date

12/28/17
 12/28/17

Time

9:30
 11:27

Laboratory Data

SDG ID: GBZ66372
 Phoenix ID: BZ66373

Project ID: IN-HOUSE-SAMPLING
 Client ID: HES LC 007 RM 8

Parameter	Result	RL/ PQL	DIL	Units	AL	MCL	MCLG	Date/Time	By	Reference
Copper	0.438	0.025	10	mg/L	1.3			01/05/18	CPP	200.8-5.4
Lead	0.0162	0.0005	2	mg/L	0.015			01/05/18	CPP	200.8-5.4
*** Lead exceeds Action Level of 0.015 ***										
Total Metal Digestion	Completed							01/02/18	CB/CB	E200.8

RL/PQL=Reporting/Practical Quantitation Level DIL=Dilution (analysis required diluting to evaluate) ND=Not Detected
 BRL=Below Reporting Level (less than the reporting level, the lowest amount the laboratory can detect and report.)
 AL = Action Level MCL = Maximum Contaminant Level MCLG = Maximum Contaminant Level Goal

Comments:

Maximum Contaminant Level (MCL) (Lower of): 40 CFR Part 141; CT Public Health Code 19-13-B102. The highest level of a contaminant that is allowed in drinking water. MCLs are enforceable standards.

Action Level (AL): 40 CFR Part 141.80.

Secondary DW Maximum Contaminant Level Goal (MCLG): (Lower of): 40 CFR Part 141; 40 CFR Part 143; CT Public Health Code 19-13-B102. The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs are non-enforceable public health goals.

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Phyllis Shiller, Laboratory Director

January 09, 2018

Reviewed and Released by: Deb Lawrie, Project Manager



Environmental Laboratories, Inc.
 587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
 Tel. (860) 645-1102 Fax (860) 645-0823

Analysis Report
 January 09, 2018

FOR: Attn: Mr. Wayne Durocher
 Hebron Elementary School
 92 Church Street
 Hebron, CT 06248
 PWS #0670112

Sample Information

Matrix: DRINKING WATER
 Location Code: HEBRON
 Rush Request: Standard
 P.O.#:

Custody Information

Collected by: WD
 Received by: SW
 Analyzed by: see "By" below

Date

12/28/17
 12/28/17

Time

9:30
 11:27

Laboratory Data

SDG ID: GBZ66372
 Phoenix ID: BZ66374

Project ID: IN-HOUSE-SAMPLING
 Client ID: HES LC 010 RM 2

Parameter	Result	RL/ PQL	DIL	Units	AL	MCL	MCLG	Date/Time	By	Reference
Copper	0.087	0.004	1	mg/L	1.3			01/09/18	MA	E200.7
Lead	0.004	0.001	1	mg/L	0.015			01/09/18	MA	E200.5
Total Metal Digestion	Completed							12/29/17		E200.5/E200.7
Potable Water Digestion	Completed							12/29/17		E200.8

RL/PQL=Reporting/Practical Quantitation Level DIL=Dilution (analysis required diluting to evaluate) ND=Not Detected
 BRL=Below Reporting Level (less than the reporting level, the lowest amount the laboratory can detect and report.)
 AL = Action Level MCL = Maximum Contaminant Level MCLG = Maximum Contaminant Level Goal

Comments:

Maximum Contaminant Level (MCL) (Lower of): 40 CFR Part 141; CT Public Health Code 19-13-B102. The highest level of a contaminant that is allowed in drinking water. MCLs are enforceable standards.

Action Level (AL): 40 CFR Part 141.80.

Secondary DW Maximum Contaminant Level Goal (MCLG): (Lower of): 40 CFR Part 141; 40 CFR Part 143; CT Public Health Code 19-13-B102. The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs are non-enforceable public health goals.

If there are any questions regarding this data, please call Phoenix Client Services.
 This report must not be reproduced except in full as defined by the attached chain of custody.

Phyllis Shiller, Laboratory Director

January 09, 2018

Reviewed and Released by: Deb Lawrie, Project Manager

Tuesday, January 09, 2018

Criteria: CT: DW

State: CT

Sample Criteria Exceedances Report

GBZ66372 - HEBRON

SampNo	Acode	Phoenix Analyte	Criteria	Result	RL	Criteria	RL	Analysis Units
BZ66372	PB-DWICP	Lead	EPA / 40 CFR 141 DW / 141.80 Lead & Copper ALs	0.129	0.001	0.015	0.001	mg/L
BZ66373	PB-DW-MS	Lead	EPA / 40 CFR 141 DW / 141.80 Lead & Copper ALs	0.0162	0.0005	0.015	0.001	mg/L

Phoenix Laboratories does not assume responsibility for the data contained in this report. It is provided as an additional tool to identify requested criteria exceedances. All efforts are made to ensure the accuracy of the data (obtained from appropriate agencies). A lack of exceedance information does not necessarily suggest conformance to the criteria. It is ultimately the site professional's responsibility to determine appropriate compliance.



Environmental Laboratories, Inc.
587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
Tel. (860) 645-1102 Fax (860) 645-0823



Analysis Comments

January 09, 2018

SDG I.D.: GBZ66372

The following analysis comments are made regarding exceptions to criteria not already noted in the Analysis Report or QA/QC Report: None.



Monday, September 25, 2017

Attn: Mr. Wayne Durocher
Hebron Elementary School
92 Church Street
Hebron, CT 06248
PWS #0670112

Project ID: FIRST DRAW LEAD & COPPER
Sample ID#: BZ03314 - BZ03317

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. This report is incomplete unless all pages indicated in the pagination at the bottom of the page are included.

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 black ink that reads "Phyllis Shiller". The signature is written in a cursive style with a large initial "P".

Phyllis Shiller
Laboratory Director

NELAC - #NY11301
CT Lab Registration #PH-0618
MA Lab Registration #M-CT007
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) 645-0823

Analysis Report
 September 25, 2017

FOR: Attn: Mr. Wayne Durocher
 Hebron Elementary School
 92 Church Street
 Hebron, CT 06248
 PWS #0670112

<u>Sample Information</u>		<u>Custody Information</u>		<u>Date</u>	<u>Time</u>
Matrix:	DRINKING WATER	Collected by:	WD	09/19/17	8:45
Location Code:	HEBRON	Received by:	LB	09/19/17	9:50
Rush Request:	Standard	Analyzed by:	see "By" below		
P.O.#:					

Laboratory Data

SDG ID: GBZ03314
 Phoenix ID: BZ03314

Project ID: FIRST DRAW LEAD & COPPER
 Client ID: HESLC022

Parameter	Result	RL/ PQL	DIL	Units	AL	MCL	MCLG	Date/Time	By	Reference
Copper	0.083	0.002	1	mg/L	1.3			09/23/17	MA	E200.7
Lead	0.0181	0.0010	1	mg/L	0.015			09/23/17	MA	E200.5
*** Lead exceeds Action Level of 0.015 ***										
Total Metal Digestion	Completed							09/22/17	CB/AG	E200.5/E200.7

RL/PQL=Reporting/Practical Quantitation Level DIL=Dilution (analysis required diluting to evaluate) ND=Not Detected
 BRL=Below Reporting Level (less than the reporting level, the lowest amount the laboratory can detect and report.)
 AL = Action Level MCL = Maximum Contaminant Level MCLG = Maximum Contaminant Level Goal

Comments:

Maximum Contaminant Level (MCL) (Lower of): 40 CFR Part 141; CT Public Health Code 19-13-B102. The highest level of a contaminant that is allowed in drinking water. MCLs are enforceable standards.

Action Level (AL): 40 CFR Part 141.80.

Secondary DW Maximum Contaminant Level Goal (MCLG): (Lower of): 40 CFR Part 141; 40 CFR Part 143; CT Public Health Code 19-13-B102. The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs are non-enforceable public health goals.

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Phyllis Shiller, Laboratory Director
September 25, 2017

Reviewed and Released by: Deb Lawrie, Project Manager



Environmental Laboratories, Inc.
 587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
 Tel. (860) 645-1102 Fax (860) 645-0823

Analysis Report
 September 25, 2017

FOR: Attn: Mr. Wayne Durocher
 Hebron Elementary School
 92 Church Street
 Hebron, CT 06248
 PWS #0670112

Sample Information

Matrix: DRINKING WATER
 Location Code: HEBRON
 Rush Request: Standard
 P.O.#:

Custody Information

Collected by: WD
 Received by: LB
 Analyzed by: see "By" below

Date

09/19/17
 09/19/17

Time

8:45
 9:50

Laboratory Data

SDG ID: GBZ03314
 Phoenix ID: BZ03315

Project ID: FIRST DRAW LEAD & COPPER
 Client ID: HESLC027

Parameter	Result	RL/ PQL	DIL	Units	AL	MCL	MCLG	Date/Time	By	Reference
Copper	0.234	0.002	1	mg/L	1.3			09/23/17	MA	E200.7
Lead	< 0.0010	0.0010	1	mg/L	0.015			09/23/17	MA	E200.5
Total Metal Digestion	Completed							09/21/17	CB/CB	E200.5/E200.7

RL/PQL=Reporting/Practical Quantitation Level DIL=Dilution (analysis required diluting to evaluate) ND=Not Detected
 BRL=Below Reporting Level (less than the reporting level, the lowest amount the laboratory can detect and report.)
 AL = Action Level MCL = Maximum Contaminant Level MCLG = Maximum Contaminant Level Goal

Comments:

Maximum Contaminant Level (MCL) (Lower of): 40 CFR Part 141; CT Public Health Code 19-13-B102. The highest level of a contaminant that is allowed in drinking water. MCLs are enforceable standards.

Action Level (AL): 40 CFR Part 141.80.

Secondary DW Maximum Contaminant Level Goal (MCLG): (Lower of): 40 CFR Part 141; 40 CFR Part 143; CT Public Health Code 19-13-B102. The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs are non-enforceable public health goals.

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Phyllis Shiller, Laboratory Director
 September 25, 2017

Reviewed and Released by: Deb Lawrie, Project Manager



Environmental Laboratories, Inc.
 587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
 Tel. (860) 645-1102 Fax (860) 645-0823

Analysis Report
 September 25, 2017

FOR: Attn: Mr. Wayne Durocher
 Hebron Elementary School
 92 Church Street
 Hebron, CT 06248
 PWS #0670112

<u>Sample Information</u>		<u>Custody Information</u>		<u>Date</u>	<u>Time</u>
Matrix:	DRINKING WATER	Collected by:	WD	09/19/17	8:45
Location Code:	HEBRON	Received by:	LB	09/19/17	9:50
Rush Request:	Standard	Analyzed by:	see "By" below		
P.O.#:					

Laboratory Data

SDG ID: GBZ03314
 Phoenix ID: BZ03316

Project ID: FIRST DRAW LEAD & COPPER
 Client ID: HESLC024

Parameter	Result	RL/ PQL	DIL	Units	AL	MCL	MCLG	Date/Time	By	Reference
Copper	0.249	0.002	1	mg/L	1.3			09/23/17	MA	E200.7
Lead	< 0.0010	0.0010	1	mg/L	0.015			09/23/17	MA	E200.5
Total Metal Digestion	Completed							09/22/17	CB/AG	E200.5/E200.7

RL/PQL=Reporting/Practical Quantitation Level DIL=Dilution (analysis required diluting to evaluate) ND=Not Detected
 BRL=Below Reporting Level (less than the reporting level, the lowest amount the laboratory can detect and report.)
 AL = Action Level MCL = Maximum Contaminant Level MCLG = Maximum Contaminant Level Goal

Comments:

Maximum Contaminant Level (MCL) (Lower of): 40 CFR Part 141; CT Public Health Code 19-13-B102. The highest level of a contaminant that is allowed in drinking water. MCLs are enforceable standards.

Action Level (AL): 40 CFR Part 141.80.

Secondary DW Maximum Contaminant Level Goal (MCLG): (Lower of): 40 CFR Part 141; 40 CFR Part 143; CT Public Health Code 19-13-B102. The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs are non-enforceable public health goals.

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Phyllis Shiller, Laboratory Director
 September 25, 2017

Reviewed and Released by: Deb Lawrie, Project Manager



Environmental Laboratories, Inc.
 587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
 Tel. (860) 645-1102 Fax (860) 645-0823

Analysis Report
 September 25, 2017

FOR: Attn: Mr. Wayne Durocher
 Hebron Elementary School
 92 Church Street
 Hebron, CT 06248
 PWS #0670112

<u>Sample Information</u>		<u>Custody Information</u>		<u>Date</u>	<u>Time</u>
Matrix:	DRINKING WATER	Collected by:	WD	09/19/17	8:45
Location Code:	HEBRON	Received by:	LB	09/19/17	9:50
Rush Request:	Standard	Analyzed by:	see "By" below		
P.O.#:					

Laboratory Data

SDG ID: GBZ03314
 Phoenix ID: BZ03317

Project ID: FIRST DRAW LEAD & COPPER
 Client ID: HESLC016

Parameter	Result	RL/ PQL	DIL	Units	AL	MCL	MCLG	Date/Time	By	Reference
Copper	0.572	0.002	1	mg/L	1.3			09/23/17	MA	E200.7
Lead	0.0275	0.0010	1	mg/L	0.015			09/23/17	MA	E200.5
*** Lead exceeds Action Level of 0.015 ***										
Total Metal Digestion	Completed							09/22/17	CB/AG	E200.5/E200.7

RL/PQL=Reporting/Practical Quantitation Level DIL=Dilution (analysis required diluting to evaluate) ND=Not Detected
 BRL=Below Reporting Level (less than the reporting level, the lowest amount the laboratory can detect and report.)
 AL = Action Level MCL = Maximum Contaminant Level MCLG = Maximum Contaminant Level Goal

Comments:

Maximum Contaminant Level (MCL) (Lower of): 40 CFR Part 141; CT Public Health Code 19-13-B102. The highest level of a contaminant that is allowed in drinking water. MCLs are enforceable standards.

Action Level (AL): 40 CFR Part 141.80.

Secondary DW Maximum Contaminant Level Goal (MCLG): (Lower of): 40 CFR Part 141; 40 CFR Part 143; CT Public Health Code 19-13-B102. The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs are non-enforceable public health goals.

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Phyllis Shiller, Laboratory Director
September 25, 2017

Reviewed and Released by: Deb Lawrie, Project Manager

Monday, September 25, 2017

Criteria: CT: DW

State: CT

Sample Criteria Exceedances Report

GBZ03314 - HEBRON

SampNo	Acode	Phoenix Analyte	Criteria	Result	RL	Criteria	RL	Analysis Units
BZ03314	PB-DWICP	Lead	EPA / 40 CFR 141 DW / 141.80 Lead & Copper ALs	0.0181	0.0010	0.015	0.001	mg/L
BZ03317	PB-DWICP	Lead	EPA / 40 CFR 141 DW / 141.80 Lead & Copper ALs	0.0275	0.0010	0.015	0.001	mg/L

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Tel. (860) 645-1102 Fax (860) 645-0823



Analysis Comments

September 25, 2017

SDG I.D.: GBZ03314

The following analysis comments are made regarding exceptions to criteria not already noted in the Analysis Report or QA/QC Report: None.



Friday, September 29, 2017

Attn: Mr. Wayne Durocher
Hebron Elementary School
92 Church Street
Hebron, CT 06248
PWS #0670112

Project ID: FIRST DRAW LEAD & COPPER
Sample ID#: BZ02737 - BZ02738, BZ02740 - BZ02743

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. This report is incomplete unless all pages indicated in the pagination at the bottom of the page are included.

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 black ink that reads "Phyllis Shiller". The signature is written in a cursive style.

Phyllis Shiller
Laboratory Director

NELAC - #NY11301
CT Lab Registration #PH-0618
MA Lab Registration #M-CT007
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) 645-0823

Analysis Report
 September 29, 2017

FOR: Attn: Mr. Wayne Durocher
 Hebron Elementary School
 92 Church Street
 Hebron, CT 06248
 PWS #0670112

Sample Information

Matrix: DRINKING WATER
 Location Code: HEBRON
 Rush Request: 48 Hour
 P.O.#:

Custody Information

Collected by:
 Received by: LB
 Analyzed by: see "By" below

Date

09/18/17
 09/18/17

Time

11:00
 14:04

Laboratory Data

SDG ID: GBZ02737
 Phoenix ID: BZ02737

Project ID: FIRST DRAW LEAD & COPPER
 Client ID: HESLC012

Parameter	Result	RL/ PQL	DIL	Units	AL	MCL	MCLG	Date/Time	By	Reference
Copper	0.292	0.002	1	mg/L	1.3			09/23/17	MA	E200.7
Lead	0.0040	0.0010	1	mg/L	0.015			09/23/17	MA	E200.5
Total Metal Digestion	Completed							09/21/17	CB/CB	E200.5/E200.7

RL/PQL=Reporting/Practical Quantitation Level DIL=Dilution (analysis required diluting to evaluate) ND=Not Detected
 BRL=Below Reporting Level (less than the reporting level, the lowest amount the laboratory can detect and report.)
 AL = Action Level MCL = Maximum Contaminant Level MCLG = Maximum Contaminant Level Goal

Comments:

Maximum Contaminant Level (MCL) (Lower of): 40 CFR Part 141; CT Public Health Code 19-13-B102. The highest level of a contaminant that is allowed in drinking water. MCLs are enforceable standards.

Action Level (AL): 40 CFR Part 141.80.

Secondary DW Maximum Contaminant Level Goal (MCLG): (Lower of): 40 CFR Part 141; 40 CFR Part 143; CT Public Health Code 19-13-B102. The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs are non-enforceable public health goals.

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Phyllis Shiller, Laboratory Director
 September 29, 2017

Reviewed and Released by: Deb Lawrie, Project Manager



Environmental Laboratories, Inc.
 587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
 Tel. (860) 645-1102 Fax (860) 645-0823

Analysis Report
 September 29, 2017

FOR: Attn: Mr. Wayne Durocher
 Hebron Elementary School
 92 Church Street
 Hebron, CT 06248
 PWS #0670112

Sample Information

Matrix: DRINKING WATER
 Location Code: HEBRON
 Rush Request: 48 Hour
 P.O.#:

Custody Information

Collected by:
 Received by: LB
 Analyzed by: see "By" below

Date

09/18/17
 09/18/17

Time

11:00
 14:04

Laboratory Data

SDG ID: GBZ02737
 Phoenix ID: BZ02738

Project ID: FIRST DRAW LEAD & COPPER
 Client ID: HESLC015

Parameter	Result	RL/ PQL	DIL	Units	AL	MCL	MCLG	Date/Time	By	Reference
Copper	0.312	0.002	1	mg/L	1.3			09/23/17	MA	E200.7
Lead	0.0074	0.0010	1	mg/L	0.015			09/23/17	MA	E200.5
Total Metal Digestion	Completed							09/22/17	CB/AG	E200.5/E200.7

RL/PQL=Reporting/Practical Quantitation Level DIL=Dilution (analysis required diluting to evaluate) ND=Not Detected
 BRL=Below Reporting Level (less than the reporting level, the lowest amount the laboratory can detect and report.)
 AL = Action Level MCL = Maximum Contaminant Level MCLG = Maximum Contaminant Level Goal

Comments:

Maximum Contaminant Level (MCL) (Lower of): 40 CFR Part 141; CT Public Health Code 19-13-B102. The highest level of a contaminant that is allowed in drinking water. MCLs are enforceable standards.

Action Level (AL): 40 CFR Part 141.80.

Secondary DW Maximum Contaminant Level Goal (MCLG): (Lower of): 40 CFR Part 141; 40 CFR Part 143; CT Public Health Code 19-13-B102. The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs are non-enforceable public health goals.

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Phyllis Shiller, Laboratory Director
 September 29, 2017

Reviewed and Released by: Deb Lawrie, Project Manager



Environmental Laboratories, Inc.
 587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
 Tel. (860) 645-1102 Fax (860) 645-0823

Analysis Report
 September 29, 2017

FOR: Attn: Mr. Wayne Durocher
 Hebron Elementary School
 92 Church Street
 Hebron, CT 06248
 PWS #0670112

<u>Sample Information</u>	<u>Custody Information</u>	<u>Date</u>	<u>Time</u>
Matrix: DRINKING WATER	Collected by:	09/18/17	11:00
Location Code: HEBRON	Received by: LB	09/18/17	14:04
Rush Request: 48 Hour	Analyzed by: see "By" below		
P.O.#:			

Laboratory Data

SDG ID: GBZ02737
 Phoenix ID: BZ02740

Project ID: FIRST DRAW LEAD & COPPER
 Client ID: HESLC017

Parameter	Result	RL/ PQL	DIL	Units	AL	MCL	MCLG	Date/Time	By	Reference
Copper	0.383	0.002	1	mg/L	1.3			09/23/17	MA	E200.7
Lead	0.0984	0.0010	1	mg/L	0.015			09/23/17	MA	E200.5
*** Lead exceeds Action Level of 0.015 ***										
Total Metal Digestion	Completed							09/21/17	CB/CB	E200.5/E200.7

RL/PQL=Reporting/Practical Quantitation Level DIL=Dilution (analysis required diluting to evaluate) ND=Not Detected
 BRL=Below Reporting Level (less than the reporting level, the lowest amount the laboratory can detect and report.)
 AL = Action Level MCL = Maximum Contaminant Level MCLG = Maximum Contaminant Level Goal

Comments:

Maximum Contaminant Level (MCL) (Lower of): 40 CFR Part 141; CT Public Health Code 19-13-B102. The highest level of a contaminant that is allowed in drinking water. MCLs are enforceable standards.

Action Level (AL): 40 CFR Part 141.80.

Secondary DW Maximum Contaminant Level Goal (MCLG): (Lower of): 40 CFR Part 141; 40 CFR Part 143; CT Public Health Code 19-13-B102. The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs are non-enforceable public health goals.

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Phyllis Shiller, Laboratory Director
September 29, 2017

Reviewed and Released by: Deb Lawrie, Project Manager



Environmental Laboratories, Inc.
 587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
 Tel. (860) 645-1102 Fax (860) 645-0823

Analysis Report
 September 29, 2017

FOR: Attn: Mr. Wayne Durocher
 Hebron Elementary School
 92 Church Street
 Hebron, CT 06248
 PWS #0670112

Sample Information

Matrix: DRINKING WATER
 Location Code: HEBRON
 Rush Request: 48 Hour
 P.O.#:

Custody Information

Collected by:
 Received by: LB
 Analyzed by: see "By" below

Date

09/18/17
 09/18/17

Time

11:00
 14:04

Laboratory Data

SDG ID: GBZ02737
 Phoenix ID: BZ02741

Project ID: FIRST DRAW LEAD & COPPER
 Client ID: HESLC018

Parameter	Result	RL/ PQL	DIL	Units	AL	MCL	MCLG	Date/Time	By	Reference
Copper	0.147	0.002	1	mg/L	1.3			09/28/17	MA	E200.7
Lead	0.0037	0.0010	1	mg/L	0.015			09/28/17	MA	E200.5
Total Metal Digestion	Completed							09/27/17	CB/CB	E200.5/E200.7

RL/PQL=Reporting/Practical Quantitation Level DIL=Dilution (analysis required diluting to evaluate) ND=Not Detected
 BRL=Below Reporting Level (less than the reporting level, the lowest amount the laboratory can detect and report.)
 AL = Action Level MCL = Maximum Contaminant Level MCLG = Maximum Contaminant Level Goal

Comments:

Maximum Contaminant Level (MCL) (Lower of): 40 CFR Part 141; CT Public Health Code 19-13-B102. The highest level of a contaminant that is allowed in drinking water. MCLs are enforceable standards.

Action Level (AL): 40 CFR Part 141.80.

Secondary DW Maximum Contaminant Level Goal (MCLG): (Lower of): 40 CFR Part 141; 40 CFR Part 143; CT Public Health Code 19-13-B102. The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs are non-enforceable public health goals.

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Phyllis Shiller, Laboratory Director
 September 29, 2017

Reviewed and Released by: Deb Lawrie, Project Manager



Environmental Laboratories, Inc.
 587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
 Tel. (860) 645-1102 Fax (860) 645-0823

Analysis Report
 September 29, 2017

FOR: Attn: Mr. Wayne Durocher
 Hebron Elementary School
 92 Church Street
 Hebron, CT 06248
 PWS #0670112

<u>Sample Information</u>	<u>Custody Information</u>	<u>Date</u>	<u>Time</u>
Matrix: DRINKING WATER	Collected by:	09/18/17	11:00
Location Code: HEBRON	Received by: LB	09/18/17	14:04
Rush Request: 48 Hour	Analyzed by: see "By" below		
P.O.#:			

Laboratory Data

SDG ID: GBZ02737
 Phoenix ID: BZ02742

Project ID: FIRST DRAW LEAD & COPPER
 Client ID: HESLC024

Parameter	Result	RL/ PQL	DIL	Units	AL	MCL	MCLG	Date/Time	By	Reference
Copper	0.331	0.002	1	mg/L	1.3			09/28/17	MA	E200.7
Lead	0.0215	0.0010	1	mg/L	0.015			09/28/17	MA	E200.5
*** Lead exceeds Action Level of 0.015 ***										
Total Metal Digestion	Completed							09/27/17	CB/CB	E200.5/E200.7

RL/PQL=Reporting/Practical Quantitation Level DIL=Dilution (analysis required diluting to evaluate) ND=Not Detected
 BRL=Below Reporting Level (less than the reporting level, the lowest amount the laboratory can detect and report.)
 AL = Action Level MCL = Maximum Contaminant Level MCLG = Maximum Contaminant Level Goal

Comments:

Maximum Contaminant Level (MCL) (Lower of): 40 CFR Part 141; CT Public Health Code 19-13-B102. The highest level of a contaminant that is allowed in drinking water. MCLs are enforceable standards.

Action Level (AL): 40 CFR Part 141.80.

Secondary DW Maximum Contaminant Level Goal (MCLG): (Lower of): 40 CFR Part 141; 40 CFR Part 143; CT Public Health Code 19-13-B102. The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs are non-enforceable public health goals.

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Phyllis Shiller, Laboratory Director
September 29, 2017

Reviewed and Released by: Deb Lawrie, Project Manager



Environmental Laboratories, Inc.
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Analysis Report
 September 29, 2017

FOR: Attn: Mr. Wayne Durocher
 Hebron Elementary School
 92 Church Street
 Hebron, CT 06248
 PWS #0670112

Sample Information

Matrix: DRINKING WATER
 Location Code: HEBRON
 Rush Request: 48 Hour
 P.O.#:

Custody Information

Collected by:
 Received by: LB
 Analyzed by: see "By" below

Date

09/18/17
 09/18/17

Time

11:00
 14:04

Laboratory Data

SDG ID: GBZ02737
 Phoenix ID: BZ02743

Project ID: FIRST DRAW LEAD & COPPER
 Client ID: HESLC020

Parameter	Result	RL/ PQL	DIL	Units	AL	MCL	MCLG	Date/Time	By	Reference
Copper	0.115	0.002	1	mg/L	1.3			09/28/17	MA	E200.7
Lead	0.0035	0.0010	1	mg/L	0.015			09/28/17	MA	E200.5
Total Metal Digestion	Completed							09/27/17	CB/CB	E200.5/E200.7

RL/PQL=Reporting/Practical Quantitation Level DIL=Dilution (analysis required diluting to evaluate) ND=Not Detected
 BRL=Below Reporting Level (less than the reporting level, the lowest amount the laboratory can detect and report.)
 AL = Action Level MCL = Maximum Contaminant Level MCLG = Maximum Contaminant Level Goal

Comments:

Maximum Contaminant Level (MCL) (Lower of): 40 CFR Part 141; CT Public Health Code 19-13-B102. The highest level of a contaminant that is allowed in drinking water. MCLs are enforceable standards.

Action Level (AL): 40 CFR Part 141.80.

Secondary DW Maximum Contaminant Level Goal (MCLG): (Lower of): 40 CFR Part 141; 40 CFR Part 143; CT Public Health Code 19-13-B102. The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs are non-enforceable public health goals.

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Phyllis Shiller, Laboratory Director
 September 29, 2017

Reviewed and Released by: Deb Lawrie, Project Manager

Friday, September 29, 2017

Criteria: CT: DW

State: CT

Sample Criteria Exceedances Report

GBZ02737 - HEBRON

SampNo	Acode	Phoenix Analyte	Criteria	Result	RL	Criteria	RL	Analysis Units
BZ02740	PB-DWICP	Lead	EPA / 40 CFR 141 DW / 141.80 Lead & Copper ALs	0.0984	0.0010	0.015	0.001	mg/L
BZ02742	PB-DWICP	Lead	EPA / 40 CFR 141 DW / 141.80 Lead & Copper ALs	0.0215	0.0010	0.015	0.001	mg/L

Phoenix Laboratories does not assume responsibility for the data contained in this report. It is provided as an additional tool to identify requested criteria exceedances. All efforts are made to ensure the accuracy of the data (obtained from appropriate agencies). A lack of exceedance information does not necessarily suggest conformance to the criteria. It is ultimately the site professional's responsibility to determine appropriate compliance.



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Tel. (860) 645-1102 Fax (860) 645-0823



Analysis Comments

September 29, 2017

SDG I.D.: GBZ02737

The following analysis comments are made regarding exceptions to criteria not already noted in the Analysis Report or QA/QC Report: None.

Cooler: Yes No
 Coolant: IPK ICE of
 Temp: 23.9 C Pg

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: HEBRON ELEMENTARY SCHOOL
 Address: 92 CHURCH ST
HEBRON CT 06248

Project: FIRST DRAW HEAD-TOPPER
 Report to: WAYNE DUROCHER
 Invoice to:

Data Delivery:
 Fax #:
 Email:

Project P.O.:
 Phone #:
 Fax #:

Sampler's Signature _____ Date: _____
 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
RM 23	HES LCO12	DW	9-18-17	11:00
RM 19	HES LCO15			
RM 3	HES LCO16			
RM 10	HES LCO17			
RM 24	HES LCO18			
RM 25	HES LCO19			
RM 1	HES LCO20			

Analysis Request

Test by copper

GL VOA Vials [methanol] [H2O]	GL Soil container []	40 ml VOA Vial [As Et] [HCl]	GL Amber 1000ml [As Et] [HCl]	PL H2SO4 [250ml] [1500ml] [1000ml]	PL HNO3 250ml	Bacteria Bottle
						02737
						02738
						02739
						02740
						02741
						02742
						02743

Relinquished By: Wayne Durocher Accepted by: Quadrine
 Date: 9/18/17 Time: 1404

Turnaround:
 1 Day*
 2 Days*
 3 Days*
 Standard
 Other

RI Direct Exposure (Residential)
 GW
 Other

CI RCP Cert
 GW Protection
 SW Protection
 GA Mobility
 GB Mobility
 Residential DEC
 I/C DEC
 Other

MA MCP Certification
 GW-1
 GW-2
 GW-3
 S-1
 S-2
 S-3
 MWRA eSMART
 Other

Data Format
 Excel
 PDF
 GIS/Key
 EQUIS
 Other

Data Package
 Tier II Checklist
 Full Data Package*
 Phoenix Std Report
 Other

Comments, Special Requirements or Regulations:
* bottle received empty

State where samples were collected: _____

* SURCHARGE APPLIES

* SURCHARGE APPLIES

GBZ 02737

Christine Paradise

From: Christine Paradise
Sent: Monday, September 18, 2017 2:58 PM
To: 'wdurocher@hebron.k12.ct.us'
Subject: Lead and Copper samples

Good Afternoon,

One of the sample bottles in the cardboard box was received empty. It was your ID HESLC016 RM 3. We will test all the others.

Christine Paradise

Phoenix Environmental Laboratories
587 East Middle Turnpike
Manchester, CT 06040
Phone: 860-645-1102
Fax: 860-645-0823



Friday, September 22, 2017

Attn: Mr. Wayne Durocher
Hebron Elementary School
92 Church Street
Hebron, CT 06248
PWS #0670112

Project ID: FIRST DRAW LEAD & COPPER
Sample ID#: BZ02727 - BZ02736

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. This report is incomplete unless all pages indicated in the pagination at the bottom of the page are included.

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 black ink that reads "Phyllis Shiller". The signature is fluid and cursive, with the first name being more prominent.

Phyllis Shiller
Laboratory Director

NELAC - #NY11301
CT Lab Registration #PH-0618
MA Lab Registration #M-CT007
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) 645-0823

Analysis Report
 September 22, 2017

FOR: Attn: Mr. Wayne Durocher
 Hebron Elementary School
 92 Church Street
 Hebron, CT 06248
 PWS #0670112

<u>Sample Information</u>		<u>Custody Information</u>		<u>Date</u>	<u>Time</u>
Matrix:	DRINKING WATER	Collected by:	WED	09/18/17	11:00
Location Code:	HEBRON	Received by:	LB	09/18/17	14:04
Rush Request:	Standard	Analyzed by:	see "By" below		
P.O.#:					

Laboratory Data

SDG ID: GBZ02727
 Phoenix ID: BZ02727

Project ID: FIRST DRAW LEAD & COPPER
 Client ID: HESLC001

Parameter	Result	RL/ PQL	DIL	Units	AL	MCL	MCLG	Date/Time	By	Reference
Copper	0.098	0.002	1	mg/L	1.3			09/21/17	MA	E200.7
Lead	< 0.0010	0.0010	1	mg/L	0.015			09/21/17	MA	E200.5
Total Metal Digestion	Completed							09/20/17	CB/AG	E200.5/E200.7

RL/PQL=Reporting/Practical Quantitation Level DIL=Dilution (analysis required diluting to evaluate) ND=Not Detected
 BRL=Below Reporting Level (less than the reporting level, the lowest amount the laboratory can detect and report.)
 AL = Action Level MCL = Maximum Contaminant Level MCLG = Maximum Contaminant Level Goal

Comments:

Maximum Contaminant Level (MCL) (Lower of): 40 CFR Part 141; CT Public Health Code 19-13-B102. The highest level of a contaminant that is allowed in drinking water. MCLs are enforceable standards.

Action Level (AL): 40 CFR Part 141.80.

Secondary DW Maximum Contaminant Level Goal (MCLG): (Lower of): 40 CFR Part 141; 40 CFR Part 143; CT Public Health Code 19-13-B102. The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs are non-enforceable public health goals.

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Phyllis Shiller, Laboratory Director

September 22, 2017

Reviewed and Released by: Deb Lawrie, Project Manager



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Analysis Report
 September 22, 2017

FOR: Attn: Mr. Wayne Durocher
 Hebron Elementary School
 92 Church Street
 Hebron, CT 06248
 PWS #0670112

<u>Sample Information</u>		<u>Custody Information</u>		<u>Date</u>	<u>Time</u>
Matrix:	DRINKING WATER	Collected by:	WED	09/18/17	11:00
Location Code:	HEBRON	Received by:	LB	09/18/17	14:04
Rush Request:	Standard	Analyzed by:	see "By" below		
P.O.#:					

Laboratory Data

SDG ID: GBZ02727
 Phoenix ID: BZ02728

Project ID: FIRST DRAW LEAD & COPPER
 Client ID: HESLC002

Parameter	Result	RL/ PQL	DIL	Units	AL	MCL	MCLG	Date/Time	By	Reference
Copper	0.768	0.002	1	mg/L	1.3			09/21/17	MA	E200.7
Lead	0.0054	0.0010	1	mg/L	0.015			09/21/17	MA	E200.5
Total Metal Digestion	Completed							09/20/17	CB/AG	E200.5/E200.7

RL/PQL=Reporting/Practical Quantitation Level DIL=Dilution (analysis required diluting to evaluate) ND=Not Detected
 BRL=Below Reporting Level (less than the reporting level, the lowest amount the laboratory can detect and report.)
 AL = Action Level MCL = Maximum Contaminant Level MCLG = Maximum Contaminant Level Goal

Comments:

Maximum Contaminant Level (MCL) (Lower of): 40 CFR Part 141; CT Public Health Code 19-13-B102. The highest level of a contaminant that is allowed in drinking water. MCLs are enforceable standards.

Action Level (AL): 40 CFR Part 141.80.

Secondary DW Maximum Contaminant Level Goal (MCLG): (Lower of): 40 CFR Part 141; 40 CFR Part 143; CT Public Health Code 19-13-B102. The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs are non-enforceable public health goals.

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September 22, 2017

Reviewed and Released by: Deb Lawrie, Project Manager



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Analysis Report
 September 22, 2017

FOR: Attn: Mr. Wayne Durocher
 Hebron Elementary School
 92 Church Street
 Hebron, CT 06248
 PWS #0670112

<u>Sample Information</u>		<u>Custody Information</u>		<u>Date</u>	<u>Time</u>
Matrix:	DRINKING WATER	Collected by:	WED	09/18/17	11:00
Location Code:	HEBRON	Received by:	LB	09/18/17	14:04
Rush Request:	Standard	Analyzed by:	see "By" below		
P.O.#:					

Laboratory Data

SDG ID: GBZ02727
 Phoenix ID: BZ02729

Project ID: FIRST DRAW LEAD & COPPER
 Client ID: HESLC003

Parameter	Result	RL/ PQL	DIL	Units	AL	MCL	MCLG	Date/Time	By	Reference
Copper	0.182	0.002	1	mg/L	1.3			09/21/17	MA	E200.7
Lead	< 0.0010	0.0010	1	mg/L	0.015			09/21/17	MA	E200.5
Total Metal Digestion	Completed							09/20/17	CB/AG	E200.5/E200.7

RL/PQL=Reporting/Practical Quantitation Level DIL=Dilution (analysis required diluting to evaluate) ND=Not Detected
 BRL=Below Reporting Level (less than the reporting level, the lowest amount the laboratory can detect and report.)
 AL = Action Level MCL = Maximum Contaminant Level MCLG = Maximum Contaminant Level Goal

Comments:

Maximum Contaminant Level (MCL) (Lower of): 40 CFR Part 141; CT Public Health Code 19-13-B102. The highest level of a contaminant that is allowed in drinking water. MCLs are enforceable standards.

Action Level (AL): 40 CFR Part 141.80.

Secondary DW Maximum Contaminant Level Goal (MCLG): (Lower of): 40 CFR Part 141; 40 CFR Part 143; CT Public Health Code 19-13-B102. The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs are non-enforceable public health goals.

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September 22, 2017

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Analysis Report
 September 22, 2017

FOR: Attn: Mr. Wayne Durocher
 Hebron Elementary School
 92 Church Street
 Hebron, CT 06248
 PWS #0670112

Sample Information

Matrix: DRINKING WATER
 Location Code: HEBRON
 Rush Request: Standard
 P.O.#:

Custody Information

Collected by: WED
 Received by: LB
 Analyzed by: see "By" below

Date

09/18/17
 09/18/17

Time

11:00
 14:04

Laboratory Data

SDG ID: GBZ02727
 Phoenix ID: BZ02730

Project ID: FIRST DRAW LEAD & COPPER
 Client ID: HESLC005

Parameter	Result	RL/ PQL	DIL	Units	AL	MCL	MCLG	Date/Time	By	Reference
Copper	0.225	0.002	1	mg/L	1.3			09/21/17	MA	E200.7
Lead	0.0019	0.0010	1	mg/L	0.015			09/21/17	MA	E200.5
Total Metal Digestion	Completed							09/20/17	CB/AG	E200.5/E200.7

RL/PQL=Reporting/Practical Quantitation Level DIL=Dilution (analysis required diluting to evaluate) ND=Not Detected
 BRL=Below Reporting Level (less than the reporting level, the lowest amount the laboratory can detect and report.)
 AL = Action Level MCL = Maximum Contaminant Level MCLG = Maximum Contaminant Level Goal

Comments:

Maximum Contaminant Level (MCL) (Lower of): 40 CFR Part 141; CT Public Health Code 19-13-B102. The highest level of a contaminant that is allowed in drinking water. MCLs are enforceable standards.

Action Level (AL): 40 CFR Part 141.80.

Secondary DW Maximum Contaminant Level Goal (MCLG): (Lower of): 40 CFR Part 141; 40 CFR Part 143; CT Public Health Code 19-13-B102. The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs are non-enforceable public health goals.

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 September 22, 2017

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Analysis Report
 September 22, 2017

FOR: Attn: Mr. Wayne Durocher
 Hebron Elementary School
 92 Church Street
 Hebron, CT 06248
 PWS #0670112

<u>Sample Information</u>		<u>Custody Information</u>		<u>Date</u>	<u>Time</u>
Matrix:	DRINKING WATER	Collected by:	WED	09/18/17	11:00
Location Code:	HEBRON	Received by:	LB	09/18/17	14:04
Rush Request:	Standard	Analyzed by:	see "By" below		
P.O.#:					

Laboratory Data

SDG ID: GBZ02727
 Phoenix ID: BZ02731

Project ID: FIRST DRAW LEAD & COPPER
 Client ID: HESLC006

Parameter	Result	RL/ PQL	DIL	Units	AL	MCL	MCLG	Date/Time	By	Reference
Copper	0.204	0.002	1	mg/L	1.3			09/21/17	MA	E200.7
Lead	0.0012	0.0010	1	mg/L	0.015			09/21/17	MA	E200.5
Total Metal Digestion	Completed							09/20/17	CB/AG	E200.5/E200.7

RL/PQL=Reporting/Practical Quantitation Level DIL=Dilution (analysis required diluting to evaluate) ND=Not Detected
 BRL=Below Reporting Level (less than the reporting level, the lowest amount the laboratory can detect and report.)
 AL = Action Level MCL = Maximum Contaminant Level MCLG = Maximum Contaminant Level Goal

Comments:

Maximum Contaminant Level (MCL) (Lower of): 40 CFR Part 141; CT Public Health Code 19-13-B102. The highest level of a contaminant that is allowed in drinking water. MCLs are enforceable standards.

Action Level (AL): 40 CFR Part 141.80.

Secondary DW Maximum Contaminant Level Goal (MCLG): (Lower of): 40 CFR Part 141; 40 CFR Part 143; CT Public Health Code 19-13-B102. The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs are non-enforceable public health goals.

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 September 22, 2017

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 Tel. (860) 645-1102 Fax (860) 645-0823

Analysis Report
 September 22, 2017

FOR: Attn: Mr. Wayne Durocher
 Hebron Elementary School
 92 Church Street
 Hebron, CT 06248
 PWS #0670112

<u>Sample Information</u>		<u>Custody Information</u>		<u>Date</u>	<u>Time</u>
Matrix:	DRINKING WATER	Collected by:	WED	09/18/17	11:00
Location Code:	HEBRON	Received by:	LB	09/18/17	14:04
Rush Request:	Standard	Analyzed by:	see "By" below		
P.O.#:					

Laboratory Data

SDG ID: GBZ02727
 Phoenix ID: BZ02732

Project ID: FIRST DRAW LEAD & COPPER
 Client ID: HESLC007

Parameter	Result	RL/ PQL	DIL	Units	AL	MCL	MCLG	Date/Time	By	Reference
Copper	0.857	0.002	1	mg/L	1.3			09/21/17	MA	E200.7
Lead	0.0351	0.0010	1	mg/L	0.015			09/21/17	MA	E200.5
*** Lead exceeds Action Level of 0.015 ***										
Total Metal Digestion	Completed							09/20/17	CB/AG	E200.5/E200.7

RL/PQL=Reporting/Practical Quantitation Level DIL=Dilution (analysis required diluting to evaluate) ND=Not Detected
 BRL=Below Reporting Level (less than the reporting level, the lowest amount the laboratory can detect and report.)
 AL = Action Level MCL = Maximum Contaminant Level MCLG = Maximum Contaminant Level Goal

Comments:

Maximum Contaminant Level (MCL) (Lower of): 40 CFR Part 141; CT Public Health Code 19-13-B102. The highest level of a contaminant that is allowed in drinking water. MCLs are enforceable standards.

Action Level (AL): 40 CFR Part 141.80.

Secondary DW Maximum Contaminant Level Goal (MCLG): (Lower of): 40 CFR Part 141; 40 CFR Part 143; CT Public Health Code 19-13-B102. The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs are non-enforceable public health goals.

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Phyllis Shiller, Laboratory Director
 September 22, 2017

Reviewed and Released by: Deb Lawrie, Project Manager



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 Tel. (860) 645-1102 Fax (860) 645-0823

Analysis Report
 September 22, 2017

FOR: Attn: Mr. Wayne Durocher
 Hebron Elementary School
 92 Church Street
 Hebron, CT 06248
 PWS #0670112

<u>Sample Information</u>		<u>Custody Information</u>		<u>Date</u>	<u>Time</u>
Matrix:	DRINKING WATER	Collected by:	WED	09/18/17	11:00
Location Code:	HEBRON	Received by:	LB	09/18/17	14:04
Rush Request:	Standard	Analyzed by:	see "By" below		
P.O.#:					

Laboratory Data

SDG ID: GBZ02727
 Phoenix ID: BZ02733

Project ID: FIRST DRAW LEAD & COPPER
 Client ID: HESLC008

Parameter	Result	RL/ PQL	DIL	Units	AL	MCL	MCLG	Date/Time	By	Reference
Copper	0.116	0.002	1	mg/L	1.3			09/21/17	MA	E200.7
Lead	0.0033	0.0010	1	mg/L	0.015			09/21/17	MA	E200.5
Total Metal Digestion	Completed							09/20/17	CB/AG	E200.5/E200.7

RL/PQL=Reporting/Practical Quantitation Level DIL=Dilution (analysis required diluting to evaluate) ND=Not Detected
 BRL=Below Reporting Level (less than the reporting level, the lowest amount the laboratory can detect and report.)
 AL = Action Level MCL = Maximum Contaminant Level MCLG = Maximum Contaminant Level Goal

Comments:

Maximum Contaminant Level (MCL) (Lower of): 40 CFR Part 141; CT Public Health Code 19-13-B102. The highest level of a contaminant that is allowed in drinking water. MCLs are enforceable standards.

Action Level (AL): 40 CFR Part 141.80.

Secondary DW Maximum Contaminant Level Goal (MCLG): (Lower of): 40 CFR Part 141; 40 CFR Part 143; CT Public Health Code 19-13-B102. The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs are non-enforceable public health goals.

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Phyllis Shiller, Laboratory Director
 September 22, 2017

Reviewed and Released by: Deb Lawrie, Project Manager



Environmental Laboratories, Inc.
 587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
 Tel. (860) 645-1102 Fax (860) 645-0823

Analysis Report
 September 22, 2017

FOR: Attn: Mr. Wayne Durocher
 Hebron Elementary School
 92 Church Street
 Hebron, CT 06248
 PWS #0670112

Sample Information

Matrix: DRINKING WATER
 Location Code: HEBRON
 Rush Request: Standard
 P.O.#:

Custody Information

Collected by: WED
 Received by: LB
 Analyzed by: see "By" below

Date

09/18/17
 09/18/17

Time

11:00
 14:04

Laboratory Data

SDG ID: GBZ02727
 Phoenix ID: BZ02734

Project ID: FIRST DRAW LEAD & COPPER
 Client ID: HESLC009

Parameter	Result	RL/ PQL	DIL	Units	AL	MCL	MCLG	Date/Time	By	Reference
Copper	0.139	0.002	1	mg/L	1.3			09/21/17	MA	E200.7
Lead	0.0247	0.0010	1	mg/L	0.015			09/21/17	MA	E200.5
*** Lead exceeds Action Level of 0.015 ***										
Total Metal Digestion	Completed							09/20/17	CB/AG	E200.5/E200.7

RL/PQL=Reporting/Practical Quantitation Level DIL=Dilution (analysis required diluting to evaluate) ND=Not Detected
 BRL=Below Reporting Level (less than the reporting level, the lowest amount the laboratory can detect and report.)
 AL = Action Level MCL = Maximum Contaminant Level MCLG = Maximum Contaminant Level Goal

Comments:

Maximum Contaminant Level (MCL) (Lower of): 40 CFR Part 141; CT Public Health Code 19-13-B102. The highest level of a contaminant that is allowed in drinking water. MCLs are enforceable standards.

Action Level (AL): 40 CFR Part 141.80.

Secondary DW Maximum Contaminant Level Goal (MCLG): (Lower of): 40 CFR Part 141; 40 CFR Part 143; CT Public Health Code 19-13-B102. The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs are non-enforceable public health goals.

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Phyllis Shiller, Laboratory Director
September 22, 2017

Reviewed and Released by: Deb Lawrie, Project Manager



Environmental Laboratories, Inc.
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 Tel. (860) 645-1102 Fax (860) 645-0823

Analysis Report
 September 22, 2017

FOR: Attn: Mr. Wayne Durocher
 Hebron Elementary School
 92 Church Street
 Hebron, CT 06248
 PWS #0670112

<u>Sample Information</u>		<u>Custody Information</u>		<u>Date</u>	<u>Time</u>
Matrix:	DRINKING WATER	Collected by:	WED	09/18/17	11:00
Location Code:	HEBRON	Received by:	LB	09/18/17	14:04
Rush Request:	Standard	Analyzed by:	see "By" below		
P.O.#:					

Laboratory Data

SDG ID: GBZ02727
 Phoenix ID: BZ02735

Project ID: FIRST DRAW LEAD & COPPER
 Client ID: HESLC010

Parameter	Result	RL/ PQL	DIL	Units	AL	MCL	MCLG	Date/Time	By	Reference
Copper	0.228	0.002	1	mg/L	1.3			09/21/17	MA	E200.7
Lead	0.0447	0.0010	1	mg/L	0.015			09/21/17	MA	E200.5
*** Lead exceeds Action Level of 0.015 ***										
Total Metal Digestion	Completed							09/20/17	CB/AG	E200.5/E200.7

RL/PQL=Reporting/Practical Quantitation Level DIL=Dilution (analysis required diluting to evaluate) ND=Not Detected
 BRL=Below Reporting Level (less than the reporting level, the lowest amount the laboratory can detect and report.)
 AL = Action Level MCL = Maximum Contaminant Level MCLG = Maximum Contaminant Level Goal

Comments:

Maximum Contaminant Level (MCL) (Lower of): 40 CFR Part 141; CT Public Health Code 19-13-B102. The highest level of a contaminant that is allowed in drinking water. MCLs are enforceable standards.

Action Level (AL): 40 CFR Part 141.80.

Secondary DW Maximum Contaminant Level Goal (MCLG): (Lower of): 40 CFR Part 141; 40 CFR Part 143; CT Public Health Code 19-13-B102. The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs are non-enforceable public health goals.

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Phyllis Shiller, Laboratory Director
 September 22, 2017

Reviewed and Released by: Deb Lawrie, Project Manager



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Analysis Report
 September 22, 2017

FOR: Attn: Mr. Wayne Durocher
 Hebron Elementary School
 92 Church Street
 Hebron, CT 06248
 PWS #0670112

<u>Sample Information</u>		<u>Custody Information</u>		<u>Date</u>	<u>Time</u>
Matrix:	DRINKING WATER	Collected by:	WED	09/18/17	11:00
Location Code:	HEBRON	Received by:	LB	09/18/17	14:04
Rush Request:	Standard	Analyzed by:	see "By" below		
P.O.#:					

Laboratory Data

SDG ID: GBZ02727
 Phoenix ID: BZ02736

Project ID: FIRST DRAW LEAD & COPPER
 Client ID: HESLC011

Parameter	Result	RL/ PQL	DIL	Units	AL	MCL	MCLG	Date/Time	By	Reference
Copper	0.616	0.002	1	mg/L	1.3			09/21/17	MA	E200.7
Lead	0.0045	0.0010	1	mg/L	0.015			09/21/17	MA	E200.5
Total Metal Digestion	Completed							09/20/17	CB/AG	E200.5/E200.7

RL/PQL=Reporting/Practical Quantitation Level DIL=Dilution (analysis required diluting to evaluate) ND=Not Detected
 BRL=Below Reporting Level (less than the reporting level, the lowest amount the laboratory can detect and report.)
 AL = Action Level MCL = Maximum Contaminant Level MCLG = Maximum Contaminant Level Goal

Comments:

Maximum Contaminant Level (MCL) (Lower of): 40 CFR Part 141; CT Public Health Code 19-13-B102. The highest level of a contaminant that is allowed in drinking water. MCLs are enforceable standards.

Action Level (AL): 40 CFR Part 141.80.

Secondary DW Maximum Contaminant Level Goal (MCLG): (Lower of): 40 CFR Part 141; 40 CFR Part 143; CT Public Health Code 19-13-B102. The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs are non-enforceable public health goals.

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Phyllis Shiller, Laboratory Director
 September 22, 2017

Reviewed and Released by: Deb Lawrie, Project Manager

Friday, September 22, 2017

Criteria: CT: DW

State: CT

Sample Criteria Exceedances Report

GBZ02727 - HEBRON

SampNo	Acode	Phoenix Analyte	Criteria	Result	RL	Criteria	RL	Analysis Units
BZ02732	PB-DWICP	Lead	EPA / 40 CFR 141 DW / 141.80 Lead & Copper ALS	0.0351	0.0010	0.015	0.001	mg/L
BZ02734	PB-DWICP	Lead	EPA / 40 CFR 141 DW / 141.80 Lead & Copper ALS	0.0247	0.0010	0.015	0.001	mg/L
BZ02735	PB-DWICP	Lead	EPA / 40 CFR 141 DW / 141.80 Lead & Copper ALS	0.0447	0.0010	0.015	0.001	mg/L

Phoenix Laboratories does not assume responsibility for the data contained in this report. It is provided as an additional tool to identify requested criteria exceedances. 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.



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Analysis Comments

September 22, 2017

SDG I.D.: GBZ02727

The following analysis comments are made regarding exceptions to criteria not already noted in the Analysis Report or QA/QC Report: None.



Friday, June 23, 2017

Attn: Mr. Wayne Durocher
Hebron Elementary School
92 Church Street
Hebron, CT 06248
PWS #0670112

Project ID: HEBRON ELEMENTARY LEAD & COPPER
Sample ID#:s: BY42134 - BY42153

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. This report is incomplete unless all pages indicated in the pagination at the bottom of the page are included.

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 black ink that reads "Phyllis Shiller". The signature is written in a cursive style.

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) 645-0823

Analysis Report
 June 23, 2017

FOR: Attn: Mr. Wayne Durocher
 Hebron Elementary School
 92 Church Street
 Hebron, CT 06248
 PWS #0670112

Sample Information

Matrix: DRINKING WATER
 Location Code: HEBRON
 Rush Request: Standard
 P.O.#:

Custody Information

Collected by:
 Received by: SW
 Analyzed by: see "By" below

Date

06/16/17
 06/19/17

Time

9:00
 11:13

Laboratory Data

SDG ID: GBY42134
 Phoenix ID: BY42134

Project ID: HEBRON ELEMENTARY LEAD & COPPER
 Client ID: KITCHEN

Parameter	Result	RL/ PQL	DIL	Units	AL	MCL	MCLG	Date/Time	By	Reference
Copper	0.147	0.002	1	mg/L	1.3			06/22/17	LK	E200.7
Lead	< 0.0010	0.0010	1	mg/L	0.015			06/22/17	LK	E200.5
Total Metal Digestion	Completed							06/21/17	CB/CB	E200.5/E200.7

RL/PQL=Reporting/Practical Quantitation Level DIL=Dilution (analysis required diluting to evaluate) ND=Not Detected
 BRL=Below Reporting Level (less than the reporting level, the lowest amount the laboratory can detect and report.)
 AL = Action Level MCL = Maximum Contaminant Level MCLG = Maximum Contaminant Level Goal

Comments:

Maximum Contaminant Level (MCL) (Lower of): 40 CFR Part 141; CT Public Health Code 19-13-B102. The highest level of a contaminant that is allowed in drinking water. MCLs are enforceable standards.

Action Level (AL): 40 CFR Part 141.80.

Secondary DW Maximum Contaminant Level Goal (MCLG): (Lower of): 40 CFR Part 141; 40 CFR Part 143; CT Public Health Code 19-13-B102. The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs are non-enforceable public health goals.

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Phyllis Shiller, Laboratory Director

June 23, 2017

Reviewed and Released by: Deb Lawrie, Project Manager



Environmental Laboratories, Inc.
 587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
 Tel. (860) 645-1102 Fax (860) 645-0823

Analysis Report
 June 23, 2017

FOR: Attn: Mr. Wayne Durocher
 Hebron Elementary School
 92 Church Street
 Hebron, CT 06248
 PWS #0670112

Sample Information

Matrix: DRINKING WATER
 Location Code: HEBRON
 Rush Request: Standard
 P.O.#:

Custody Information

Collected by:
 Received by: SW
 Analyzed by: see "By" below

Date

06/16/17
 06/19/17

Time

9:00
 11:13

Laboratory Data

SDG ID: GBY42134
 Phoenix ID: BY42135

Project ID: HEBRON ELEMENTARY LEAD & COPPER
 Client ID: RM 22

Parameter	Result	RL/ PQL	DIL	Units	AL	MCL	MCLG	Date/Time	By	Reference
Copper	0.118	0.002	1	mg/L	1.3			06/22/17	LK	E200.7
Lead	< 0.0010	0.0010	1	mg/L	0.015			06/22/17	LK	E200.5
Total Metal Digestion	Completed							06/21/17	CB/CB	E200.5/E200.7

RL/PQL=Reporting/Practical Quantitation Level DIL=Dilution (analysis required diluting to evaluate) ND=Not Detected
 BRL=Below Reporting Level (less than the reporting level, the lowest amount the laboratory can detect and report.)
 AL = Action Level MCL = Maximum Contaminant Level MCLG = Maximum Contaminant Level Goal

Comments:

Maximum Contaminant Level (MCL) (Lower of): 40 CFR Part 141; CT Public Health Code 19-13-B102. The highest level of a contaminant that is allowed in drinking water. MCLs are enforceable standards.

Action Level (AL): 40 CFR Part 141.80.

Secondary DW Maximum Contaminant Level Goal (MCLG): (Lower of): 40 CFR Part 141; 40 CFR Part 143; CT Public Health Code 19-13-B102. The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs are non-enforceable public health goals.

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Phyllis Shiller, Laboratory Director

June 23, 2017

Reviewed and Released by: Deb Lawrie, Project Manager



Environmental Laboratories, Inc.
 587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
 Tel. (860) 645-1102 Fax (860) 645-0823

Analysis Report
 June 23, 2017

FOR: Attn: Mr. Wayne Durocher
 Hebron Elementary School
 92 Church Street
 Hebron, CT 06248
 PWS #0670112

Sample Information

Matrix: DRINKING WATER
 Location Code: HEBRON
 Rush Request: Standard
 P.O.#:

Custody Information

Collected by:
 Received by: SW
 Analyzed by: see "By" below

Date

06/16/17
 06/19/17

Time

9:00
 11:13

Laboratory Data

SDG ID: GBY42134
 Phoenix ID: BY42136

Project ID: HEBRON ELEMENTARY LEAD & COPPER
 Client ID: RM 17

Parameter	Result	RL/ PQL	DIL	Units	AL	MCL	MCLG	Date/Time	By	Reference
Copper	0.743	0.002	1	mg/L	1.3			06/22/17	LK	E200.7
Lead	0.0025	0.0010	1	mg/L	0.015			06/22/17	LK	E200.5
Total Metal Digestion	Completed							06/21/17	CB/CB	E200.5/E200.7

RL/PQL=Reporting/Practical Quantitation Level DIL=Dilution (analysis required diluting to evaluate) ND=Not Detected
 BRL=Below Reporting Level (less than the reporting level, the lowest amount the laboratory can detect and report.)
 AL = Action Level MCL = Maximum Contaminant Level MCLG = Maximum Contaminant Level Goal

Comments:

Maximum Contaminant Level (MCL) (Lower of): 40 CFR Part 141; CT Public Health Code 19-13-B102. The highest level of a contaminant that is allowed in drinking water. MCLs are enforceable standards.

Action Level (AL): 40 CFR Part 141.80.

Secondary DW Maximum Contaminant Level Goal (MCLG): (Lower of): 40 CFR Part 141; 40 CFR Part 143; CT Public Health Code 19-13-B102. The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs are non-enforceable public health goals.

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June 23, 2017

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Environmental Laboratories, Inc.
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 Tel. (860) 645-1102 Fax (860) 645-0823

Analysis Report
 June 23, 2017

FOR: Attn: Mr. Wayne Durocher
 Hebron Elementary School
 92 Church Street
 Hebron, CT 06248
 PWS #0670112

Sample Information

Matrix: DRINKING WATER
 Location Code: HEBRON
 Rush Request: Standard
 P.O.#:

Custody Information

Collected by:
 Received by: SW
 Analyzed by: see "By" below

Date

06/16/17
 06/19/17

Time

9:00
 11:13

Laboratory Data

SDG ID: GBY42134
 Phoenix ID: BY42137

Project ID: HEBRON ELEMENTARY LEAD & COPPER
 Client ID: MEDIA CENTER

Parameter	Result	RL/ PQL	DIL	Units	AL	MCL	MCLG	Date/Time	By	Reference
Copper	0.110	0.002	1	mg/L	1.3			06/22/17	LK	E200.7
Lead	< 0.0010	0.0010	1	mg/L	0.015			06/22/17	LK	E200.5
Total Metal Digestion	Completed							06/21/17	CB/CB	E200.5/E200.7

RL/PQL=Reporting/Practical Quantitation Level DIL=Dilution (analysis required diluting to evaluate) ND=Not Detected
 BRL=Below Reporting Level (less than the reporting level, the lowest amount the laboratory can detect and report.)
 AL = Action Level MCL = Maximum Contaminant Level MCLG = Maximum Contaminant Level Goal

Comments:

Maximum Contaminant Level (MCL) (Lower of): 40 CFR Part 141; CT Public Health Code 19-13-B102. The highest level of a contaminant that is allowed in drinking water. MCLs are enforceable standards.

Action Level (AL): 40 CFR Part 141.80.

Secondary DW Maximum Contaminant Level Goal (MCLG): (Lower of): 40 CFR Part 141; 40 CFR Part 143; CT Public Health Code 19-13-B102. The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs are non-enforceable public health goals.

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June 23, 2017

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Analysis Report
 June 23, 2017

FOR: Attn: Mr. Wayne Durocher
 Hebron Elementary School
 92 Church Street
 Hebron, CT 06248
 PWS #0670112

Sample Information

Matrix: DRINKING WATER
 Location Code: HEBRON
 Rush Request: Standard
 P.O.#:

Custody Information

Collected by:
 Received by: SW
 Analyzed by: see "By" below

Date

06/16/17
 06/19/17

Time

9:00
 11:13

Laboratory Data

SDG ID: GBY42134
 Phoenix ID: BY42138

Project ID: HEBRON ELEMENTARY LEAD & COPPER
 Client ID: ART ROOM

Parameter	Result	RL/ PQL	DIL	Units	AL	MCL	MCLG	Date/Time	By	Reference
Copper	0.144	0.002	1	mg/L	1.3			06/22/17	LK	E200.7
Lead	< 0.0010	0.0010	1	mg/L	0.015			06/22/17	LK	E200.5
Total Metal Digestion	Completed							06/21/17	CB/CB	E200.5/E200.7

RL/PQL=Reporting/Practical Quantitation Level DIL=Dilution (analysis required diluting to evaluate) ND=Not Detected
 BRL=Below Reporting Level (less than the reporting level, the lowest amount the laboratory can detect and report.)
 AL = Action Level MCL = Maximum Contaminant Level MCLG = Maximum Contaminant Level Goal

Comments:

Maximum Contaminant Level (MCL) (Lower of): 40 CFR Part 141; CT Public Health Code 19-13-B102. The highest level of a contaminant that is allowed in drinking water. MCLs are enforceable standards.

Action Level (AL): 40 CFR Part 141.80.

Secondary DW Maximum Contaminant Level Goal (MCLG): (Lower of): 40 CFR Part 141; 40 CFR Part 143; CT Public Health Code 19-13-B102. The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs are non-enforceable public health goals.

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Phyllis Shiller, Laboratory Director

June 23, 2017

Reviewed and Released by: Deb Lawrie, Project Manager



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 Tel. (860) 645-1102 Fax (860) 645-0823

Analysis Report
 June 23, 2017

FOR: Attn: Mr. Wayne Durocher
 Hebron Elementary School
 92 Church Street
 Hebron, CT 06248
 PWS #0670112

Sample Information

Matrix: DRINKING WATER
 Location Code: HEBRON
 Rush Request: Standard
 P.O.#:

Custody Information

Collected by:
 Received by: SW
 Analyzed by: see "By" below

Date

06/16/17
 06/19/17

Time

9:00
 11:13

Laboratory Data

SDG ID: GBY42134
 Phoenix ID: BY42139

Project ID: HEBRON ELEMENTARY LEAD & COPPER
 Client ID: RM 8

Parameter	Result	RL/ PQL	DIL	Units	AL	MCL	MCLG	Date/Time	By	Reference
Copper	0.117	0.002	1	mg/L	1.3			06/22/17	LK	E200.7
Lead	0.0033	0.0010	1	mg/L	0.015			06/22/17	LK	E200.5
Total Metal Digestion	Completed							06/21/17	CB/CB	E200.5/E200.7

RL/PQL=Reporting/Practical Quantitation Level DIL=Dilution (analysis required diluting to evaluate) ND=Not Detected
 BRL=Below Reporting Level (less than the reporting level, the lowest amount the laboratory can detect and report.)
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Comments:

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Action Level (AL): 40 CFR Part 141.80.

Secondary DW Maximum Contaminant Level Goal (MCLG): (Lower of): 40 CFR Part 141; 40 CFR Part 143; CT Public Health Code 19-13-B102. The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs are non-enforceable public health goals.

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June 23, 2017

Reviewed and Released by: Deb Lawrie, Project Manager



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 Tel. (860) 645-1102 Fax (860) 645-0823

Analysis Report
 June 23, 2017

FOR: Attn: Mr. Wayne Durocher
 Hebron Elementary School
 92 Church Street
 Hebron, CT 06248
 PWS #0670112

Sample Information

Matrix: DRINKING WATER
 Location Code: HEBRON
 Rush Request: Standard
 P.O.#:

Custody Information

Collected by:
 Received by: SW
 Analyzed by: see "By" below

Date

06/16/17
 06/19/17

Time

9:00
 11:13

Laboratory Data

SDG ID: GBY42134
 Phoenix ID: BY42140

Project ID: HEBRON ELEMENTARY LEAD & COPPER
 Client ID: RM 9

Parameter	Result	RL/ PQL	DIL	Units	AL	MCL	MCLG	Date/Time	By	Reference
Copper	0.028	0.002	1	mg/L	1.3			06/22/17	LK	E200.7
Lead	< 0.0010	0.0010	1	mg/L	0.015			06/22/17	LK	E200.5
Total Metal Digestion	Completed							06/21/17	CB/CB	E200.5/E200.7

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 BRL=Below Reporting Level (less than the reporting level, the lowest amount the laboratory can detect and report.)
 AL = Action Level MCL = Maximum Contaminant Level MCLG = Maximum Contaminant Level Goal

Comments:

Maximum Contaminant Level (MCL) (Lower of): 40 CFR Part 141; CT Public Health Code 19-13-B102. The highest level of a contaminant that is allowed in drinking water. MCLs are enforceable standards.

Action Level (AL): 40 CFR Part 141.80.

Secondary DW Maximum Contaminant Level Goal (MCLG): (Lower of): 40 CFR Part 141; 40 CFR Part 143; CT Public Health Code 19-13-B102. The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs are non-enforceable public health goals.

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Phyllis Shiller, Laboratory Director

June 23, 2017

Reviewed and Released by: Deb Lawrie, Project Manager



Environmental Laboratories, Inc.
 587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
 Tel. (860) 645-1102 Fax (860) 645-0823

Analysis Report
 June 23, 2017

FOR: Attn: Mr. Wayne Durocher
 Hebron Elementary School
 92 Church Street
 Hebron, CT 06248
 PWS #0670112

Sample Information

Matrix: DRINKING WATER
 Location Code: HEBRON
 Rush Request: Standard
 P.O.#:

Custody Information

Collected by:
 Received by: SW
 Analyzed by: see "By" below

Date

06/16/17
 06/19/17

Time

9:00
 11:13

Laboratory Data

SDG ID: GBY42134
 Phoenix ID: BY42141

Project ID: HEBRON ELEMENTARY LEAD & COPPER
 Client ID: RM14

Parameter	Result	RL/ PQL	DIL	Units	AL	MCL	MCLG	Date/Time	By	Reference
Copper	0.054	0.002	1	mg/L	1.3			06/22/17	LK	E200.7
Lead	0.0016	0.0010	1	mg/L	0.015			06/22/17	LK	E200.5
Total Metal Digestion	Completed							06/21/17	CB/CB	E200.5/E200.7

RL/PQL=Reporting/Practical Quantitation Level DIL=Dilution (analysis required diluting to evaluate) ND=Not Detected
 BRL=Below Reporting Level (less than the reporting level, the lowest amount the laboratory can detect and report.)
 AL = Action Level MCL = Maximum Contaminant Level MCLG = Maximum Contaminant Level Goal

Comments:

Maximum Contaminant Level (MCL) (Lower of): 40 CFR Part 141; CT Public Health Code 19-13-B102. The highest level of a contaminant that is allowed in drinking water. MCLs are enforceable standards.

Action Level (AL): 40 CFR Part 141.80.

Secondary DW Maximum Contaminant Level Goal (MCLG): (Lower of): 40 CFR Part 141; 40 CFR Part 143; CT Public Health Code 19-13-B102. The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs are non-enforceable public health goals.

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Phyllis Shiller, Laboratory Director

June 23, 2017

Reviewed and Released by: Deb Lawrie, Project Manager



Environmental Laboratories, Inc.
 587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
 Tel. (860) 645-1102 Fax (860) 645-0823

Analysis Report
 June 23, 2017

FOR: Attn: Mr. Wayne Durocher
 Hebron Elementary School
 92 Church Street
 Hebron, CT 06248
 PWS #0670112

Sample Information

Matrix: DRINKING WATER
 Location Code: HEBRON
 Rush Request: Standard
 P.O.#:

Custody Information

Collected by:
 Received by: SW
 Analyzed by: see "By" below

Date

06/16/17
 06/19/17

Time

9:00
 11:13

Laboratory Data

SDG ID: GBY42134
 Phoenix ID: BY42142

Project ID: HEBRON ELEMENTARY LEAD & COPPER
 Client ID: RM 2

Parameter	Result	RL/ PQL	DIL	Units	AL	MCL	MCLG	Date/Time	By	Reference
Copper	0.111	0.002	1	mg/L	1.3			06/22/17	LK	E200.7
Lead	0.0052	0.0010	1	mg/L	0.015			06/22/17	LK	E200.5
Total Metal Digestion	Completed							06/21/17	CB/CB	E200.5/E200.7

RL/PQL=Reporting/Practical Quantitation Level DIL=Dilution (analysis required diluting to evaluate) ND=Not Detected
 BRL=Below Reporting Level (less than the reporting level, the lowest amount the laboratory can detect and report.)
 AL = Action Level MCL = Maximum Contaminant Level MCLG = Maximum Contaminant Level Goal

Comments:

Maximum Contaminant Level (MCL) (Lower of): 40 CFR Part 141; CT Public Health Code 19-13-B102. The highest level of a contaminant that is allowed in drinking water. MCLs are enforceable standards.

Action Level (AL): 40 CFR Part 141.80.

Secondary DW Maximum Contaminant Level Goal (MCLG): (Lower of): 40 CFR Part 141; 40 CFR Part 143; CT Public Health Code 19-13-B102. The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs are non-enforceable public health goals.

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Phyllis Shiller, Laboratory Director

June 23, 2017

Reviewed and Released by: Deb Lawrie, Project Manager



Environmental Laboratories, Inc.
 587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
 Tel. (860) 645-1102 Fax (860) 645-0823

Analysis Report
 June 23, 2017

FOR: Attn: Mr. Wayne Durocher
 Hebron Elementary School
 92 Church Street
 Hebron, CT 06248
 PWS #0670112

Sample Information

Matrix: DRINKING WATER
 Location Code: HEBRON
 Rush Request: Standard
 P.O.#:

Custody Information

Collected by:
 Received by: SW
 Analyzed by: see "By" below

Date

06/16/17
 06/19/17

Time

9:00
 11:13

Laboratory Data

SDG ID: GBY42134
 Phoenix ID: BY42143

Project ID: HEBRON ELEMENTARY LEAD & COPPER
 Client ID: BAND RM

Parameter	Result	RL/ PQL	DIL	Units	AL	MCL	MCLG	Date/Time	By	Reference
Copper	0.207	0.002	1	mg/L	1.3			06/22/17	LK	E200.7
Lead	0.0022	0.0010	1	mg/L	0.015			06/22/17	LK	E200.5
Total Metal Digestion	Completed							06/21/17	CB/CB	E200.5/E200.7

RL/PQL=Reporting/Practical Quantitation Level DIL=Dilution (analysis required diluting to evaluate) ND=Not Detected
 BRL=Below Reporting Level (less than the reporting level, the lowest amount the laboratory can detect and report.)
 AL = Action Level MCL = Maximum Contaminant Level MCLG = Maximum Contaminant Level Goal

Comments:

Maximum Contaminant Level (MCL) (Lower of): 40 CFR Part 141; CT Public Health Code 19-13-B102. The highest level of a contaminant that is allowed in drinking water. MCLs are enforceable standards.

Action Level (AL): 40 CFR Part 141.80.

Secondary DW Maximum Contaminant Level Goal (MCLG): (Lower of): 40 CFR Part 141; 40 CFR Part 143; CT Public Health Code 19-13-B102. The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs are non-enforceable public health goals.

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June 23, 2017

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 Tel. (860) 645-1102 Fax (860) 645-0823

Analysis Report
 June 23, 2017

FOR: Attn: Mr. Wayne Durocher
 Hebron Elementary School
 92 Church Street
 Hebron, CT 06248
 PWS #0670112

Sample Information

Matrix: DRINKING WATER
 Location Code: HEBRON
 Rush Request: Standard
 P.O.#:

Custody Information

Collected by: WD
 Received by: SW
 Analyzed by: see "By" below

Date

06/16/17
 06/19/17

Time

9:00
 11:13

Laboratory Data

SDG ID: GBY42134
 Phoenix ID: BY42144

Project ID: HEBRON ELEMENTARY LEAD & COPPER
 Client ID: RM 23

Parameter	Result	RL/ PQL	DIL	Units	AL	MCL	MCLG	Date/Time	By	Reference
Copper	0.145	0.002	1	mg/L	1.3			06/22/17	LK	E200.7
Lead	< 0.0010	0.0010	1	mg/L	0.015			06/22/17	LK	E200.5
Total Metal Digestion	Completed							06/21/17	CB/CB	E200.5/E200.7

RL/PQL=Reporting/Practical Quantitation Level DIL=Dilution (analysis required diluting to evaluate) ND=Not Detected
 BRL=Below Reporting Level (less than the reporting level, the lowest amount the laboratory can detect and report.)
 AL = Action Level MCL = Maximum Contaminant Level MCLG = Maximum Contaminant Level Goal

Comments:

Maximum Contaminant Level (MCL) (Lower of): 40 CFR Part 141; CT Public Health Code 19-13-B102. The highest level of a contaminant that is allowed in drinking water. MCLs are enforceable standards.

Action Level (AL): 40 CFR Part 141.80.

Secondary DW Maximum Contaminant Level Goal (MCLG): (Lower of): 40 CFR Part 141; 40 CFR Part 143; CT Public Health Code 19-13-B102. The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs are non-enforceable public health goals.

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Phyllis Shiller, Laboratory Director

June 23, 2017

Reviewed and Released by: Deb Lawrie, Project Manager



Environmental Laboratories, Inc.
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 Tel. (860) 645-1102 Fax (860) 645-0823

Analysis Report
 June 23, 2017

FOR: Attn: Mr. Wayne Durocher
 Hebron Elementary School
 92 Church Street
 Hebron, CT 06248
 PWS #0670112

Sample Information

Matrix: DRINKING WATER
 Location Code: HEBRON
 Rush Request: Standard
 P.O.#:

Custody Information

Collected by: WD
 Received by: SW
 Analyzed by: see "By" below

Date

06/16/17
 06/19/17

Time

9:00
 11:13

Laboratory Data

SDG ID: GBY42134
 Phoenix ID: BY42145

Project ID: HEBRON ELEMENTARY LEAD & COPPER
 Client ID: RM 26

Parameter	Result	RL/ PQL	DIL	Units	AL	MCL	MCLG	Date/Time	By	Reference
Copper	0.175	0.002	1	mg/L	1.3			06/22/17	LK	E200.7
Lead	< 0.0010	0.0010	1	mg/L	0.015			06/22/17	LK	E200.5
Total Metal Digestion	Completed							06/21/17	CB/CB	E200.5/E200.7

RL/PQL=Reporting/Practical Quantitation Level DIL=Dilution (analysis required diluting to evaluate) ND=Not Detected
 BRL=Below Reporting Level (less than the reporting level, the lowest amount the laboratory can detect and report.)
 AL = Action Level MCL = Maximum Contaminant Level MCLG = Maximum Contaminant Level Goal

Comments:

Maximum Contaminant Level (MCL) (Lower of): 40 CFR Part 141; CT Public Health Code 19-13-B102. The highest level of a contaminant that is allowed in drinking water. MCLs are enforceable standards.

Action Level (AL): 40 CFR Part 141.80.

Secondary DW Maximum Contaminant Level Goal (MCLG): (Lower of): 40 CFR Part 141; 40 CFR Part 143; CT Public Health Code 19-13-B102. The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs are non-enforceable public health goals.

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June 23, 2017

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 Tel. (860) 645-1102 Fax (860) 645-0823

Analysis Report
 June 23, 2017

FOR: Attn: Mr. Wayne Durocher
 Hebron Elementary School
 92 Church Street
 Hebron, CT 06248
 PWS #0670112

Sample Information

Matrix: DRINKING WATER
 Location Code: HEBRON
 Rush Request: Standard
 P.O.#:

Custody Information

Collected by: WD
 Received by: SW
 Analyzed by: see "By" below

Date

06/16/17
 06/19/17

Time

9:00
 11:13

Laboratory Data

SDG ID: GBY42134
 Phoenix ID: BY42146

Project ID: HEBRON ELEMENTARY LEAD & COPPER
 Client ID: RM 31

Parameter	Result	RL/ PQL	DIL	Units	AL	MCL	MCLG	Date/Time	By	Reference
Copper	0.110	0.002	1	mg/L	1.3			06/22/17	LK	E200.7
Lead	< 0.0010	0.0010	1	mg/L	0.015			06/22/17	LK	E200.5
Total Metal Digestion	Completed							06/21/17	CB/CB	E200.5/E200.7

RL/PQL=Reporting/Practical Quantitation Level DIL=Dilution (analysis required diluting to evaluate) ND=Not Detected
 BRL=Below Reporting Level (less than the reporting level, the lowest amount the laboratory can detect and report.)
 AL = Action Level MCL = Maximum Contaminant Level MCLG = Maximum Contaminant Level Goal

Comments:

Maximum Contaminant Level (MCL) (Lower of): 40 CFR Part 141; CT Public Health Code 19-13-B102. The highest level of a contaminant that is allowed in drinking water. MCLs are enforceable standards.

Action Level (AL): 40 CFR Part 141.80.

Secondary DW Maximum Contaminant Level Goal (MCLG): (Lower of): 40 CFR Part 141; 40 CFR Part 143; CT Public Health Code 19-13-B102. The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs are non-enforceable public health goals.

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Phyllis Shiller, Laboratory Director

June 23, 2017

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 Tel. (860) 645-1102 Fax (860) 645-0823

Analysis Report
 June 23, 2017

FOR: Attn: Mr. Wayne Durocher
 Hebron Elementary School
 92 Church Street
 Hebron, CT 06248
 PWS #0670112

Sample Information

Matrix: DRINKING WATER
 Location Code: HEBRON
 Rush Request: Standard
 P.O.#:

Custody Information

Collected by: WD
 Received by: SW
 Analyzed by: see "By" below

Date

06/16/17
 06/19/17

Time

9:00
 11:13

Laboratory Data

SDG ID: GBY42134
 Phoenix ID: BY42147

Project ID: HEBRON ELEMENTARY LEAD & COPPER
 Client ID: RM 19

Parameter	Result	RL/ PQL	DIL	Units	AL	MCL	MCLG	Date/Time	By	Reference
Copper	0.175	0.002	1	mg/L	1.3			06/22/17	LK	E200.7
Lead	< 0.0010	0.0010	1	mg/L	0.015			06/22/17	LK	E200.5
Total Metal Digestion	Completed							06/21/17	CB/CB	E200.5/E200.7

RL/PQL=Reporting/Practical Quantitation Level DIL=Dilution (analysis required diluting to evaluate) ND=Not Detected
 BRL=Below Reporting Level (less than the reporting level, the lowest amount the laboratory can detect and report.)
 AL = Action Level MCL = Maximum Contaminant Level MCLG = Maximum Contaminant Level Goal

Comments:

Maximum Contaminant Level (MCL) (Lower of): 40 CFR Part 141; CT Public Health Code 19-13-B102. The highest level of a contaminant that is allowed in drinking water. MCLs are enforceable standards.

Action Level (AL): 40 CFR Part 141.80.

Secondary DW Maximum Contaminant Level Goal (MCLG): (Lower of): 40 CFR Part 141; 40 CFR Part 143; CT Public Health Code 19-13-B102. The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs are non-enforceable public health goals.

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June 23, 2017

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 Tel. (860) 645-1102 Fax (860) 645-0823

Analysis Report
 June 23, 2017

FOR: Attn: Mr. Wayne Durocher
 Hebron Elementary School
 92 Church Street
 Hebron, CT 06248
 PWS #0670112

Sample Information

Matrix: DRINKING WATER
 Location Code: HEBRON
 Rush Request: Standard
 P.O.#:

Custody Information

Collected by: WD
 Received by: SW
 Analyzed by: see "By" below

Date

06/16/17
 06/19/17

Time

9:00
 11:13

Laboratory Data

SDG ID: GBY42134
 Phoenix ID: BY42148

Project ID: HEBRON ELEMENTARY LEAD & COPPER
 Client ID: RM 3

Parameter	Result	RL/ PQL	DIL	Units	AL	MCL	MCLG	Date/Time	By	Reference
Copper	0.146	0.002	1	mg/L	1.3			06/22/17	LK	E200.7
Lead	0.0063	0.0010	1	mg/L	0.015			06/22/17	LK	E200.5
Total Metal Digestion	Completed							06/21/17	CB/CB	E200.5/E200.7

RL/PQL=Reporting/Practical Quantitation Level DIL=Dilution (analysis required diluting to evaluate) ND=Not Detected
 BRL=Below Reporting Level (less than the reporting level, the lowest amount the laboratory can detect and report.)
 AL = Action Level MCL = Maximum Contaminant Level MCLG = Maximum Contaminant Level Goal

Comments:

Maximum Contaminant Level (MCL) (Lower of): 40 CFR Part 141; CT Public Health Code 19-13-B102. The highest level of a contaminant that is allowed in drinking water. MCLs are enforceable standards.

Action Level (AL): 40 CFR Part 141.80.

Secondary DW Maximum Contaminant Level Goal (MCLG): (Lower of): 40 CFR Part 141; 40 CFR Part 143; CT Public Health Code 19-13-B102. The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs are non-enforceable public health goals.

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June 23, 2017

Reviewed and Released by: Deb Lawrie, Project Manager



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 Tel. (860) 645-1102 Fax (860) 645-0823

Analysis Report
 June 23, 2017

FOR: Attn: Mr. Wayne Durocher
 Hebron Elementary School
 92 Church Street
 Hebron, CT 06248
 PWS #0670112

Sample Information

Matrix: DRINKING WATER
 Location Code: HEBRON
 Rush Request: Standard
 P.O.#:

Custody Information

Collected by: WD
 Received by: SW
 Analyzed by: see "By" below

Date

06/16/17
 06/19/17

Time

9:00
 11:13

Laboratory Data

SDG ID: GBY42134
 Phoenix ID: BY42149

Project ID: HEBRON ELEMENTARY LEAD & COPPER
 Client ID: RM 10

Parameter	Result	RL/ PQL	DIL	Units	AL	MCL	MCLG	Date/Time	By	Reference
Copper	0.085	0.002	1	mg/L	1.3			06/21/17	LK	E200.7
Lead	0.0099	0.0010	1	mg/L	0.015			06/21/17	LK	E200.5
Total Metal Digestion	Completed							06/21/17	CB/CB	E200.5/E200.7

RL/PQL=Reporting/Practical Quantitation Level DIL=Dilution (analysis required diluting to evaluate) ND=Not Detected
 BRL=Below Reporting Level (less than the reporting level, the lowest amount the laboratory can detect and report.)
 AL = Action Level MCL = Maximum Contaminant Level MCLG = Maximum Contaminant Level Goal

Comments:

Maximum Contaminant Level (MCL) (Lower of): 40 CFR Part 141; CT Public Health Code 19-13-B102. The highest level of a contaminant that is allowed in drinking water. MCLs are enforceable standards.

Action Level (AL): 40 CFR Part 141.80.

Secondary DW Maximum Contaminant Level Goal (MCLG): (Lower of): 40 CFR Part 141; 40 CFR Part 143; CT Public Health Code 19-13-B102. The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs are non-enforceable public health goals.

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Phyllis Shiller, Laboratory Director

June 23, 2017

Reviewed and Released by: Deb Lawrie, Project Manager



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 Tel. (860) 645-1102 Fax (860) 645-0823

Analysis Report
 June 23, 2017

FOR: Attn: Mr. Wayne Durocher
 Hebron Elementary School
 92 Church Street
 Hebron, CT 06248
 PWS #0670112

Sample Information

Matrix: DRINKING WATER
 Location Code: HEBRON
 Rush Request: Standard
 P.O.#:

Custody Information

Collected by: WD
 Received by: SW
 Analyzed by: see "By" below

Date

06/16/17
 06/19/17

Time

9:00
 11:13

Laboratory Data

SDG ID: GBY42134
 Phoenix ID: BY42150

Project ID: HEBRON ELEMENTARY LEAD & COPPER
 Client ID: RM 24

Parameter	Result	RL/ PQL	DIL	Units	AL	MCL	MCLG	Date/Time	By	Reference
Copper	0.131	0.002	1	mg/L	1.3			06/22/17	LK	E200.7
Lead	0.0015	0.0010	1	mg/L	0.015			06/22/17	LK	E200.5
Total Metal Digestion	Completed							06/21/17	CB/CB	E200.5/E200.7

RL/PQL=Reporting/Practical Quantitation Level DIL=Dilution (analysis required diluting to evaluate) ND=Not Detected
 BRL=Below Reporting Level (less than the reporting level, the lowest amount the laboratory can detect and report.)
 AL = Action Level MCL = Maximum Contaminant Level MCLG = Maximum Contaminant Level Goal

Comments:

Maximum Contaminant Level (MCL) (Lower of): 40 CFR Part 141; CT Public Health Code 19-13-B102. The highest level of a contaminant that is allowed in drinking water. MCLs are enforceable standards.

Action Level (AL): 40 CFR Part 141.80.

Secondary DW Maximum Contaminant Level Goal (MCLG): (Lower of): 40 CFR Part 141; 40 CFR Part 143; CT Public Health Code 19-13-B102. The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs are non-enforceable public health goals.

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Phyllis Shiller, Laboratory Director

June 23, 2017

Reviewed and Released by: Deb Lawrie, Project Manager



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 Tel. (860) 645-1102 Fax (860) 645-0823

Analysis Report
 June 23, 2017

FOR: Attn: Mr. Wayne Durocher
 Hebron Elementary School
 92 Church Street
 Hebron, CT 06248
 PWS #0670112

Sample Information

Matrix: DRINKING WATER
 Location Code: HEBRON
 Rush Request: Standard
 P.O.#:

Custody Information

Collected by: WD
 Received by: SW
 Analyzed by: see "By" below

Date

06/16/17
 06/19/17

Time

9:00
 11:13

Laboratory Data

SDG ID: GBY42134
 Phoenix ID: BY42151

Project ID: HEBRON ELEMENTARY LEAD & COPPER
 Client ID: RM 5

Parameter	Result	RL/ PQL	DIL	Units	AL	MCL	MCLG	Date/Time	By	Reference
Copper	0.148	0.002	1	mg/L	1.3			06/22/17	LK	E200.7
Lead	0.0064	0.0010	1	mg/L	0.015			06/22/17	LK	E200.5
Total Metal Digestion	Completed							06/21/17	CB/CB	E200.5/E200.7

RL/PQL=Reporting/Practical Quantitation Level DIL=Dilution (analysis required diluting to evaluate) ND=Not Detected
 BRL=Below Reporting Level (less than the reporting level, the lowest amount the laboratory can detect and report.)
 AL = Action Level MCL = Maximum Contaminant Level MCLG = Maximum Contaminant Level Goal

Comments:

Maximum Contaminant Level (MCL) (Lower of): 40 CFR Part 141; CT Public Health Code 19-13-B102. The highest level of a contaminant that is allowed in drinking water. MCLs are enforceable standards.

Action Level (AL): 40 CFR Part 141.80.

Secondary DW Maximum Contaminant Level Goal (MCLG): (Lower of): 40 CFR Part 141; 40 CFR Part 143; CT Public Health Code 19-13-B102. The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs are non-enforceable public health goals.

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Phyllis Shiller, Laboratory Director

June 23, 2017

Reviewed and Released by: Deb Lawrie, Project Manager



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 Tel. (860) 645-1102 Fax (860) 645-0823

Analysis Report
 June 23, 2017

FOR: Attn: Mr. Wayne Durocher
 Hebron Elementary School
 92 Church Street
 Hebron, CT 06248
 PWS #0670112

Sample Information

Matrix: DRINKING WATER
 Location Code: HEBRON
 Rush Request: Standard
 P.O.#:

Custody Information

Collected by: WD
 Received by: SW
 Analyzed by: see "By" below

Date

06/16/17
 06/19/17

Time

9:00
 11:13

Laboratory Data

SDG ID: GBY42134
 Phoenix ID: BY42152

Project ID: HEBRON ELEMENTARY LEAD & COPPER
 Client ID: RM 1

Parameter	Result	RL/ PQL	DIL	Units	AL	MCL	MCLG	Date/Time	By	Reference
Copper	0.101	0.002	1	mg/L	1.3			06/22/17	LK	E200.7
Lead	0.0035	0.0010	1	mg/L	0.015			06/22/17	LK	E200.5
Total Metal Digestion	Completed							06/21/17	CB/CB	E200.5/E200.7

RL/PQL=Reporting/Practical Quantitation Level DIL=Dilution (analysis required diluting to evaluate) ND=Not Detected
 BRL=Below Reporting Level (less than the reporting level, the lowest amount the laboratory can detect and report.)
 AL = Action Level MCL = Maximum Contaminant Level MCLG = Maximum Contaminant Level Goal

Comments:

Maximum Contaminant Level (MCL) (Lower of): 40 CFR Part 141; CT Public Health Code 19-13-B102. The highest level of a contaminant that is allowed in drinking water. MCLs are enforceable standards.

Action Level (AL): 40 CFR Part 141.80.

Secondary DW Maximum Contaminant Level Goal (MCLG): (Lower of): 40 CFR Part 141; 40 CFR Part 143; CT Public Health Code 19-13-B102. The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs are non-enforceable public health goals.

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Phyllis Shiller, Laboratory Director

June 23, 2017

Reviewed and Released by: Deb Lawrie, Project Manager



Environmental Laboratories, Inc.
 587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
 Tel. (860) 645-1102 Fax (860) 645-0823

Analysis Report
 June 23, 2017

FOR: Attn: Mr. Wayne Durocher
 Hebron Elementary School
 92 Church Street
 Hebron, CT 06248
 PWS #0670112

Sample Information

Matrix: DRINKING WATER
 Location Code: HEBRON
 Rush Request: Standard
 P.O.#:

Custody Information

Collected by: WD
 Received by: SW
 Analyzed by: see "By" below

Date

06/16/17
 06/19/17

Time

9:00
 11:13

Laboratory Data

SDG ID: GBY42134
 Phoenix ID: BY42153

Project ID: HEBRON ELEMENTARY LEAD & COPPER
 Client ID: RM 27

Parameter	Result	RL/ PQL	DIL	Units	AL	MCL	MCLG	Date/Time	By	Reference
Copper	0.129	0.002	1	mg/L	1.3			06/22/17	LK	E200.7
Lead	< 0.0010	0.0010	1	mg/L	0.015			06/22/17	LK	E200.5
Total Metal Digestion	Completed							06/21/17	CB/CB	E200.5/E200.7

RL/PQL=Reporting/Practical Quantitation Level DIL=Dilution (analysis required diluting to evaluate) ND=Not Detected
 BRL=Below Reporting Level (less than the reporting level, the lowest amount the laboratory can detect and report.)
 AL = Action Level MCL = Maximum Contaminant Level MCLG = Maximum Contaminant Level Goal

Comments:

Maximum Contaminant Level (MCL) (Lower of): 40 CFR Part 141; CT Public Health Code 19-13-B102. The highest level of a contaminant that is allowed in drinking water. MCLs are enforceable standards.

Action Level (AL): 40 CFR Part 141.80.

Secondary DW Maximum Contaminant Level Goal (MCLG): (Lower of): 40 CFR Part 141; 40 CFR Part 143; CT Public Health Code 19-13-B102. The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs are non-enforceable public health goals.

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

June 23, 2017

Reviewed and Released by: Deb Lawrie, Project Manager

Friday, June 23, 2017

Criteria: CT: DW

State: CT

SampNo Acode Phoenix Analyte

Sample Criteria Exceedances Report

GBY42134 - HEBRON

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.



Environmental Laboratories, Inc.
587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
Tel. (860) 645-1102 Fax (860) 645-0823



Analysis Comments

June 23, 2017

SDG I.D.: GBY42134

The following analysis comments are made regarding exceptions to criteria not already noted in the Analysis Report or QA/QC Report: None.

24.7 °C

Temp Pg 1 of 2

CHAIN OF CUSTODY RECORD

587 East Middle Turnpike, P.O. Box 370, Manchester, CT 06040
 Email: service@phoenixlabs.com Fax (860) 645-0823
Client Services (860) 645-8726



Customer: Hebron Elementary School
 Address: 580 Gilead Street
 Hebron, CT 06248

Project: LEAD & COPPER
 Report to: Wayne Durocher
 Invoice to: Accounts Payable - Hebron BOE

PWS ID#: CT0670112
 Phone #: 860-228-9458
 Fax #:

Client Sample - Information - Identification
 Sampler's Signature: *Wayne Durocher* Date: 6-16-17
 Matrix Code: WW=wastewater S=soil/solid O=other
 DW=drinking water A=air
 GW=groundwater SL=sludge

Phoelix Sample #	Customer Sample Identification	Sample Matrix	Date Sampled	Time Sampled	Analysis Request	Residual Chlorine	Sample Type	Sampling Point ID	WSFID	Duration	Repeat Location	40 ml VOA Vial	PL As is 250ml	PL As is 500ml	PL HNO3 250ml	PL NaOH 250ml	Bacteria Bottle
HESLC1	KITCHEN	DW	6-16	9:00am	X		RT 4 600										42134
HESLC2	RM 22	DW	6-16		X		RT 4 600										42135
HESLC3	RM 17	DW	6-16		X		RT 4 600										42136
HESLC5	MEDIA CENTER	DW	6-16		X		RT 4 600										42137
HESLC6	AFT ROOM	DW	6-16		X		RT 4 600										42138
HESLC7	RM 8	DW	6-16		X		RT 4 600										42139
HESLC8	RM 9	DW	6-16		X		RT 4 600										42140
HESLC9	RM 14	DW	6-16		X		RT 4 600										42141
HESLC10	RM 2	DW	6-16		X		RT 4 600										42142
HESLC11	BAND RM	DW	6-16		X		RT 4 600										42143

Relinquished by: *Wayne Durocher* Accepted by: *Quadratic*
 Date: 6/19/17 Time: 11:13

Turnaround:
 1 Day*
 2 Days*
 3 Days*
 Standard
 Other

Sample Type: RT-Compliance Routine, RP-Repeat, SP-Special
 O-Other
 Sampling Point ID: Assigned by DWD or 4-Generic Distribution
 3-Generic Entry Point, 2-Generic Raw Well
 WSFID: Assigned or 00600-Distribution, 00700-Entry Point
 Duration: M-Monthly, Q-Quarterly, A-Annual, 3-Triannual
 Repeat Location: O-Original, D-Downstream, U-Upstream, OT-Other

Comments, Special Requirements or Regulations:

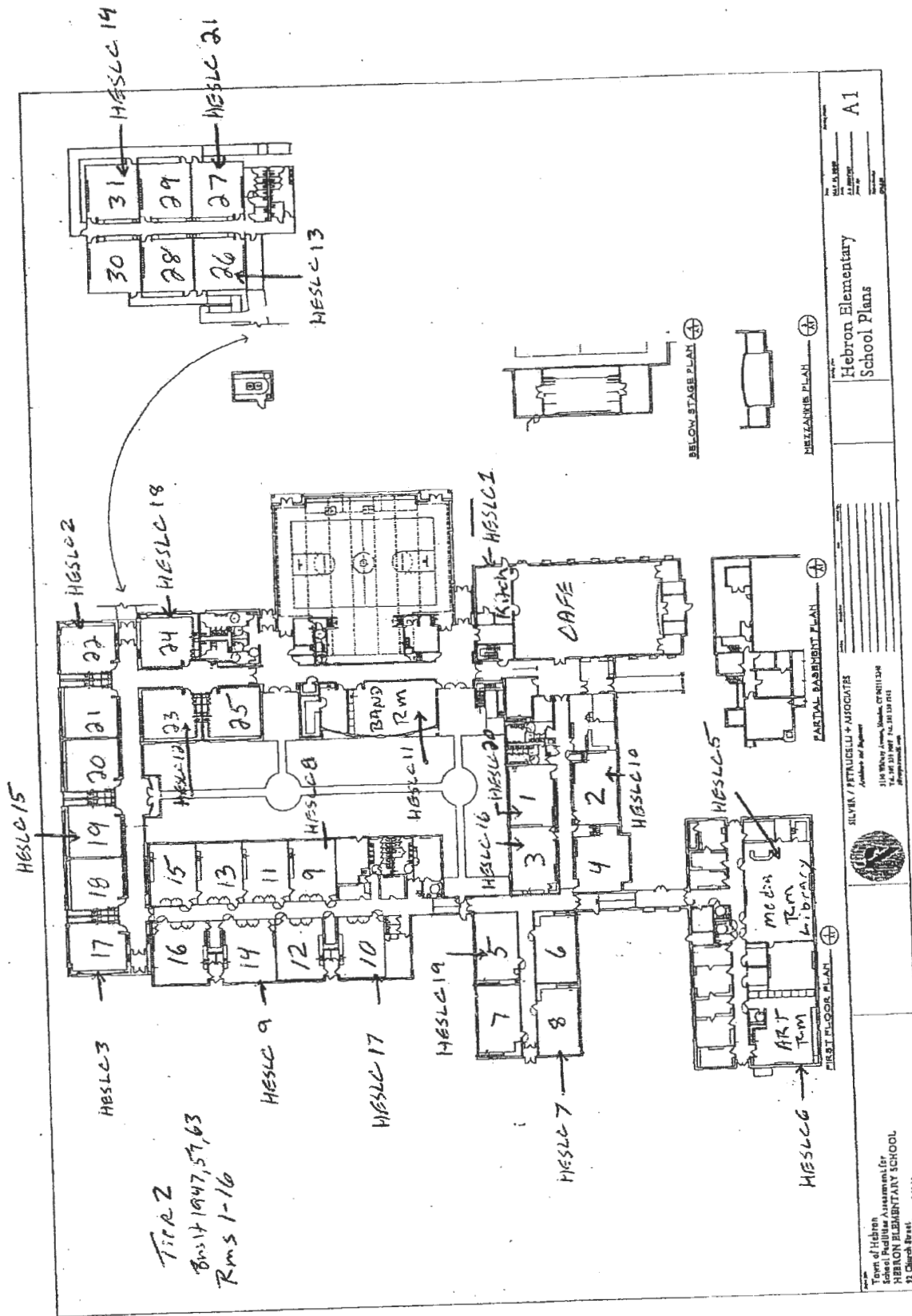
SOC Kit Includes:
 5 - 60ml Amber Vials
 2 - 40ml Vials
 7 - Amber 1 Liter
 2 - 500ml Plastic Amber

* Surcharge Applies

JG

613442134

UP DATED 12-5-16





Tuesday, October 02, 2018

Attn: Mr. Wayne Durocher
Hebron Elementary School
92 Church Street
Hebron, CT 06248
PWS #0670112

Project ID: LEAD & COPPER
Sample ID#: CB59559

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. This report is incomplete unless all pages indicated in the pagination at the bottom of the page are included.

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 black ink that reads "Phyllis Shiller". The signature is written in a cursive style.

Phyllis Shiller
Laboratory Director

NELAC - #NY11301
CT Lab Registration #PH-0618
MA Lab Registration #M-CT007
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
UT Lab Registration #CT00007
VT Lab Registration #VT11301



Environmental Laboratories, Inc.
 587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
 Tel. (860) 645-1102 Fax (860) 645-0823

Analysis Report
 October 02, 2018

FOR: Attn: Mr. Wayne Durocher
 Hebron Elementary School
 92 Church Street
 Hebron, CT 06248
 PWS #0670112

Sample Information

Matrix: DRINKING WATER
 Location Code: HEBRON
 Rush Request: Standard
 P.O.#:

Custody Information

Collected by: WD
 Received by: CP
 Analyzed by: see "By" below

Date

09/27/18
 09/27/18

Time

11:09

Laboratory Data

SDG ID: GCB59559
 Phoenix ID: CB59559

Project ID: LEAD & COPPER
 Client ID: RM 15 HESLC 022

Parameter	Result	RL/ PQL	DIL	Units	AL	MCL	MCLG	Date/Time	By	Reference
Copper	0.137	0.002	1	mg/L	1.3			10/01/18	TH	E200.7
Lead	0.0032	0.0010	1	mg/L	0.015			10/01/18	TH	E200.5
Total Metal Digestion	Completed							09/29/18	AG	E200.5/E200.7

RL/PQL=Reporting/Practical Quantitation Level DIL=Dilution (analysis required diluting to evaluate) ND=Not Detected
 BRL=Below Reporting Level (less than the reporting level, the lowest amount the laboratory can detect and report.)
 AL = Action Level MCL = Maximum Contaminant Level MCLG = Maximum Contaminant Level Goal

Comments:

Maximum Contaminant Level (MCL) (Lower of): 40 CFR Part 141; CT Public Health Code 19-13-B102. The highest level of a contaminant that is allowed in drinking water. MCLs are enforceable standards.

Action Level (AL): 40 CFR Part 141.80.

Secondary DW Maximum Contaminant Level Goal (MCLG): (Lower of): 40 CFR Part 141; 40 CFR Part 143; CT Public Health Code 19-13-B102. The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs are non-enforceable public health goals.

If there are any questions regarding this data, please call Phoenix Client Services.
 This report must not be reproduced except in full as defined by the attached chain of custody.

Phyllis Shiller, Laboratory Director

October 02, 2018

Reviewed and Released by: Helen Geoghegan, Project Manager

Tuesday, October 02, 2018

Criteria: CT: DW

State: CT

SampNo Acode Phoenix Analyte

Sample Criteria Exceedances Report

GCB59559 - HEBRON

Criteria

Result RL Criteria RL Criteria Analysis
Units

*** No Data to Display ***

Phoenix Laboratories does not assume responsibility for the data contained in this exceedance report. It is provided as an additional tool to identify requested criteria exceedances. All efforts are made to ensure the accuracy of the data (obtained from appropriate agencies). A lack of exceedance information does not necessarily suggest conformance to the criteria. It is ultimately the site professional's responsibility to determine appropriate compliance.



Environmental Laboratories, Inc.
587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
Tel. (860) 645-1102 Fax (860) 645-0823



Analysis Comments

October 02, 2018

SDG I.D.: GCB59559

The following analysis comments are made regarding exceptions to criteria not already noted in the Analysis Report or QA/QC Report: None.



Wednesday, September 26, 2018

Attn: Mr. Wayne Durocher
Hebron Elementary School
92 Church Street
Hebron, CT 06248
PWS #0670112

Project ID: LEAD & COPPER
Sample ID#: CB31508 - CB31527

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. This report is incomplete unless all pages indicated in the pagination at the bottom of the page are included.

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 black ink that reads "Phyllis Shiller". The signature is written in a cursive style.

Phyllis Shiller
Laboratory Director

NELAC - #NY11301
CT Lab Registration #PH-0618
MA Lab Registration #M-CT007
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
UT Lab Registration #CT00007
VT Lab Registration #VT11301



Environmental Laboratories, Inc.
 587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
 Tel. (860) 645-1102 Fax (860) 645-0823

Analysis Report
 September 26, 2018

FOR: Attn: Mr. Wayne Durocher
 Hebron Elementary School
 92 Church Street
 Hebron, CT 06248
 PWS #0670112

Sample Information

Matrix: DRINKING WATER
 Location Code: HEBRON
 Rush Request: Standard
 P.O.#:

Custody Information

Collected by: WD
 Received by: LB
 Analyzed by: see "By" below

Date

09/14/18
 09/14/18

Time

6:30
 12:54

Laboratory Data

SDG ID: GCB31508
 Phoenix ID: CB31508

Project ID: LEAD & COPPER
 Client ID: KITCHEN HESLC001

Parameter	Result	RL/ PQL	DIL	Units	AL	MCL	MCLG	Date/Time	By	Reference
Copper	0.023	0.002	1	mg/L	1.3			09/18/18	EK	E200.7
Lead	< 0.0010	0.0010	1	mg/L	0.015			09/18/18	EK	E200.5
Total Metal Digestion	Completed							09/17/18	AG/BF	E200.5/E200.7

RL/PQL=Reporting/Practical Quantitation Level DIL=Dilution (analysis required diluting to evaluate) ND=Not Detected
 BRL=Below Reporting Level (less than the reporting level, the lowest amount the laboratory can detect and report.)
 AL = Action Level MCL = Maximum Contaminant Level MCLG = Maximum Contaminant Level Goal

Comments:

Maximum Contaminant Level (MCL) (Lower of): 40 CFR Part 141; CT Public Health Code 19-13-B102. The highest level of a contaminant that is allowed in drinking water. MCLs are enforceable standards.

Action Level (AL): 40 CFR Part 141.80.

Secondary DW Maximum Contaminant Level Goal (MCLG): (Lower of): 40 CFR Part 141; 40 CFR Part 143; CT Public Health Code 19-13-B102. The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs are non-enforceable public health goals.

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Phyllis Shiller, Laboratory Director

September 26, 2018

Reviewed and Released by: Helen Geoghegan, Project Manager



Environmental Laboratories, Inc.
 587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
 Tel. (860) 645-1102 Fax (860) 645-0823

Analysis Report
 September 26, 2018

FOR: Attn: Mr. Wayne Durocher
 Hebron Elementary School
 92 Church Street
 Hebron, CT 06248
 PWS #0670112

Sample Information

Matrix: DRINKING WATER
 Location Code: HEBRON
 Rush Request: Standard
 P.O.#:

Custody Information

Collected by: WD
 Received by: LB
 Analyzed by: see "By" below

Date

09/14/18
 09/14/18

Time

6:30
 12:54

Laboratory Data

SDG ID: GCB31508
 Phoenix ID: CB31509

Project ID: LEAD & COPPER
 Client ID: RM 22 HESLC002

Parameter	Result	RL/ PQL	DIL	Units	AL	MCL	MCLG	Date/Time	By	Reference
Copper	0.089	0.002	1	mg/L	1.3			09/18/18	EK	E200.7
Lead	< 0.0010	0.0010	1	mg/L	0.015			09/18/18	EK	E200.5
Total Metal Digestion	Completed							09/17/18	AG/BF	E200.5/E200.7

RL/PQL=Reporting/Practical Quantitation Level DIL=Dilution (analysis required diluting to evaluate) ND=Not Detected
 BRL=Below Reporting Level (less than the reporting level, the lowest amount the laboratory can detect and report.)
 AL = Action Level MCL = Maximum Contaminant Level MCLG = Maximum Contaminant Level Goal

Comments:

Maximum Contaminant Level (MCL) (Lower of): 40 CFR Part 141; CT Public Health Code 19-13-B102. The highest level of a contaminant that is allowed in drinking water. MCLs are enforceable standards.

Action Level (AL): 40 CFR Part 141.80.

Secondary DW Maximum Contaminant Level Goal (MCLG): (Lower of): 40 CFR Part 141; 40 CFR Part 143; CT Public Health Code 19-13-B102. The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs are non-enforceable public health goals.

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Phyllis Shiller, Laboratory Director
 September 26, 2018

Reviewed and Released by: Helen Geoghegan, Project Manager



Environmental Laboratories, Inc.
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 Tel. (860) 645-1102 Fax (860) 645-0823

Analysis Report
 September 26, 2018

FOR: Attn: Mr. Wayne Durocher
 Hebron Elementary School
 92 Church Street
 Hebron, CT 06248
 PWS #0670112

Sample Information

Matrix: DRINKING WATER
 Location Code: HEBRON
 Rush Request: Standard
 P.O.#:

Custody Information

Collected by: WD
 Received by: LB
 Analyzed by: see "By" below

Date

09/14/18
 09/14/18

Time

6:30
 12:54

Laboratory Data

SDG ID: GCB31508
 Phoenix ID: CB31510

Project ID: LEAD & COPPER
 Client ID: RM 17 HESLC003

Parameter	Result	RL/ PQL	DIL	Units	AL	MCL	MCLG	Date/Time	By	Reference
Copper	0.172	0.002	1	mg/L	1.3			09/19/18	EK	E200.7
Lead	< 0.0010	0.0010	1	mg/L	0.015			09/19/18	EK	E200.5
Total Metal Digestion	Completed							09/18/18	AG/BF	E200.5/E200.7

RL/PQL=Reporting/Practical Quantitation Level DIL=Dilution (analysis required diluting to evaluate) ND=Not Detected
 BRL=Below Reporting Level (less than the reporting level, the lowest amount the laboratory can detect and report.)
 AL = Action Level MCL = Maximum Contaminant Level MCLG = Maximum Contaminant Level Goal

Comments:

Maximum Contaminant Level (MCL) (Lower of): 40 CFR Part 141; CT Public Health Code 19-13-B102. The highest level of a contaminant that is allowed in drinking water. MCLs are enforceable standards.

Action Level (AL): 40 CFR Part 141.80.

Secondary DW Maximum Contaminant Level Goal (MCLG): (Lower of): 40 CFR Part 141; 40 CFR Part 143; CT Public Health Code 19-13-B102. The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs are non-enforceable public health goals.

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Phyllis Shiller, Laboratory Director

September 26, 2018

Reviewed and Released by: Helen Geoghegan, Project Manager



Environmental Laboratories, Inc.
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 Tel. (860) 645-1102 Fax (860) 645-0823

Analysis Report
 September 26, 2018

FOR: Attn: Mr. Wayne Durocher
 Hebron Elementary School
 92 Church Street
 Hebron, CT 06248
 PWS #0670112

<u>Sample Information</u>		<u>Custody Information</u>		<u>Date</u>	<u>Time</u>
Matrix:	DRINKING WATER	Collected by:	WD	09/14/18	6:30
Location Code:	HEBRON	Received by:	LB	09/14/18	12:54
Rush Request:	Standard	Analyzed by:	see "By" below		
P.O.#:					

Laboratory Data

SDG ID: GCB31508
 Phoenix ID: CB31511

Project ID: LEAD & COPPER
 Client ID: MEDIA CTR HESLC005

Parameter	Result	RL/ PQL	DIL	Units	AL	MCL	MCLG	Date/Time	By	Reference
Copper	0.136	0.002	1	mg/L	1.3			09/19/18	EK	E200.7
Lead	< 0.0010	0.0010	1	mg/L	0.015			09/19/18	EK	E200.5
Total Metal Digestion	Completed							09/18/18	AG/BF	E200.5/E200.7

RL/PQL=Reporting/Practical Quantitation Level DIL=Dilution (analysis required diluting to evaluate) ND=Not Detected
 BRL=Below Reporting Level (less than the reporting level, the lowest amount the laboratory can detect and report.)
 AL = Action Level MCL = Maximum Contaminant Level MCLG = Maximum Contaminant Level Goal

Comments:

Maximum Contaminant Level (MCL) (Lower of): 40 CFR Part 141; CT Public Health Code 19-13-B102. The highest level of a contaminant that is allowed in drinking water. MCLs are enforceable standards.

Action Level (AL): 40 CFR Part 141.80.

Secondary DW Maximum Contaminant Level Goal (MCLG): (Lower of): 40 CFR Part 141; 40 CFR Part 143; CT Public Health Code 19-13-B102. The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs are non-enforceable public health goals.

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Phyllis Shiller, Laboratory Director

September 26, 2018

Reviewed and Released by: Helen Geoghegan, Project Manager



Environmental Laboratories, Inc.
 587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
 Tel. (860) 645-1102 Fax (860) 645-0823

Analysis Report
 September 26, 2018

FOR: Attn: Mr. Wayne Durocher
 Hebron Elementary School
 92 Church Street
 Hebron, CT 06248
 PWS #0670112

Sample Information

Matrix: DRINKING WATER
 Location Code: HEBRON
 Rush Request: Standard
 P.O.#:

Custody Information

Collected by: WD
 Received by: LB
 Analyzed by: see "By" below

Date

09/14/18
 09/14/18

Time

6:30
 12:54

Laboratory Data

SDG ID: GCB31508
 Phoenix ID: CB31512

Project ID: LEAD & COPPER
 Client ID: AIT ROOM HESLC006

Parameter	Result	RL/ PQL	DIL	Units	AL	MCL	MCLG	Date/Time	By	Reference
Copper	0.103	0.002	1	mg/L	1.3			09/19/18	EK	E200.7
Lead	< 0.0010	0.0010	1	mg/L	0.015			09/19/18	EK	E200.5
Total Metal Digestion	Completed							09/18/18	AG/BF	E200.5/E200.7

RL/PQL=Reporting/Practical Quantitation Level DIL=Dilution (analysis required diluting to evaluate) ND=Not Detected
 BRL=Below Reporting Level (less than the reporting level, the lowest amount the laboratory can detect and report.)
 AL = Action Level MCL = Maximum Contaminant Level MCLG = Maximum Contaminant Level Goal

Comments:

Maximum Contaminant Level (MCL) (Lower of): 40 CFR Part 141; CT Public Health Code 19-13-B102. The highest level of a contaminant that is allowed in drinking water. MCLs are enforceable standards.

Action Level (AL): 40 CFR Part 141.80.

Secondary DW Maximum Contaminant Level Goal (MCLG): (Lower of): 40 CFR Part 141; 40 CFR Part 143; CT Public Health Code 19-13-B102. The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs are non-enforceable public health goals.

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 This report must not be reproduced except in full as defined by the attached chain of custody.

Phyllis Shiller, Laboratory Director

September 26, 2018

Reviewed and Released by: Helen Geoghegan, Project Manager



Environmental Laboratories, Inc.
 587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
 Tel. (860) 645-1102 Fax (860) 645-0823

Analysis Report
 September 26, 2018

FOR: Attn: Mr. Wayne Durocher
 Hebron Elementary School
 92 Church Street
 Hebron, CT 06248
 PWS #0670112

Sample Information

Matrix: DRINKING WATER
 Location Code: HEBRON
 Rush Request: Standard
 P.O.#:

Custody Information

Collected by: WD
 Received by: LB
 Analyzed by: see "By" below

Date

09/14/18
 09/14/18

Time

6:30
 12:54

Laboratory Data

SDG ID: GCB31508
 Phoenix ID: CB31513

Project ID: LEAD & COPPER
 Client ID: RM 8 HESLC007

Parameter	Result	RL/ PQL	DIL	Units	AL	MCL	MCLG	Date/Time	By	Reference
Copper	0.216	0.002	1	mg/L	1.3			09/19/18	EK	E200.7
Lead	0.0018	0.0010	1	mg/L	0.015			09/19/18	EK	E200.5
Total Metal Digestion	Completed							09/18/18	AG/BF	E200.5/E200.7

RL/PQL=Reporting/Practical Quantitation Level DIL=Dilution (analysis required diluting to evaluate) ND=Not Detected
 BRL=Below Reporting Level (less than the reporting level, the lowest amount the laboratory can detect and report.)
 AL = Action Level MCL = Maximum Contaminant Level MCLG = Maximum Contaminant Level Goal

Comments:

Maximum Contaminant Level (MCL) (Lower of): 40 CFR Part 141; CT Public Health Code 19-13-B102. The highest level of a contaminant that is allowed in drinking water. MCLs are enforceable standards.

Action Level (AL): 40 CFR Part 141.80.

Secondary DW Maximum Contaminant Level Goal (MCLG): (Lower of): 40 CFR Part 141; 40 CFR Part 143; CT Public Health Code 19-13-B102. The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs are non-enforceable public health goals.

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Phyllis Shiller, Laboratory Director

September 26, 2018

Reviewed and Released by: Helen Geoghegan, Project Manager



Environmental Laboratories, Inc.
 587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
 Tel. (860) 645-1102 Fax (860) 645-0823

Analysis Report
 September 26, 2018

FOR: Attn: Mr. Wayne Durocher
 Hebron Elementary School
 92 Church Street
 Hebron, CT 06248
 PWS #0670112

Sample Information

Matrix: DRINKING WATER
 Location Code: HEBRON
 Rush Request: Standard
 P.O.#:

Custody Information

Collected by: WD
 Received by: LB
 Analyzed by: see "By" below

Date

09/14/18
 09/14/18

Time

6:30
 12:54

Laboratory Data

SDG ID: GCB31508
 Phoenix ID: CB31514

Project ID: LEAD & COPPER
 Client ID: RM 9 HESLC008

Parameter	Result	RL/ PQL	DIL	Units	AL	MCL	MCLG	Date/Time	By	Reference
Copper	0.112	0.002	1	mg/L	1.3			09/19/18	EK	E200.7
Lead	< 0.0010	0.0010	1	mg/L	0.015			09/19/18	EK	E200.5
Total Metal Digestion	Completed							09/18/18	AG/BF	E200.5/E200.7

RL/PQL=Reporting/Practical Quantitation Level DIL=Dilution (analysis required diluting to evaluate) ND=Not Detected
 BRL=Below Reporting Level (less than the reporting level, the lowest amount the laboratory can detect and report.)
 AL = Action Level MCL = Maximum Contaminant Level MCLG = Maximum Contaminant Level Goal

Comments:

Maximum Contaminant Level (MCL) (Lower of): 40 CFR Part 141; CT Public Health Code 19-13-B102. The highest level of a contaminant that is allowed in drinking water. MCLs are enforceable standards.

Action Level (AL): 40 CFR Part 141.80.

Secondary DW Maximum Contaminant Level Goal (MCLG): (Lower of): 40 CFR Part 141; 40 CFR Part 143; CT Public Health Code 19-13-B102. The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs are non-enforceable public health goals.

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Phyllis Shiller, Laboratory Director

September 26, 2018

Reviewed and Released by: Helen Geoghegan, Project Manager



Environmental Laboratories, Inc.
 587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
 Tel. (860) 645-1102 Fax (860) 645-0823

Analysis Report
 September 26, 2018

FOR: Attn: Mr. Wayne Durocher
 Hebron Elementary School
 92 Church Street
 Hebron, CT 06248
 PWS #0670112

Sample Information

Matrix: DRINKING WATER
 Location Code: HEBRON
 Rush Request: Standard
 P.O.#:

Custody Information

Collected by: WD
 Received by: LB
 Analyzed by: see "By" below

Date

09/14/18
 09/14/18

Time

6:30
 12:54

Laboratory Data

SDG ID: GCB31508
 Phoenix ID: CB31515

Project ID: LEAD & COPPER
 Client ID: RM 14 HESLC009

Parameter	Result	RL/ PQL	DIL	Units	AL	MCL	MCLG	Date/Time	By	Reference
Copper	0.165	0.002	1	mg/L	1.3			09/19/18	EK	E200.7
Lead	0.0021	0.0010	1	mg/L	0.015			09/19/18	EK	E200.5
Total Metal Digestion	Completed							09/18/18	AG/BF	E200.5/E200.7

RL/PQL=Reporting/Practical Quantitation Level DIL=Dilution (analysis required diluting to evaluate) ND=Not Detected
 BRL=Below Reporting Level (less than the reporting level, the lowest amount the laboratory can detect and report.)
 AL = Action Level MCL = Maximum Contaminant Level MCLG = Maximum Contaminant Level Goal

Comments:

Maximum Contaminant Level (MCL) (Lower of): 40 CFR Part 141; CT Public Health Code 19-13-B102. The highest level of a contaminant that is allowed in drinking water. MCLs are enforceable standards.

Action Level (AL): 40 CFR Part 141.80.

Secondary DW Maximum Contaminant Level Goal (MCLG): (Lower of): 40 CFR Part 141; 40 CFR Part 143; CT Public Health Code 19-13-B102. The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs are non-enforceable public health goals.

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Phyllis Shiller, Laboratory Director

September 26, 2018

Reviewed and Released by: Helen Geoghegan, Project Manager



Environmental Laboratories, Inc.
 587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
 Tel. (860) 645-1102 Fax (860) 645-0823

Analysis Report
 September 26, 2018

FOR: Attn: Mr. Wayne Durocher
 Hebron Elementary School
 92 Church Street
 Hebron, CT 06248
 PWS #0670112

Sample Information

Matrix: DRINKING WATER
 Location Code: HEBRON
 Rush Request: Standard
 P.O.#:

Custody Information

Collected by: WD
 Received by: LB
 Analyzed by: see "By" below

Date

09/14/18
 09/14/18

Time

6:30
 12:54

Laboratory Data

SDG ID: GCB31508
 Phoenix ID: CB31516

Project ID: LEAD & COPPER
 Client ID: RM 2 HESLC010

Parameter	Result	RL/ PQL	DIL	Units	AL	MCL	MCLG	Date/Time	By	Reference
Copper	0.087	0.002	1	mg/L	1.3			09/19/18	EK	E200.7
Lead	0.0040	0.0010	1	mg/L	0.015			09/19/18	EK	E200.5
Total Metal Digestion	Completed							09/18/18	AG/BF	E200.5/E200.7

RL/PQL=Reporting/Practical Quantitation Level DIL=Dilution (analysis required diluting to evaluate) ND=Not Detected
 BRL=Below Reporting Level (less than the reporting level, the lowest amount the laboratory can detect and report.)
 AL = Action Level MCL = Maximum Contaminant Level MCLG = Maximum Contaminant Level Goal

Comments:

Maximum Contaminant Level (MCL) (Lower of): 40 CFR Part 141; CT Public Health Code 19-13-B102. The highest level of a contaminant that is allowed in drinking water. MCLs are enforceable standards.

Action Level (AL): 40 CFR Part 141.80.

Secondary DW Maximum Contaminant Level Goal (MCLG): (Lower of): 40 CFR Part 141; 40 CFR Part 143; CT Public Health Code 19-13-B102. The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs are non-enforceable public health goals.

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Phyllis Shiller, Laboratory Director

September 26, 2018

Reviewed and Released by: Helen Geoghegan, Project Manager



Environmental Laboratories, Inc.
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 Tel. (860) 645-1102 Fax (860) 645-0823

Analysis Report
 September 26, 2018

FOR: Attn: Mr. Wayne Durocher
 Hebron Elementary School
 92 Church Street
 Hebron, CT 06248
 PWS #0670112

Sample Information

Matrix: DRINKING WATER
 Location Code: HEBRON
 Rush Request: Standard
 P.O.#:

Custody Information

Collected by: WD
 Received by: LB
 Analyzed by: see "By" below

Date

09/14/18
 09/14/18

Time

6:30
 12:54

Laboratory Data

SDG ID: GCB31508
 Phoenix ID: CB31517

Project ID: LEAD & COPPER
 Client ID: BAND RM HESLC011

Parameter	Result	RL/ PQL	DIL	Units	AL	MCL	MCLG	Date/Time	By	Reference
Copper	0.046	0.002	1	mg/L	1.3			09/19/18	EK	E200.7
Lead	< 0.0010	0.0010	1	mg/L	0.015			09/19/18	EK	E200.5
Total Metal Digestion	Completed							09/18/18	AG/BF	E200.5/E200.7

RL/PQL=Reporting/Practical Quantitation Level DIL=Dilution (analysis required diluting to evaluate) ND=Not Detected
 BRL=Below Reporting Level (less than the reporting level, the lowest amount the laboratory can detect and report.)
 AL = Action Level MCL = Maximum Contaminant Level MCLG = Maximum Contaminant Level Goal

Comments:

Maximum Contaminant Level (MCL) (Lower of): 40 CFR Part 141; CT Public Health Code 19-13-B102. The highest level of a contaminant that is allowed in drinking water. MCLs are enforceable standards.

Action Level (AL): 40 CFR Part 141.80.

Secondary DW Maximum Contaminant Level Goal (MCLG): (Lower of): 40 CFR Part 141; 40 CFR Part 143; CT Public Health Code 19-13-B102. The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs are non-enforceable public health goals.

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September 26, 2018

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Analysis Report
 September 26, 2018

FOR: Attn: Mr. Wayne Durocher
 Hebron Elementary School
 92 Church Street
 Hebron, CT 06248
 PWS #0670112

Sample Information

Matrix: DRINKING WATER
 Location Code: HEBRON
 Rush Request: Standard
 P.O.#:

Custody Information

Collected by: WD
 Received by: LB
 Analyzed by: see "By" below

Date

09/14/18
 09/14/18

Time

6:30
 12:54

Laboratory Data

SDG ID: GCB31508
 Phoenix ID: CB31518

Project ID: LEAD & COPPER
 Client ID: RM 23 HESLC012

Parameter	Result	RL/ PQL	DIL	Units	AL	MCL	MCLG	Date/Time	By	Reference
Copper	0.160	0.002	1	mg/L	1.3			09/19/18	EK	E200.7
Lead	< 0.0010	0.0010	1	mg/L	0.015			09/19/18	EK	E200.5
Total Metal Digestion	Completed							09/18/18	AG/BF	E200.5/E200.7

RL/PQL=Reporting/Practical Quantitation Level DIL=Dilution (analysis required diluting to evaluate) ND=Not Detected
 BRL=Below Reporting Level (less than the reporting level, the lowest amount the laboratory can detect and report.)
 AL = Action Level MCL = Maximum Contaminant Level MCLG = Maximum Contaminant Level Goal

Comments:

Maximum Contaminant Level (MCL) (Lower of): 40 CFR Part 141; CT Public Health Code 19-13-B102. The highest level of a contaminant that is allowed in drinking water. MCLs are enforceable standards.

Action Level (AL): 40 CFR Part 141.80.

Secondary DW Maximum Contaminant Level Goal (MCLG): (Lower of): 40 CFR Part 141; 40 CFR Part 143; CT Public Health Code 19-13-B102. The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs are non-enforceable public health goals.

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Phyllis Shiller, Laboratory Director

September 26, 2018

Reviewed and Released by: Helen Geoghegan, Project Manager



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 Tel. (860) 645-1102 Fax (860) 645-0823

Analysis Report
 September 26, 2018

FOR: Attn: Mr. Wayne Durocher
 Hebron Elementary School
 92 Church Street
 Hebron, CT 06248
 PWS #0670112

Sample Information

Matrix: DRINKING WATER
 Location Code: HEBRON
 Rush Request: Standard
 P.O.#:

Custody Information

Collected by: WD
 Received by: LB
 Analyzed by: see "By" below

Date

09/14/18
 09/14/18

Time

6:30
 12:54

Laboratory Data

SDG ID: GCB31508
 Phoenix ID: CB31519

Project ID: LEAD & COPPER
 Client ID: RM 19 HESLC015

Parameter	Result	RL/ PQL	DIL	Units	AL	MCL	MCLG	Date/Time	By	Reference
Copper	0.121	0.002	1	mg/L	1.3			09/19/18	EK	E200.7
Lead	< 0.0010	0.0010	1	mg/L	0.015			09/19/18	EK	E200.5
Total Metal Digestion	Completed							09/18/18	AG/BF	E200.5/E200.7

RL/PQL=Reporting/Practical Quantitation Level DIL=Dilution (analysis required diluting to evaluate) ND=Not Detected
 BRL=Below Reporting Level (less than the reporting level, the lowest amount the laboratory can detect and report.)
 AL = Action Level MCL = Maximum Contaminant Level MCLG = Maximum Contaminant Level Goal

Comments:

Maximum Contaminant Level (MCL) (Lower of): 40 CFR Part 141; CT Public Health Code 19-13-B102. The highest level of a contaminant that is allowed in drinking water. MCLs are enforceable standards.

Action Level (AL): 40 CFR Part 141.80.

Secondary DW Maximum Contaminant Level Goal (MCLG): (Lower of): 40 CFR Part 141; 40 CFR Part 143; CT Public Health Code 19-13-B102. The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs are non-enforceable public health goals.

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September 26, 2018

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 Tel. (860) 645-1102 Fax (860) 645-0823

Analysis Report
 September 26, 2018

FOR: Attn: Mr. Wayne Durocher
 Hebron Elementary School
 92 Church Street
 Hebron, CT 06248
 PWS #0670112

Sample Information

Matrix: DRINKING WATER
 Location Code: HEBRON
 Rush Request: Standard
 P.O.#:

Custody Information

Collected by: WD
 Received by: LB
 Analyzed by: see "By" below

Date

09/14/18
 09/14/18

Time

6:30
 12:54

Laboratory Data

SDG ID: GCB31508
 Phoenix ID: CB31520

Project ID: LEAD & COPPER
 Client ID: RM 3 HESLC016

Parameter	Result	RL/ PQL	DIL	Units	AL	MCL	MCLG	Date/Time	By	Reference
Copper	0.238	0.002	1	mg/L	1.3			09/19/18	EK	E200.7
Lead	0.0044	0.0010	1	mg/L	0.015			09/19/18	EK	E200.5
Total Metal Digestion	Completed							09/18/18	AG/BF	E200.5/E200.7

RL/PQL=Reporting/Practical Quantitation Level DIL=Dilution (analysis required diluting to evaluate) ND=Not Detected
 BRL=Below Reporting Level (less than the reporting level, the lowest amount the laboratory can detect and report.)
 AL = Action Level MCL = Maximum Contaminant Level MCLG = Maximum Contaminant Level Goal

Comments:

Maximum Contaminant Level (MCL) (Lower of): 40 CFR Part 141; CT Public Health Code 19-13-B102. The highest level of a contaminant that is allowed in drinking water. MCLs are enforceable standards.

Action Level (AL): 40 CFR Part 141.80.

Secondary DW Maximum Contaminant Level Goal (MCLG): (Lower of): 40 CFR Part 141; 40 CFR Part 143; CT Public Health Code 19-13-B102. The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs are non-enforceable public health goals.

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September 26, 2018

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Analysis Report
 September 26, 2018

FOR: Attn: Mr. Wayne Durocher
 Hebron Elementary School
 92 Church Street
 Hebron, CT 06248
 PWS #0670112

Sample Information

Matrix: DRINKING WATER
 Location Code: HEBRON
 Rush Request: Standard
 P.O.#:

Custody Information

Collected by: WD
 Received by: LB
 Analyzed by: see "By" below

Date

09/14/18
 09/14/18

Time

6:30
 12:54

Laboratory Data

SDG ID: GCB31508
 Phoenix ID: CB31521

Project ID: LEAD & COPPER
 Client ID: RM 10 HESLC017

Parameter	Result	RL/ PQL	DIL	Units	AL	MCL	MCLG	Date/Time	By	Reference
Copper	0.048	0.002	1	mg/L	1.3			09/19/18	TH	E200.7
Lead	< 0.0010	0.0010	1	mg/L	0.015			09/19/18	TH	E200.5
Total Metal Digestion	Completed							09/18/18	AG/BF	E200.5/E200.7

RL/PQL=Reporting/Practical Quantitation Level DIL=Dilution (analysis required diluting to evaluate) ND=Not Detected
 BRL=Below Reporting Level (less than the reporting level, the lowest amount the laboratory can detect and report.)
 AL = Action Level MCL = Maximum Contaminant Level MCLG = Maximum Contaminant Level Goal

Comments:

Maximum Contaminant Level (MCL) (Lower of): 40 CFR Part 141; CT Public Health Code 19-13-B102. The highest level of a contaminant that is allowed in drinking water. MCLs are enforceable standards.

Action Level (AL): 40 CFR Part 141.80.

Secondary DW Maximum Contaminant Level Goal (MCLG): (Lower of): 40 CFR Part 141; 40 CFR Part 143; CT Public Health Code 19-13-B102. The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs are non-enforceable public health goals.

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September 26, 2018

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Analysis Report
 September 26, 2018

FOR: Attn: Mr. Wayne Durocher
 Hebron Elementary School
 92 Church Street
 Hebron, CT 06248
 PWS #0670112

Sample Information

Matrix: DRINKING WATER
 Location Code: HEBRON
 Rush Request: Standard
 P.O.#:

Custody Information

Collected by: WD
 Received by: LB
 Analyzed by: see "By" below

Date

09/14/18
 09/14/18

Time

6:30
 12:54

Laboratory Data

SDG ID: GCB31508
 Phoenix ID: CB31522

Project ID: LEAD & COPPER
 Client ID: RM 24 HESLC018

Parameter	Result	RL/ PQL	DIL	Units	AL	MCL	MCLG	Date/Time	By	Reference
Copper	0.060	0.002	1	mg/L	1.3			09/19/18	TH	E200.7
Lead	< 0.0010	0.0010	1	mg/L	0.015			09/19/18	TH	E200.5
Total Metal Digestion	Completed							09/18/18	AG/BF	E200.5/E200.7

RL/PQL=Reporting/Practical Quantitation Level DIL=Dilution (analysis required diluting to evaluate) ND=Not Detected
 BRL=Below Reporting Level (less than the reporting level, the lowest amount the laboratory can detect and report.)
 AL = Action Level MCL = Maximum Contaminant Level MCLG = Maximum Contaminant Level Goal

Comments:

Maximum Contaminant Level (MCL) (Lower of): 40 CFR Part 141; CT Public Health Code 19-13-B102. The highest level of a contaminant that is allowed in drinking water. MCLs are enforceable standards.

Action Level (AL): 40 CFR Part 141.80.

Secondary DW Maximum Contaminant Level Goal (MCLG): (Lower of): 40 CFR Part 141; 40 CFR Part 143; CT Public Health Code 19-13-B102. The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs are non-enforceable public health goals.

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Phyllis Shiller, Laboratory Director

September 26, 2018

Reviewed and Released by: Helen Geoghegan, Project Manager



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Analysis Report
 September 26, 2018

FOR: Attn: Mr. Wayne Durocher
 Hebron Elementary School
 92 Church Street
 Hebron, CT 06248
 PWS #0670112

Sample Information

Matrix: DRINKING WATER
 Location Code: HEBRON
 Rush Request: Standard
 P.O.#:

Custody Information

Collected by: WD
 Received by: LB
 Analyzed by: see "By" below

Date

09/14/18
 09/14/18

Time

6:30
 12:54

Laboratory Data

SDG ID: GCB31508
 Phoenix ID: CB31523

Project ID: LEAD & COPPER
 Client ID: RM 5 HESLC019

Parameter	Result	RL/ PQL	DIL	Units	AL	MCL	MCLG	Date/Time	By	Reference
Copper	0.374	0.002	1	mg/L	1.3			09/19/18	TH	E200.7
Lead	0.0076	0.0010	1	mg/L	0.015			09/19/18	TH	E200.5
Total Metal Digestion	Completed							09/18/18	AG/BF	E200.5/E200.7

RL/PQL=Reporting/Practical Quantitation Level DIL=Dilution (analysis required diluting to evaluate) ND=Not Detected
 BRL=Below Reporting Level (less than the reporting level, the lowest amount the laboratory can detect and report.)
 AL = Action Level MCL = Maximum Contaminant Level MCLG = Maximum Contaminant Level Goal

Comments:

Maximum Contaminant Level (MCL) (Lower of): 40 CFR Part 141; CT Public Health Code 19-13-B102. The highest level of a contaminant that is allowed in drinking water. MCLs are enforceable standards.

Action Level (AL): 40 CFR Part 141.80.

Secondary DW Maximum Contaminant Level Goal (MCLG): (Lower of): 40 CFR Part 141; 40 CFR Part 143; CT Public Health Code 19-13-B102. The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs are non-enforceable public health goals.

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Phyllis Shiller, Laboratory Director

September 26, 2018

Reviewed and Released by: Helen Geoghegan, Project Manager



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Analysis Report
 September 26, 2018

FOR: Attn: Mr. Wayne Durocher
 Hebron Elementary School
 92 Church Street
 Hebron, CT 06248
 PWS #0670112

Sample Information

Matrix: DRINKING WATER
 Location Code: HEBRON
 Rush Request: Standard
 P.O.#:

Custody Information

Collected by: WD
 Received by: LB
 Analyzed by: see "By" below

Date

09/14/18
 09/14/18

Time

6:30
 12:54

Laboratory Data

SDG ID: GCB31508
 Phoenix ID: CB31524

Project ID: LEAD & COPPER
 Client ID: RM 1 HESLC020

Parameter	Result	RL/ PQL	DIL	Units	AL	MCL	MCLG	Date/Time	By	Reference
Copper	0.062	0.002	1	mg/L	1.3			09/19/18	TH	E200.7
Lead	0.0014	0.0010	1	mg/L	0.015			09/19/18	TH	E200.5
Total Metal Digestion	Completed							09/18/18	AG/BF	E200.5/E200.7

RL/PQL=Reporting/Practical Quantitation Level DIL=Dilution (analysis required diluting to evaluate) ND=Not Detected
 BRL=Below Reporting Level (less than the reporting level, the lowest amount the laboratory can detect and report.)
 AL = Action Level MCL = Maximum Contaminant Level MCLG = Maximum Contaminant Level Goal

Comments:

Maximum Contaminant Level (MCL) (Lower of): 40 CFR Part 141; CT Public Health Code 19-13-B102. The highest level of a contaminant that is allowed in drinking water. MCLs are enforceable standards.

Action Level (AL): 40 CFR Part 141.80.

Secondary DW Maximum Contaminant Level Goal (MCLG): (Lower of): 40 CFR Part 141; 40 CFR Part 143; CT Public Health Code 19-13-B102. The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs are non-enforceable public health goals.

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Phyllis Shiller, Laboratory Director

September 26, 2018

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 Tel. (860) 645-1102 Fax (860) 645-0823

Analysis Report
 September 26, 2018

FOR: Attn: Mr. Wayne Durocher
 Hebron Elementary School
 92 Church Street
 Hebron, CT 06248
 PWS #0670112

<u>Sample Information</u>		<u>Custody Information</u>		<u>Date</u>	<u>Time</u>
Matrix:	DRINKING WATER	Collected by:	WD	09/14/18	6:30
Location Code:	HEBRON	Received by:	LB	09/14/18	12:54
Rush Request:	Standard	Analyzed by:	see "By" below		
P.O.#:					

Laboratory Data

SDG ID: GCB31508
 Phoenix ID: CB31525

Project ID: LEAD & COPPER
 Client ID: RM 15 HESLC022

Parameter	Result	RL/ PQL	DIL	Units	AL	MCL	MCLG	Date/Time	By	Reference
Copper	0.185	0.025	10	mg/L	1.3			09/24/18	CPP	E200.8
Lead	0.210	0.0010	10	mg/L	0.015			09/24/18	CPP	E200.8
*** Lead exceeds Action Level of 0.015 ***										
Total Metal Digestion	Completed							09/19/18	AG	E200.5/E200.7
Total Metal Digestion	Completed							09/19/18		E200.8

RL/PQL=Reporting/Practical Quantitation Level DIL=Dilution (analysis required diluting to evaluate) ND=Not Detected
 BRL=Below Reporting Level (less than the reporting level, the lowest amount the laboratory can detect and report.)
 AL = Action Level MCL = Maximum Contaminant Level MCLG = Maximum Contaminant Level Goal

Comments:

Maximum Contaminant Level (MCL) (Lower of): 40 CFR Part 141; CT Public Health Code 19-13-B102. The highest level of a contaminant that is allowed in drinking water. MCLs are enforceable standards.

Action Level (AL): 40 CFR Part 141.80.

Secondary DW Maximum Contaminant Level Goal (MCLG): (Lower of): 40 CFR Part 141; 40 CFR Part 143; CT Public Health Code 19-13-B102. The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs are non-enforceable public health goals.

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Phyllis Shiller, Laboratory Director
September 26, 2018

Reviewed and Released by: Helen Geoghegan, Project Manager



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 Tel. (860) 645-1102 Fax (860) 645-0823

Analysis Report
 September 26, 2018

FOR: Attn: Mr. Wayne Durocher
 Hebron Elementary School
 92 Church Street
 Hebron, CT 06248
 PWS #0670112

Sample Information

Matrix: DRINKING WATER
 Location Code: HEBRON
 Rush Request: Standard
 P.O.#:

Custody Information

Collected by: WD
 Received by: LB
 Analyzed by: see "By" below

Date

09/14/18
 09/14/18

Time

6:30
 12:54

Laboratory Data

SDG ID: GCB31508
 Phoenix ID: CB31526

Project ID: LEAD & COPPER
 Client ID: RM 25 HESLC024

Parameter	Result	RL/ PQL	DIL	Units	AL	MCL	MCLG	Date/Time	By	Reference
Copper	0.066	0.002	1	mg/L	1.3			09/19/18	TH	E200.7
Lead	< 0.0010	0.0010	1	mg/L	0.015			09/19/18	TH	E200.5
Total Metal Digestion	Completed							09/18/18	AG/BF	E200.5/E200.7

RL/PQL=Reporting/Practical Quantitation Level DIL=Dilution (analysis required diluting to evaluate) ND=Not Detected
 BRL=Below Reporting Level (less than the reporting level, the lowest amount the laboratory can detect and report.)
 AL = Action Level MCL = Maximum Contaminant Level MCLG = Maximum Contaminant Level Goal

Comments:

Maximum Contaminant Level (MCL) (Lower of): 40 CFR Part 141; CT Public Health Code 19-13-B102. The highest level of a contaminant that is allowed in drinking water. MCLs are enforceable standards.

Action Level (AL): 40 CFR Part 141.80.

Secondary DW Maximum Contaminant Level Goal (MCLG): (Lower of): 40 CFR Part 141; 40 CFR Part 143; CT Public Health Code 19-13-B102. The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs are non-enforceable public health goals.

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Phyllis Shiller, Laboratory Director

September 26, 2018

Reviewed and Released by: Helen Geoghegan, Project Manager



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 Tel. (860) 645-1102 Fax (860) 645-0823

Analysis Report
 September 26, 2018

FOR: Attn: Mr. Wayne Durocher
 Hebron Elementary School
 92 Church Street
 Hebron, CT 06248
 PWS #0670112

Sample Information

Matrix: DRINKING WATER
 Location Code: HEBRON
 Rush Request: Standard
 P.O.#:

Custody Information

Collected by: WD
 Received by: LB
 Analyzed by: see "By" below

Date

09/14/18
 09/14/18

Time

6:30
 12:54

Laboratory Data

SDG ID: GCB31508
 Phoenix ID: CB31527

Project ID: LEAD & COPPER
 Client ID: RM 20 HESLC027

Parameter	Result	RL/ PQL	DIL	Units	AL	MCL	MCLG	Date/Time	By	Reference
Copper	0.102	0.002	1	mg/L	1.3			09/19/18	TH	E200.7
Lead	< 0.0010	0.0010	1	mg/L	0.015			09/19/18	TH	E200.5
Total Metal Digestion	Completed							09/18/18	AG/BF	E200.5/E200.7

RL/PQL=Reporting/Practical Quantitation Level DIL=Dilution (analysis required diluting to evaluate) ND=Not Detected
 BRL=Below Reporting Level (less than the reporting level, the lowest amount the laboratory can detect and report.)
 AL = Action Level MCL = Maximum Contaminant Level MCLG = Maximum Contaminant Level Goal

Comments:

Maximum Contaminant Level (MCL) (Lower of): 40 CFR Part 141; CT Public Health Code 19-13-B102. The highest level of a contaminant that is allowed in drinking water. MCLs are enforceable standards.

Action Level (AL): 40 CFR Part 141.80.

Secondary DW Maximum Contaminant Level Goal (MCLG): (Lower of): 40 CFR Part 141; 40 CFR Part 143; CT Public Health Code 19-13-B102. The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs are non-enforceable public health goals.

If there are any questions regarding this data, please call Phoenix Client Services.
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Phyllis Shiller, Laboratory Director
 September 26, 2018

Reviewed and Released by: Helen Geoghegan, Project Manager

Wednesday, September 26, 2018

Criteria: CT: DW

State: CT

Sample Criteria Exceedances Report

GCB31508 - HEBRON

SampNo	Acode	Phoenix Analyte	Criteria	Result	RL	Criteria	RL	Analysis Units
CB31525	PB-DW-MS	Lead	EPA / 40 CFR 141 DW / 141.80 Lead & Copper ALs	0.210	0.0010	0.015	0.001	mg/L

Phoenix Laboratories does not assume responsibility for the data contained in this exceedance report. It is provided as an additional tool to identify requested criteria exceedances. All efforts are made to ensure the accuracy of the data (obtained from appropriate agencies). A lack of exceedance information does not necessarily suggest conformance to the criteria. It is ultimately the site professional's responsibility to determine appropriate compliance.



Environmental Laboratories, Inc.
587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
Tel. (860) 645-1102 Fax (860) 645-0823



Analysis Comments

September 26, 2018

SDG I.D.: GCB31508

The following analysis comments are made regarding exceptions to criteria not already noted in the Analysis Report or QA/QC Report: None.

CHAIN OF CUSTODY RECORD



587 East Middle Turnpike, P.O. Box 370, Manchester, CT 06040
 Email: info@phoenixlabs.com Fax (860) 645-0823
 Client Services (860) 645-8726

Cooler: Yes No
 Coolant: IPK ICE

Temp 79.8 Pg of 1
 Data Delivery/Contact Options:
 Fax: 860-228-1106
 Phone: 860-428-4816
 Email: w.Durocher@Hebron.K12.CT.US

Customer: Hebron Elementary School
 Address: 92 Church Street
Hebron CT 06248
 Project: Lead + Copper
 Report to: Wayne Durocher
 Invoice to:

Client Sample - Information - Identification
 Sampler's Signature: Wayne Durocher Date: 9-14-15

Matrix Code:
 DW=Drinking Water GW=Ground Water SW=Surface Water WW=Waste Water
 RW=Raw Water SE=Sediment SL=Sludge S=Soil SD=Solid W=Wipe OIL=Oil
 B=Bulk L=Liquid

Analysis Request
Lead + Copper
 This section **MUST** be completed with Bottle Quantities.

PHOENIX USE ONLY	Customer Sample Identification	Sample Matrix	Date Sampled	Time Sampled
Kitchen	HESLC001		9-14-15	6:30 AM
RM 22	HESLC002			
RM 17	HESLC003			
media center	HESLC005			
ART ROOM	HESLC006			
RM 8	HESLC007			
RM 9	HESLC008			
RM 14	HESLC009			
RM 2	HESLC010			
Bandroom	HESLC011			

Relinquished by: [Signature] Accepted by: [Signature]
 Date: 9-18-15 Time: 12:54
 Turnaround:
 1 Day*
 2 Days*
 3 Days*
 Standard
 Other
 * SURCHARGE APPLIES

RI Direct Exposure (Residential)
 GW
 Other

CT RCP Cert
 GW Protection
 SW Protection
 GA Mobility
 GB Mobility
 Residential DEC
 I/C DEC
 Other

MA MCP Certification
 GW-1
 GW-2
 GW-3
 S-1
 S-2
 S-3
 MWRA eSMART
 Other

Data Format
 Excel
 PDF
 GIS/Key
 EQUIS
 Other

Data Package
 Tier II Checklist
 Full Data Package*
 Phoenix Std Report
 Other

State where samples were collected: _____
 * SURCHARGE APPLIES

CHAIN OF CUSTODY RECORD



587 East Middle Turnpike, P.O. Box 370, Manchester, CT 06040
 Email: info@phoenixlabs.com Fax (860) 645-0823
 Client Services (860) 645-8726

Customer: Hebron Elementary School
 Address: 92 Church Street
Hebron CT 06248

Project: Lead + Copper
 Report to: Wayne Durocher
 Invoice to:

Project P.O.:

This section **MUST** be completed with **Bottle Quantities.**

Cooler: Yes No
 Coolant: IPK ICE

Temp 72.8 °F Pg 1 of 1

Data Delivery/Contact Options:
 Fax:
 Phone:
 Email:

Client Sample - Information - Identification

Sampler's Signature: Wayne Durocher Date: 9-14-18

Matrix Code:
 DW=Drinking Water GW=Ground Water SW=Surface Water WW=Waste Water
 RW=Raw Water SE=Sludge S=Soil SD=Solid W=Wipe OIL=Oil
 B=Bulk L=Liquid

PHOENIX USE ONLY SAMPLE #	Customer Sample Identification	Sample Matrix	Date Sampled	Time Sampled
RM 23	HES LCO12		9-14-18	6:30
RM 19	HES LCO15			
RM 3	HES LCO16			
RM 10	HES LCO17			
RM 24	HES LCO18			
RM 5	HES LCO19			
RM 1	HES LCO20			
RM 15	HES LCO22			
RM 25	HES LCO24			
RM 20	HES LCO27			

Analysis Request: LEAD + COPPER

GL Amber 8 oz. WhiPCA	GL Soil container () oz	GL Amber 1000ml (As Is) (HCL)	PL As Is (1250ml) (As Is) (H2SO4)	PL HNO3 250ml	Bacteria Bottle w/100ml
1				31	518
1				31	519
1				31	520
1				31	521
1				31	522
1				31	524
1				31	525
1				31	526
1				31	527

Relinquished by: [Signature] Accepted by: [Signature]
 Date: 9-14-18 Time: 12:54

RI Direct Exposure (Residential) GW Other

CT RCP Cert GW Protection SW Protection GA Mobility GB Mobility Residential DEC I/C DEC Other

MA MCP Certification GW-1 GW-2 GW-3 S-1 S-2 S-3 MWRA eSMART Other

Data Format: Excel PDF GIS/Key EQUIS Other

Data Package: Tier II Checklist Full Data Package* Phoenix Std Report Other

* SURCHARGE APPLIES

Turnaround:
 1 Day*
 2 Days*
 3 Days*
 Standard
 Other
 * SURCHARGE APPLIES

State where samples were collected: _____

Comments, Special Requirements or Regulations:



Tuesday, May 29, 2018

Attn: Mr. Wayne Durocher
Hebron Elementary School
92 Church Street
Hebron, CT 06248
PWS #0670112

Project ID: LEAD & COPPER
Sample ID#: CA52000 - CA52009

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. This report is incomplete unless all pages indicated in the pagination at the bottom of the page are included.

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 black ink that reads "Phyllis Shiller". The signature is fluid and cursive, with the first name being more prominent.

Phyllis Shiller
Laboratory Director

NELAC - #NY11301
CT Lab Registration #PH-0618
MA Lab Registration #M-CT007
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
UT Lab Registration #CT00007
VT Lab Registration #VT11301



Environmental Laboratories, Inc.
 587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
 Tel. (860) 645-1102 Fax (860) 645-0823

Analysis Report
 May 29, 2018

FOR: Attn: Mr. Wayne Durocher
 Hebron Elementary School
 92 Church Street
 Hebron, CT 06248
 PWS #0670112

Sample Information

Matrix: DRINKING WATER
 Location Code: HEBRON
 Rush Request: Standard
 P.O.#:

Custody Information

Collected by: WD
 Received by: LB
 Analyzed by: see "By" below

Date

05/23/18
 05/23/18

Time

6:30
 13:23

Laboratory Data

SDG ID: GCA52000
 Phoenix ID: CA52000

Project ID: LEAD & COPPER
 Client ID: RM 23 HESLC012 FIRST DRAW

Parameter	Result	RL/ PQL	DIL	Units	AL	MCL	MCLG	Date/Time	By	Reference
Copper	0.240	0.002	1	mg/L	1.3			05/25/18	EK	E200.7
Lead	0.0024	0.0010	1	mg/L	0.015			05/25/18	EK	E200.5, E200.7
Total Metal Digestion	Completed							05/24/18	AG/BF	E200.5/E200.7

RL/PQL=Reporting/Practical Quantitation Level DIL=Dilution (analysis required diluting to evaluate) ND=Not Detected
 BRL=Below Reporting Level (less than the reporting level, the lowest amount the laboratory can detect and report.)
 AL = Action Level MCL = Maximum Contaminant Level MCLG = Maximum Contaminant Level Goal

Comments:

Maximum Contaminant Level (MCL) (Lower of): 40 CFR Part 141; CT Public Health Code 19-13-B102. The highest level of a contaminant that is allowed in drinking water. MCLs are enforceable standards.

Action Level (AL): 40 CFR Part 141.80.

Secondary DW Maximum Contaminant Level Goal (MCLG): (Lower of): 40 CFR Part 141; 40 CFR Part 143; CT Public Health Code 19-13-B102. The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs are non-enforceable public health goals.

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Phyllis Shiller, Laboratory Director

May 29, 2018

Reviewed and Released by: Deb Lawrie, Project Manager



Environmental Laboratories, Inc.
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 Tel. (860) 645-1102 Fax (860) 645-0823

Analysis Report
 May 29, 2018

FOR: Attn: Mr. Wayne Durocher
 Hebron Elementary School
 92 Church Street
 Hebron, CT 06248
 PWS #0670112

Sample Information

Matrix: DRINKING WATER
 Location Code: HEBRON
 Rush Request: Standard
 P.O.#:

Custody Information

Collected by: WD
 Received by: LB
 Analyzed by: see "By" below

Date

05/23/18
 05/23/18

Time

6:30
 13:23

Laboratory Data

SDG ID: GCA52000
 Phoenix ID: CA52001

Project ID: LEAD & COPPER
 Client ID: RM 19 HESLC015 FIRST DRAW

Parameter	Result	RL/ PQL	DIL	Units	AL	MCL	MCLG	Date/Time	By	Reference
Copper	0.312	0.002	1	mg/L	1.3			05/25/18	EK	E200.7
Lead	0.0033	0.0010	1	mg/L	0.015			05/25/18	EK	E200.5, E200.7
Total Metal Digestion	Completed							05/24/18	AG/BF	E200.5/E200.7

RL/PQL=Reporting/Practical Quantitation Level DIL=Dilution (analysis required diluting to evaluate) ND=Not Detected
 BRL=Below Reporting Level (less than the reporting level, the lowest amount the laboratory can detect and report.)
 AL = Action Level MCL = Maximum Contaminant Level MCLG = Maximum Contaminant Level Goal

Comments:

Maximum Contaminant Level (MCL) (Lower of): 40 CFR Part 141; CT Public Health Code 19-13-B102. The highest level of a contaminant that is allowed in drinking water. MCLs are enforceable standards.

Action Level (AL): 40 CFR Part 141.80.

Secondary DW Maximum Contaminant Level Goal (MCLG): (Lower of): 40 CFR Part 141; 40 CFR Part 143; CT Public Health Code 19-13-B102. The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs are non-enforceable public health goals.

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Phyllis Shiller, Laboratory Director

May 29, 2018

Reviewed and Released by: Deb Lawrie, Project Manager



Environmental Laboratories, Inc.
 587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
 Tel. (860) 645-1102 Fax (860) 645-0823

Analysis Report
 May 29, 2018

FOR: Attn: Mr. Wayne Durocher
 Hebron Elementary School
 92 Church Street
 Hebron, CT 06248
 PWS #0670112

Sample Information

Matrix: DRINKING WATER
 Location Code: HEBRON
 Rush Request: Standard
 P.O.#:

Custody Information

Collected by: WD
 Received by: LB
 Analyzed by: see "By" below

Date

05/23/18
 05/23/18

Time

6:30
 13:23

Laboratory Data

SDG ID: GCA52000
 Phoenix ID: CA52002

Project ID: LEAD & COPPER
 Client ID: RM 3 HESLC016 FIRST DRAW

Parameter	Result	RL/ PQL	DIL	Units	AL	MCL	MCLG	Date/Time	By	Reference
Copper	0.075	0.002	1	mg/L	1.3			05/25/18	EK	E200.7
Lead	0.0013	0.0010	1	mg/L	0.015			05/25/18	EK	E200.5, E200.7
Total Metal Digestion	Completed							05/24/18	AG/BF	E200.5/E200.7

RL/PQL=Reporting/Practical Quantitation Level DIL=Dilution (analysis required diluting to evaluate) ND=Not Detected
 BRL=Below Reporting Level (less than the reporting level, the lowest amount the laboratory can detect and report.)
 AL = Action Level MCL = Maximum Contaminant Level MCLG = Maximum Contaminant Level Goal

Comments:

Maximum Contaminant Level (MCL) (Lower of): 40 CFR Part 141; CT Public Health Code 19-13-B102. The highest level of a contaminant that is allowed in drinking water. MCLs are enforceable standards.

Action Level (AL): 40 CFR Part 141.80.

Secondary DW Maximum Contaminant Level Goal (MCLG): (Lower of): 40 CFR Part 141; 40 CFR Part 143; CT Public Health Code 19-13-B102. The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs are non-enforceable public health goals.

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Phyllis Shiller, Laboratory Director

May 29, 2018

Reviewed and Released by: Deb Lawrie, Project Manager



Environmental Laboratories, Inc.
 587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
 Tel. (860) 645-1102 Fax (860) 645-0823

Analysis Report
 May 29, 2018

FOR: Attn: Mr. Wayne Durocher
 Hebron Elementary School
 92 Church Street
 Hebron, CT 06248
 PWS #0670112

Sample Information

Matrix: DRINKING WATER
 Location Code: HEBRON
 Rush Request: Standard
 P.O.#:

Custody Information

Collected by: WD
 Received by: LB
 Analyzed by: see "By" below

Date

05/23/18
 05/23/18

Time

6:30
 13:23

Laboratory Data

SDG ID: GCA52000
 Phoenix ID: CA52003

Project ID: LEAD & COPPER
 Client ID: RM 10 HESLC017 FIRST DRAW

Parameter	Result	RL/ PQL	DIL	Units	AL	MCL	MCLG	Date/Time	By	Reference
Copper	0.063	0.002	1	mg/L	1.3			05/25/18	EK	E200.7
Lead	< 0.0010	0.0010	1	mg/L	0.015			05/25/18	EK	E200.5, E200.7
Total Metal Digestion	Completed							05/24/18	AG/BF	E200.5/E200.7

RL/PQL=Reporting/Practical Quantitation Level DIL=Dilution (analysis required diluting to evaluate) ND=Not Detected
 BRL=Below Reporting Level (less than the reporting level, the lowest amount the laboratory can detect and report.)
 AL = Action Level MCL = Maximum Contaminant Level MCLG = Maximum Contaminant Level Goal

Comments:

Maximum Contaminant Level (MCL) (Lower of): 40 CFR Part 141; CT Public Health Code 19-13-B102. The highest level of a contaminant that is allowed in drinking water. MCLs are enforceable standards.

Action Level (AL): 40 CFR Part 141.80.

Secondary DW Maximum Contaminant Level Goal (MCLG): (Lower of): 40 CFR Part 141; 40 CFR Part 143; CT Public Health Code 19-13-B102. The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs are non-enforceable public health goals.

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Phyllis Shiller, Laboratory Director

May 29, 2018

Reviewed and Released by: Deb Lawrie, Project Manager



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 587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
 Tel. (860) 645-1102 Fax (860) 645-0823

Analysis Report
 May 29, 2018

FOR: Attn: Mr. Wayne Durocher
 Hebron Elementary School
 92 Church Street
 Hebron, CT 06248
 PWS #0670112

Sample Information

Matrix: DRINKING WATER
 Location Code: HEBRON
 Rush Request: Standard
 P.O.#:

Custody Information

Collected by: WD
 Received by: LB
 Analyzed by: see "By" below

Date

05/23/18
 05/23/18

Time

6:30
 13:23

Laboratory Data

SDG ID: GCA52000
 Phoenix ID: CA52004

Project ID: LEAD & COPPER
 Client ID: RM 24 HESLC018 FIRST DRAW

Parameter	Result	RL/ PQL	DIL	Units	AL	MCL	MCLG	Date/Time	By	Reference
Copper	0.057	0.002	1	mg/L	1.3			05/25/18	EK	E200.7
Lead	< 0.0010	0.0010	1	mg/L	0.015			05/25/18	EK	E200.5, E200.7
Total Metal Digestion	Completed							05/24/18	AG/BF	E200.5/E200.7

RL/PQL=Reporting/Practical Quantitation Level DIL=Dilution (analysis required diluting to evaluate) ND=Not Detected
 BRL=Below Reporting Level (less than the reporting level, the lowest amount the laboratory can detect and report.)
 AL = Action Level MCL = Maximum Contaminant Level MCLG = Maximum Contaminant Level Goal

Comments:

Maximum Contaminant Level (MCL) (Lower of): 40 CFR Part 141; CT Public Health Code 19-13-B102. The highest level of a contaminant that is allowed in drinking water. MCLs are enforceable standards.

Action Level (AL): 40 CFR Part 141.80.

Secondary DW Maximum Contaminant Level Goal (MCLG): (Lower of): 40 CFR Part 141; 40 CFR Part 143; CT Public Health Code 19-13-B102. The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs are non-enforceable public health goals.

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Phyllis Shiller, Laboratory Director

May 29, 2018

Reviewed and Released by: Deb Lawrie, Project Manager



Environmental Laboratories, Inc.
 587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
 Tel. (860) 645-1102 Fax (860) 645-0823

Analysis Report
 May 29, 2018

FOR: Attn: Mr. Wayne Durocher
 Hebron Elementary School
 92 Church Street
 Hebron, CT 06248
 PWS #0670112

Sample Information

Matrix: DRINKING WATER
 Location Code: HEBRON
 Rush Request: Standard
 P.O.#:

Custody Information

Collected by: WD
 Received by: LB
 Analyzed by: see "By" below

Date

05/23/18
 05/23/18

Time

6:30
 13:23

Laboratory Data

SDG ID: GCA52000
 Phoenix ID: CA52005

Project ID: LEAD & COPPER
 Client ID: RM 5 HESLC019 FIRST DRAW

Parameter	Result	RL/ PQL	DIL	Units	AL	MCL	MCLG	Date/Time	By	Reference
Copper	0.225	0.002	1	mg/L	1.3			05/29/18	EK	E200.7
Lead	0.0011	0.0010	1	mg/L	0.015			05/29/18	EK	E200.5, E200.7
Total Metal Digestion	Completed							05/25/18	AG/BF	E200.5/E200.7

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Phyllis Shiller, Laboratory Director

May 29, 2018

Reviewed and Released by: Deb Lawrie, Project Manager



Environmental Laboratories, Inc.
 587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
 Tel. (860) 645-1102 Fax (860) 645-0823

Analysis Report
 May 29, 2018

FOR: Attn: Mr. Wayne Durocher
 Hebron Elementary School
 92 Church Street
 Hebron, CT 06248
 PWS #0670112

Sample Information

Matrix: DRINKING WATER
 Location Code: HEBRON
 Rush Request: Standard
 P.O.#:

Custody Information

Collected by: WD
 Received by: LB
 Analyzed by: see "By" below

Date

05/23/18
 05/23/18

Time

6:30
 13:23

Laboratory Data

SDG ID: GCA52000
 Phoenix ID: CA52006

Project ID: LEAD & COPPER
 Client ID: RM 1 HESLC020 FIRST DRAW

Parameter	Result	RL/ PQL	DIL	Units	AL	MCL	MCLG	Date/Time	By	Reference
Copper	0.063	0.002	1	mg/L	1.3			05/29/18	EK	E200.7
Lead	< 0.0010	0.0010	1	mg/L	0.015			05/29/18	EK	E200.5, E200.7
Total Metal Digestion	Completed							05/25/18	AG/BF	E200.5/E200.7

RL/PQL=Reporting/Practical Quantitation Level DIL=Dilution (analysis required diluting to evaluate) ND=Not Detected
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Secondary DW Maximum Contaminant Level Goal (MCLG): (Lower of): 40 CFR Part 141; 40 CFR Part 143; CT Public Health Code 19-13-B102. The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs are non-enforceable public health goals.

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Phyllis Shiller, Laboratory Director

May 29, 2018

Reviewed and Released by: Deb Lawrie, Project Manager



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 Tel. (860) 645-1102 Fax (860) 645-0823

Analysis Report
 May 29, 2018

FOR: Attn: Mr. Wayne Durocher
 Hebron Elementary School
 92 Church Street
 Hebron, CT 06248
 PWS #0670112

Sample Information

Matrix: DRINKING WATER
 Location Code: HEBRON
 Rush Request: Standard
 P.O.#:

Custody Information

Collected by: WD
 Received by: LB
 Analyzed by: see "By" below

Date

05/23/18
 05/23/18

Time

6:30
 13:23

Laboratory Data

SDG ID: GCA52000
 Phoenix ID: CA52007

Project ID: LEAD & COPPER
 Client ID: RM 15 HESLC022 FIRST DRAW

Parameter	Result	RL/ PQL	DIL	Units	AL	MCL	MCLG	Date/Time	By	Reference
Copper	0.153	0.002	1	mg/L	1.3			05/29/18	EK	E200.7
Lead	0.0029	0.0010	1	mg/L	0.015			05/29/18	EK	E200.5, E200.7
Total Metal Digestion	Completed							05/25/18	AG/BF	E200.5/E200.7

RL/PQL=Reporting/Practical Quantitation Level DIL=Dilution (analysis required diluting to evaluate) ND=Not Detected
 BRL=Below Reporting Level (less than the reporting level, the lowest amount the laboratory can detect and report.)
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Action Level (AL): 40 CFR Part 141.80.

Secondary DW Maximum Contaminant Level Goal (MCLG): (Lower of): 40 CFR Part 141; 40 CFR Part 143; CT Public Health Code 19-13-B102. The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs are non-enforceable public health goals.

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Phyllis Shiller, Laboratory Director

May 29, 2018

Reviewed and Released by: Deb Lawrie, Project Manager



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 Tel. (860) 645-1102 Fax (860) 645-0823

Analysis Report
 May 29, 2018

FOR: Attn: Mr. Wayne Durocher
 Hebron Elementary School
 92 Church Street
 Hebron, CT 06248
 PWS #0670112

Sample Information

Matrix: DRINKING WATER
 Location Code: HEBRON
 Rush Request: Standard
 P.O.#:

Custody Information

Collected by: WD
 Received by: LB
 Analyzed by: see "By" below

Date

05/23/18
 05/23/18

Time

6:30
 13:23

Laboratory Data

SDG ID: GCA52000
 Phoenix ID: CA52008

Project ID: LEAD & COPPER
 Client ID: RM 25 HESLC024 FIRST DRAW

Parameter	Result	RL/ PQL	DIL	Units	AL	MCL	MCLG	Date/Time	By	Reference
Copper	0.122	0.002	1	mg/L	1.3			05/29/18	EK	E200.7
Lead	< 0.0010	0.0010	1	mg/L	0.015			05/29/18	EK	E200.5, E200.7
Total Metal Digestion	Completed							05/25/18	AG/BF	E200.5/E200.7

RL/PQL=Reporting/Practical Quantitation Level DIL=Dilution (analysis required diluting to evaluate) ND=Not Detected
 BRL=Below Reporting Level (less than the reporting level, the lowest amount the laboratory can detect and report.)
 AL = Action Level MCL = Maximum Contaminant Level MCLG = Maximum Contaminant Level Goal

Comments:

Maximum Contaminant Level (MCL) (Lower of): 40 CFR Part 141; CT Public Health Code 19-13-B102. The highest level of a contaminant that is allowed in drinking water. MCLs are enforceable standards.

Action Level (AL): 40 CFR Part 141.80.

Secondary DW Maximum Contaminant Level Goal (MCLG): (Lower of): 40 CFR Part 141; 40 CFR Part 143; CT Public Health Code 19-13-B102. The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs are non-enforceable public health goals.

If there are any questions regarding this data, please call Phoenix Client Services.
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Phyllis Shiller, Laboratory Director

May 29, 2018

Reviewed and Released by: Deb Lawrie, Project Manager



Environmental Laboratories, Inc.
 587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
 Tel. (860) 645-1102 Fax (860) 645-0823

Analysis Report
 May 29, 2018

FOR: Attn: Mr. Wayne Durocher
 Hebron Elementary School
 92 Church Street
 Hebron, CT 06248
 PWS #0670112

Sample Information

Matrix: DRINKING WATER
 Location Code: HEBRON
 Rush Request: Standard
 P.O.#:

Custody Information

Collected by: WD
 Received by: LB
 Analyzed by: see "By" below

Date

05/23/18
 05/23/18

Time

6:30
 13:23

Laboratory Data

SDG ID: GCA52000
 Phoenix ID: CA52009

Project ID: LEAD & COPPER
 Client ID: RM 20 HESLC027 FIRST DRAW

Parameter	Result	RL/ PQL	DIL	Units	AL	MCL	MCLG	Date/Time	By	Reference
Copper	0.169	0.002	1	mg/L	1.3			05/29/18	EK	E200.7
Lead	< 0.0010	0.0010	1	mg/L	0.015			05/29/18	EK	E200.5, E200.7
Total Metal Digestion	Completed							05/25/18	AG/BF	E200.5/E200.7

RL/PQL=Reporting/Practical Quantitation Level DIL=Dilution (analysis required diluting to evaluate) ND=Not Detected
 BRL=Below Reporting Level (less than the reporting level, the lowest amount the laboratory can detect and report.)
 AL = Action Level MCL = Maximum Contaminant Level MCLG = Maximum Contaminant Level Goal

Comments:

Maximum Contaminant Level (MCL) (Lower of): 40 CFR Part 141; CT Public Health Code 19-13-B102. The highest level of a contaminant that is allowed in drinking water. MCLs are enforceable standards.

Action Level (AL): 40 CFR Part 141.80.

Secondary DW Maximum Contaminant Level Goal (MCLG): (Lower of): 40 CFR Part 141; 40 CFR Part 143; CT Public Health Code 19-13-B102. The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs are non-enforceable public health goals.

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Phyllis Shiller, Laboratory Director

May 29, 2018

Reviewed and Released by: Deb Lawrie, Project Manager

Tuesday, May 29, 2018

Criteria: CT: DW

State: CT

SampNo Acode Phoenix Analyte

Sample Criteria Exceedances Report

GCA52000 - HEBRON

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.



Environmental Laboratories, Inc.
587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
Tel. (860) 645-1102 Fax (860) 645-0823



Analysis Comments

May 29, 2018

SDG I.D.: GCA52000

The following analysis comments are made regarding exceptions to criteria not already noted in the Analysis Report or QA/QC Report: None.



CHAIN OF CUSTODY RECORD

587 East Middle Turnpike, P.O. Box 370, Manchester, CT 06040
 Email: info@phoenixlabs.com Fax (860) 645-0823
 Client Services (860) 645-8726

Customer: Hebron Elementary School
 Address: 92 Church Street
Hebron CT 06248

Project: Lead + Copper
 Report to: Wayne Durocher
 Invoice to:

Project P.O.:

This section **MUST** be completed with **Bottle Quantities.**

Cooler: Yes No
 Coolant: IPK ICE
 Temp 20 C, Pg of

Data Delivery/Contact Options:
 Fax: 860 228 1106
 Phone: 860-428-4816
 Email: W.Durocher@Hebron.K12.CT.US

Sampler's Signature: Wayne Durocher Date: _____

Client Sample - Information - Identification
 Matrix Code: DW=Drinking Water GW=Ground Water SW=Surface Water WW=Waste Water
 RW=Raw Water SE=Sediment SL=Sludge S=Soil SD=Solid W=Wipe OIL=Oil
 B=Bulk L=Liquid

Analysis Request
First Draw
Lead + Copper

PHOENIX USE ONLY SAMPLE #	Customer Sample Identification	Sample Matrix	Date Sampled	Time Sampled
RM 23	HESLCO12		5-23	6:30
RM 19	HESLCO15			
RM 3	HESLCO16			
RM 16	HESLCO17			
RM 24	HESLCO18			
RM 5	HESLCO19			
RM 1	HESLCO20			
RM 15	HESLCO22			
RM 25	HESLCO24			
RM 20	HESLCO27			

Relinquished by: [Signature] Accepted by: [Signature]

Date: 5/23/18 Time: 13:23

RI Direct Exposure (Residential)
 GW
 Other

CT RCP Cert
 GW Protection
 SW Protection
 GA Mobility
 GB Mobility
 Residential DEC
 I/C DEC
 Other

MA MCP Certification
 GW-1
 GW-2
 GW-3
 S-1
 S-2
 S-3
 MWRA eSMART
 Other

Data Format
 Excel
 PDF
 GIS/Key
 EQUIS
 Other

Comments, Special Requirements or Regulations:

Turnaround:
 1 Day*
 2 Days*
 3 Days*
 Standard
 Other

State where samples were collected: _____

* SURCHARGE APPLIES



Wednesday, May 30, 2018

Attn: Mr. Wayne Durocher
Hebron Elementary School
92 Church Street
Hebron, CT 06248
PWS #0670112

Project ID: LEAD & COPPER
Sample ID#: CA51990 - CA51999

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. This report is incomplete unless all pages indicated in the pagination at the bottom of the page are included.

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 black ink that reads "Phyllis Shiller". The signature is written in a cursive style.

Phyllis Shiller
Laboratory Director

NELAC - #NY11301
CT Lab Registration #PH-0618
MA Lab Registration #M-CT007
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
UT Lab Registration #CT00007
VT Lab Registration #VT11301



Environmental Laboratories, Inc.
 587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
 Tel. (860) 645-1102 Fax (860) 645-0823

Analysis Report
 May 30, 2018

FOR: Attn: Mr. Wayne Durocher
 Hebron Elementary School
 92 Church Street
 Hebron, CT 06248
 PWS #0670112

Sample Information

Matrix: DRINKING WATER
 Location Code: HEBRON
 Rush Request: Standard
 P.O.#:

Custody Information

Collected by: WD
 Received by: SW
 Analyzed by: see "By" below

Date

05/23/18
 05/23/18

Time

6:30
 13:23

Laboratory Data

SDG ID: GCA51990
 Phoenix ID: CA51990

Project ID: LEAD & COPPER
 Client ID: KITCHEN HES LC 001

Parameter	Result	RL/ PQL	DIL	Units	AL	MCL	MCLG	Date/Time	By	Reference
Copper	0.071	0.002	1	mg/L	1.3			05/25/18	EK	E200.7
Lead	< 0.0010	0.0010	1	mg/L	0.015			05/25/18	EK	E200.5, E200.7
Total Metal Digestion	Completed							05/24/18	AG	E200.5/E200.7

RL/PQL=Reporting/Practical Quantitation Level DIL=Dilution (analysis required diluting to evaluate) ND=Not Detected
 BRL=Below Reporting Level (less than the reporting level, the lowest amount the laboratory can detect and report.)
 AL = Action Level MCL = Maximum Contaminant Level MCLG = Maximum Contaminant Level Goal

Comments:

Maximum Contaminant Level (MCL) (Lower of): 40 CFR Part 141; CT Public Health Code 19-13-B102. The highest level of a contaminant that is allowed in drinking water. MCLs are enforceable standards.

Action Level (AL): 40 CFR Part 141.80.

Secondary DW Maximum Contaminant Level Goal (MCLG): (Lower of): 40 CFR Part 141; 40 CFR Part 143; CT Public Health Code 19-13-B102. The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs are non-enforceable public health goals.

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Phyllis Shiller, Laboratory Director

May 30, 2018

Reviewed and Released by: Deb Lawrie, Project Manager



Environmental Laboratories, Inc.
 587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
 Tel. (860) 645-1102 Fax (860) 645-0823

Analysis Report
 May 30, 2018

FOR: Attn: Mr. Wayne Durocher
 Hebron Elementary School
 92 Church Street
 Hebron, CT 06248
 PWS #0670112

Sample Information

Matrix: DRINKING WATER
 Location Code: HEBRON
 Rush Request: Standard
 P.O.#:

Custody Information

Collected by: WD
 Received by: SW
 Analyzed by: see "By" below

Date

05/23/18
 05/23/18

Time

6:30
 13:23

Laboratory Data

SDG ID: GCA51990
 Phoenix ID: CA51991

Project ID: LEAD & COPPER
 Client ID: RM 22 HES LC 002

Parameter	Result	RL/ PQL	DIL	Units	AL	MCL	MCLG	Date/Time	By	Reference
Copper	0.198	0.002	1	mg/L	1.3			05/25/18	EK	E200.7
Lead	0.0014	0.0010	1	mg/L	0.015			05/25/18	EK	E200.5, E200.7
Total Metal Digestion	Completed							05/24/18	AG	E200.5/E200.7

RL/PQL=Reporting/Practical Quantitation Level DIL=Dilution (analysis required diluting to evaluate) ND=Not Detected
 BRL=Below Reporting Level (less than the reporting level, the lowest amount the laboratory can detect and report.)
 AL = Action Level MCL = Maximum Contaminant Level MCLG = Maximum Contaminant Level Goal

Comments:

Maximum Contaminant Level (MCL) (Lower of): 40 CFR Part 141; CT Public Health Code 19-13-B102. The highest level of a contaminant that is allowed in drinking water. MCLs are enforceable standards.

Action Level (AL): 40 CFR Part 141.80.

Secondary DW Maximum Contaminant Level Goal (MCLG): (Lower of): 40 CFR Part 141; 40 CFR Part 143; CT Public Health Code 19-13-B102. The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs are non-enforceable public health goals.

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Phyllis Shiller, Laboratory Director

May 30, 2018

Reviewed and Released by: Deb Lawrie, Project Manager



Environmental Laboratories, Inc.
 587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
 Tel. (860) 645-1102 Fax (860) 645-0823

Analysis Report
 May 30, 2018

FOR: Attn: Mr. Wayne Durocher
 Hebron Elementary School
 92 Church Street
 Hebron, CT 06248
 PWS #0670112

Sample Information

Matrix: DRINKING WATER
 Location Code: HEBRON
 Rush Request: Standard
 P.O.#:

Custody Information

Collected by: WD
 Received by: SW
 Analyzed by: see "By" below

Date

05/23/18
 05/23/18

Time

6:30
 13:23

Laboratory Data

SDG ID: GCA51990
 Phoenix ID: CA51992

Project ID: LEAD & COPPER
 Client ID: RM 17 HES LC 003

Parameter	Result	RL/ PQL	DIL	Units	AL	MCL	MCLG	Date/Time	By	Reference
Copper	0.266	0.002	1	mg/L	1.3			05/25/18	EK	E200.7
Lead	0.0010	0.0010	1	mg/L	0.015			05/25/18	EK	E200.5, E200.7
Total Metal Digestion	Completed							05/24/18	AG	E200.5/E200.7

RL/PQL=Reporting/Practical Quantitation Level DIL=Dilution (analysis required diluting to evaluate) ND=Not Detected
 BRL=Below Reporting Level (less than the reporting level, the lowest amount the laboratory can detect and report.)
 AL = Action Level MCL = Maximum Contaminant Level MCLG = Maximum Contaminant Level Goal

Comments:

Maximum Contaminant Level (MCL) (Lower of): 40 CFR Part 141; CT Public Health Code 19-13-B102. The highest level of a contaminant that is allowed in drinking water. MCLs are enforceable standards.

Action Level (AL): 40 CFR Part 141.80.

Secondary DW Maximum Contaminant Level Goal (MCLG): (Lower of): 40 CFR Part 141; 40 CFR Part 143; CT Public Health Code 19-13-B102. The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs are non-enforceable public health goals.

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May 30, 2018

Reviewed and Released by: Deb Lawrie, Project Manager



Environmental Laboratories, Inc.
 587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
 Tel. (860) 645-1102 Fax (860) 645-0823

Analysis Report
 May 30, 2018

FOR: Attn: Mr. Wayne Durocher
 Hebron Elementary School
 92 Church Street
 Hebron, CT 06248
 PWS #0670112

Sample Information

Matrix: DRINKING WATER
 Location Code: HEBRON
 Rush Request: Standard
 P.O.#:

Custody Information

Collected by: WD
 Received by: SW
 Analyzed by: see "By" below

Date

05/23/18
 05/23/18

Time

6:30
 13:23

Laboratory Data

SDG ID: GCA51990
 Phoenix ID: CA51993

Project ID: LEAD & COPPER
 Client ID: MEDIA CENTER HES LC 005

Parameter	Result	RL/ PQL	DIL	Units	AL	MCL	MCLG	Date/Time	By	Reference
Copper	0.267	0.002	1	mg/L	1.3			05/25/18	EK	E200.7
Lead	< 0.0010	0.0010	1	mg/L	0.015			05/25/18	EK	E200.5, E200.7
Total Metal Digestion	Completed							05/24/18	AG	E200.5/E200.7

RL/PQL=Reporting/Practical Quantitation Level DIL=Dilution (analysis required diluting to evaluate) ND=Not Detected
 BRL=Below Reporting Level (less than the reporting level, the lowest amount the laboratory can detect and report.)
 AL = Action Level MCL = Maximum Contaminant Level MCLG = Maximum Contaminant Level Goal

Comments:

Maximum Contaminant Level (MCL) (Lower of): 40 CFR Part 141; CT Public Health Code 19-13-B102. The highest level of a contaminant that is allowed in drinking water. MCLs are enforceable standards.

Action Level (AL): 40 CFR Part 141.80.

Secondary DW Maximum Contaminant Level Goal (MCLG): (Lower of): 40 CFR Part 141; 40 CFR Part 143; CT Public Health Code 19-13-B102. The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs are non-enforceable public health goals.

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May 30, 2018

Reviewed and Released by: Deb Lawrie, Project Manager



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 587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
 Tel. (860) 645-1102 Fax (860) 645-0823

Analysis Report
 May 30, 2018

FOR: Attn: Mr. Wayne Durocher
 Hebron Elementary School
 92 Church Street
 Hebron, CT 06248
 PWS #0670112

Sample Information

Matrix: DRINKING WATER
 Location Code: HEBRON
 Rush Request: Standard
 P.O.#:

Custody Information

Collected by: WD
 Received by: SW
 Analyzed by: see "By" below

Date

05/23/18
 05/23/18

Time

6:30
 13:23

Laboratory Data

SDG ID: GCA51990
 Phoenix ID: CA51994

Project ID: LEAD & COPPER
 Client ID: ART ROOM HES LC 006

Parameter	Result	RL/ PQL	DIL	Units	AL	MCL	MCLG	Date/Time	By	Reference
Copper	0.146	0.002	1	mg/L	1.3			05/25/18	EK	E200.7
Lead	< 0.0010	0.0010	1	mg/L	0.015			05/25/18	EK	E200.5, E200.7
Total Metal Digestion	Completed							05/24/18	AG	E200.5/E200.7

RL/PQL=Reporting/Practical Quantitation Level DIL=Dilution (analysis required diluting to evaluate) ND=Not Detected
 BRL=Below Reporting Level (less than the reporting level, the lowest amount the laboratory can detect and report.)
 AL = Action Level MCL = Maximum Contaminant Level MCLG = Maximum Contaminant Level Goal

Comments:

Maximum Contaminant Level (MCL) (Lower of): 40 CFR Part 141; CT Public Health Code 19-13-B102. The highest level of a contaminant that is allowed in drinking water. MCLs are enforceable standards.

Action Level (AL): 40 CFR Part 141.80.

Secondary DW Maximum Contaminant Level Goal (MCLG): (Lower of): 40 CFR Part 141; 40 CFR Part 143; CT Public Health Code 19-13-B102. The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs are non-enforceable public health goals.

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Phyllis Shiller, Laboratory Director

May 30, 2018

Reviewed and Released by: Deb Lawrie, Project Manager



Environmental Laboratories, Inc.
 587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
 Tel. (860) 645-1102 Fax (860) 645-0823

Analysis Report
 May 30, 2018

FOR: Attn: Mr. Wayne Durocher
 Hebron Elementary School
 92 Church Street
 Hebron, CT 06248
 PWS #0670112

Sample Information

Matrix: DRINKING WATER
 Location Code: HEBRON
 Rush Request: Standard
 P.O.#:

Custody Information

Collected by: WD
 Received by: SW
 Analyzed by: see "By" below

Date

05/23/18
 05/23/18

Time

6:30
 13:23

Laboratory Data

SDG ID: GCA51990
 Phoenix ID: CA51995

Project ID: LEAD & COPPER
 Client ID: RM 8 HES LC 007

Parameter	Result	RL/ PQL	DIL	Units	AL	MCL	MCLG	Date/Time	By	Reference
Copper	0.260	0.002	1	mg/L	1.3			05/25/18	EK	E200.7
Lead	< 0.0010	0.0010	1	mg/L	0.015			05/25/18	EK	E200.5, E200.7
Total Metal Digestion	Completed							05/24/18	AG/BF	E200.5/E200.7

RL/PQL=Reporting/Practical Quantitation Level DIL=Dilution (analysis required diluting to evaluate) ND=Not Detected
 BRL=Below Reporting Level (less than the reporting level, the lowest amount the laboratory can detect and report.)
 AL = Action Level MCL = Maximum Contaminant Level MCLG = Maximum Contaminant Level Goal

Comments:

Maximum Contaminant Level (MCL) (Lower of): 40 CFR Part 141; CT Public Health Code 19-13-B102. The highest level of a contaminant that is allowed in drinking water. MCLs are enforceable standards.

Action Level (AL): 40 CFR Part 141.80.

Secondary DW Maximum Contaminant Level Goal (MCLG): (Lower of): 40 CFR Part 141; 40 CFR Part 143; CT Public Health Code 19-13-B102. The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs are non-enforceable public health goals.

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Phyllis Shiller, Laboratory Director

May 30, 2018

Reviewed and Released by: Deb Lawrie, Project Manager



Environmental Laboratories, Inc.
 587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
 Tel. (860) 645-1102 Fax (860) 645-0823

Analysis Report
 May 30, 2018

FOR: Attn: Mr. Wayne Durocher
 Hebron Elementary School
 92 Church Street
 Hebron, CT 06248
 PWS #0670112

Sample Information

Matrix: DRINKING WATER
 Location Code: HEBRON
 Rush Request: Standard
 P.O.#:

Custody Information

Collected by: WD
 Received by: SW
 Analyzed by: see "By" below

Date

05/23/18
 05/23/18

Time

6:30
 13:23

Laboratory Data

SDG ID: GCA51990
 Phoenix ID: CA51996

Project ID: LEAD & COPPER
 Client ID: RM 9 HES LC 008

Parameter	Result	RL/ PQL	DIL	Units	AL	MCL	MCLG	Date/Time	By	Reference
Copper	0.121	0.002	1	mg/L	1.3			05/25/18	EK	E200.7
Lead	< 0.0010	0.0010	1	mg/L	0.015			05/25/18	EK	E200.5, E200.7
Total Metal Digestion	Completed							05/24/18	AG/BF	E200.5/E200.7

RL/PQL=Reporting/Practical Quantitation Level DIL=Dilution (analysis required diluting to evaluate) ND=Not Detected
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 AL = Action Level MCL = Maximum Contaminant Level MCLG = Maximum Contaminant Level Goal

Comments:

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Action Level (AL): 40 CFR Part 141.80.

Secondary DW Maximum Contaminant Level Goal (MCLG): (Lower of): 40 CFR Part 141; 40 CFR Part 143; CT Public Health Code 19-13-B102. The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs are non-enforceable public health goals.

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Phyllis Shiller, Laboratory Director

May 30, 2018

Reviewed and Released by: Deb Lawrie, Project Manager



Environmental Laboratories, Inc.
 587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
 Tel. (860) 645-1102 Fax (860) 645-0823

Analysis Report
 May 30, 2018

FOR: Attn: Mr. Wayne Durocher
 Hebron Elementary School
 92 Church Street
 Hebron, CT 06248
 PWS #0670112

Sample Information

Matrix: DRINKING WATER
 Location Code: HEBRON
 Rush Request: Standard
 P.O.#:

Custody Information

Collected by: WD
 Received by: SW
 Analyzed by: see "By" below

Date

05/23/18
 05/23/18

Time

6:30
 13:23

Laboratory Data

SDG ID: GCA51990
 Phoenix ID: CA51997

Project ID: LEAD & COPPER
 Client ID: RM 14 HES LC 009

Parameter	Result	RL/ PQL	DIL	Units	AL	MCL	MCLG	Date/Time	By	Reference
Copper	0.189	0.002	1	mg/L	1.3			05/25/18	EK	E200.7
Lead	0.0030	0.0010	1	mg/L	0.015			05/25/18	EK	E200.5, E200.7
Total Metal Digestion	Completed							05/24/18	AG/BF	E200.5/E200.7

RL/PQL=Reporting/Practical Quantitation Level DIL=Dilution (analysis required diluting to evaluate) ND=Not Detected
 BRL=Below Reporting Level (less than the reporting level, the lowest amount the laboratory can detect and report.)
 AL = Action Level MCL = Maximum Contaminant Level MCLG = Maximum Contaminant Level Goal

Comments:

Maximum Contaminant Level (MCL) (Lower of): 40 CFR Part 141; CT Public Health Code 19-13-B102. The highest level of a contaminant that is allowed in drinking water. MCLs are enforceable standards.

Action Level (AL): 40 CFR Part 141.80.

Secondary DW Maximum Contaminant Level Goal (MCLG): (Lower of): 40 CFR Part 141; 40 CFR Part 143; CT Public Health Code 19-13-B102. The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs are non-enforceable public health goals.

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Phyllis Shiller, Laboratory Director

May 30, 2018

Reviewed and Released by: Deb Lawrie, Project Manager



Environmental Laboratories, Inc.
 587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
 Tel. (860) 645-1102 Fax (860) 645-0823

Analysis Report
 May 30, 2018

FOR: Attn: Mr. Wayne Durocher
 Hebron Elementary School
 92 Church Street
 Hebron, CT 06248
 PWS #0670112

Sample Information

Matrix: DRINKING WATER
 Location Code: HEBRON
 Rush Request: Standard
 P.O.#:

Custody Information

Collected by: WD
 Received by: SW
 Analyzed by: see "By" below

Date

05/23/18
 05/23/18

Time

6:30
 13:23

Laboratory Data

SDG ID: GCA51990
 Phoenix ID: CA51998

Project ID: LEAD & COPPER
 Client ID: RM 2 HES LC 010

Parameter	Result	RL/ PQL	DIL	Units	AL	MCL	MCLG	Date/Time	By	Reference
Copper	0.188	0.002	1	mg/L	1.3			05/25/18	EK	E200.7
Lead	0.0010	0.0010	1	mg/L	0.015			05/25/18	EK	E200.5, E200.7
Total Metal Digestion	Completed							05/24/18	AG/BF	E200.5/E200.7

RL/PQL=Reporting/Practical Quantitation Level DIL=Dilution (analysis required diluting to evaluate) ND=Not Detected
 BRL=Below Reporting Level (less than the reporting level, the lowest amount the laboratory can detect and report.)
 AL = Action Level MCL = Maximum Contaminant Level MCLG = Maximum Contaminant Level Goal

Comments:

Maximum Contaminant Level (MCL) (Lower of): 40 CFR Part 141; CT Public Health Code 19-13-B102. The highest level of a contaminant that is allowed in drinking water. MCLs are enforceable standards.

Action Level (AL): 40 CFR Part 141.80.

Secondary DW Maximum Contaminant Level Goal (MCLG): (Lower of): 40 CFR Part 141; 40 CFR Part 143; CT Public Health Code 19-13-B102. The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs are non-enforceable public health goals.

If there are any questions regarding this data, please call Phoenix Client Services.
 This report must not be reproduced except in full as defined by the attached chain of custody.

Phyllis Shiller, Laboratory Director

May 30, 2018

Reviewed and Released by: Deb Lawrie, Project Manager



Environmental Laboratories, Inc.
 587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
 Tel. (860) 645-1102 Fax (860) 645-0823

Analysis Report
 May 30, 2018

FOR: Attn: Mr. Wayne Durocher
 Hebron Elementary School
 92 Church Street
 Hebron, CT 06248
 PWS #0670112

Sample Information

Matrix: DRINKING WATER
 Location Code: HEBRON
 Rush Request: Standard
 P.O.#:

Custody Information

Collected by: WD
 Received by: SW
 Analyzed by: see "By" below

Date

05/23/18
 05/23/18

Time

6:30
 13:23

Laboratory Data

SDG ID: GCA51990
 Phoenix ID: CA51999

Project ID: LEAD & COPPER
 Client ID: BAND RM HES LC 011

Parameter	Result	RL/ PQL	DIL	Units	AL	MCL	MCLG	Date/Time	By	Reference
Copper	0.343	0.002	1	mg/L	1.3			05/25/18	EK	E200.7
Lead	0.0056	0.0010	1	mg/L	0.015			05/25/18	EK	E200.5, E200.7
Total Metal Digestion	Completed							05/24/18	AG/BF	E200.5/E200.7

RL/PQL=Reporting/Practical Quantitation Level DIL=Dilution (analysis required diluting to evaluate) ND=Not Detected
 BRL=Below Reporting Level (less than the reporting level, the lowest amount the laboratory can detect and report.)
 AL = Action Level MCL = Maximum Contaminant Level MCLG = Maximum Contaminant Level Goal

Comments:

Maximum Contaminant Level (MCL) (Lower of): 40 CFR Part 141; CT Public Health Code 19-13-B102. The highest level of a contaminant that is allowed in drinking water. MCLs are enforceable standards.

Action Level (AL): 40 CFR Part 141.80.

Secondary DW Maximum Contaminant Level Goal (MCLG): (Lower of): 40 CFR Part 141; 40 CFR Part 143; CT Public Health Code 19-13-B102. The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs are non-enforceable public health goals.

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Phyllis Shiller, Laboratory Director

May 30, 2018

Reviewed and Released by: Deb Lawrie, Project Manager

Wednesday, May 30, 2018

Criteria: CT: DW

State: CT

Sample Criteria Exceedances Report

GCA51990 - HEBRON

SampNo Acode 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.



Environmental Laboratories, Inc.
587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
Tel. (860) 645-1102 Fax (860) 645-0823



Analysis Comments

May 30, 2018

SDG I.D.: GCA51990

The following analysis comments are made regarding exceptions to criteria not already noted in the Analysis Report or QA/QC Report: None.

Coolant: IPK ICE No No

Temp: 90° C, Pg of

Data Delivery/Contact Options:

Fax: 860-228-1106
 Phone: 860-428-4816
 Email: W.Durocher@Hebron.K12.CT.US

CHAIN OF CUSTODY RECORD

587 East Middle Turnpike, P.O. Box 370, Manchester, CT 06040
 Email: info@phoenixlabs.com Fax (860) 645-0823
 Client Services (860) 645-8726



Project: LEAD + COPPER
 Report to: Wayne Durocher
 Invoice to:

Customer: HEBRON ELEMENTARY SCHOOL
 Address: 92 CHURCH STREET
HEBRON CT 06248

This section **MUST** be completed with **Bottle Quantities.**

Client Sample - Information - Identification
 Sampler's Signature: Wayne Durocher Date: 5-23-18

Matrix Code:
 DW=Drinking Water GW=Ground Water SW=Surface Water WW=Waste Water
 RW=Raw Water SE=Sediment SL=Sludge S=Soil SD=Solid W=Wipe OIL=Oil
 B=Bulk L=Liquid

PHOENIX USE ONLY SAMPLE #	Customer Sample Identification	Sample Matrix	Date Sampled	Time Sampled	Analysis Request	RI	CT	MA	Data Format
Kitchen	HESLC001		5-23	1:30 AM	LEAD + COPPER	<input type="checkbox"/> Direct Exposure (Residential) <input type="checkbox"/> GW <input type="checkbox"/> Other	<input type="checkbox"/> RCP Cert <input type="checkbox"/> GW Protection <input type="checkbox"/> SW Protection <input type="checkbox"/> GA Mobility <input type="checkbox"/> GB Mobility <input type="checkbox"/> Residential DEC <input type="checkbox"/> I/C DEC <input type="checkbox"/> Other	<input type="checkbox"/> MCP Certification <input type="checkbox"/> GW-1 <input type="checkbox"/> GW-2 <input type="checkbox"/> GW-3 <input type="checkbox"/> S-1 <input type="checkbox"/> S-2 <input type="checkbox"/> S-3 <input type="checkbox"/> MWRA eSMART <input type="checkbox"/> Other	<input type="checkbox"/> Excel <input type="checkbox"/> PDF <input type="checkbox"/> GIS/Key <input type="checkbox"/> EQUIS <input type="checkbox"/> Other Data Package <input type="checkbox"/> Tier II Checklist <input type="checkbox"/> Full Data Package* <input type="checkbox"/> Phoenix Std Report <input type="checkbox"/> Other
Rm 22	HESLC002								
Rm 17	HESLC003								
media center	HESLC004								
ART ROOM	HESLC006								
Rm 8	HESLC007								
Rm 9	HESLC008								
Rm 14	HESLC009								
Rm 2	HESLC010								
BAND ROOM	HESLC011								

Relinquished by: Wayne Durocher Accepted by: [Signature]

Date: 5/23/18 Time: 13:23

Comments, Special Requirements or Regulations:

Turnaround:
 1 Day*
 2 Days*
 3 Days*
 Standard
 Other
 * SURCHARGE APPLIES

State where samples were collected: _____

* SURCHARGE APPLIES



Thursday, March 22, 2018

Attn: Mr. Wayne Durocher
Hebron Elementary School
92 Church Street
Hebron, CT 06248
PWS #0670112

Project ID: LEAD & COPPER IN HOUSE ONLY
Sample ID#: CA03846 - CA03852

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. This report is incomplete unless all pages indicated in the pagination at the bottom of the page are included.

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 black ink that reads "Phyllis Shiller". The signature is fluid and cursive, with the first name "Phyllis" being larger and more prominent than the last name "Shiller".

Phyllis Shiller
Laboratory Director

NELAC - #NY11301
CT Lab Registration #PH-0618
MA Lab Registration #M-CT007
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
UT Lab Registration #CT00007
VT Lab Registration #VT11301



Environmental Laboratories, Inc.
 587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
 Tel. (860) 645-1102 Fax (860) 645-0823

Analysis Report
 March 22, 2018

FOR: Attn: Mr. Wayne Durocher
 Hebron Elementary School
 92 Church Street
 Hebron, CT 06248
 PWS #0670112

Sample Information

Matrix: DRINKING WATER
 Location Code: HEBRON
 Rush Request: Standard
 P.O.#:

Custody Information

Collected by: WD
 Received by: CP
 Analyzed by: see "By" below

Date

03/16/18
 03/16/18

Time

7:30
 11:51

Laboratory Data

SDG ID: GCA03846
 Phoenix ID: CA03846

Project ID: LEAD & COPPER IN HOUSE ONLY
 Client ID: RM 2 HESLC 010

Parameter	Result	RL/ PQL	DIL	Units	AL	MCL	MCLG	Date/Time	By	Reference
Copper	0.084	0.002	1	mg/L	1.3			03/20/18	EK	E200.7
Lead	0.0021	0.0010	1	mg/L	0.015			03/20/18	EK	E200.5
Total Metal Digestion	Completed							03/19/18	CB/CB	E200.5/E200.7

RL/PQL=Reporting/Practical Quantitation Level DIL=Dilution (analysis required diluting to evaluate) ND=Not Detected
 BRL=Below Reporting Level (less than the reporting level, the lowest amount the laboratory can detect and report.)
 AL = Action Level MCL = Maximum Contaminant Level MCLG = Maximum Contaminant Level Goal

Comments:

Maximum Contaminant Level (MCL) (Lower of): 40 CFR Part 141; CT Public Health Code 19-13-B102. The highest level of a contaminant that is allowed in drinking water. MCLs are enforceable standards.

Action Level (AL): 40 CFR Part 141.80.

Secondary DW Maximum Contaminant Level Goal (MCLG): (Lower of): 40 CFR Part 141; 40 CFR Part 143; CT Public Health Code 19-13-B102. The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs are non-enforceable public health goals.

If there are any questions regarding this data, please call Phoenix Client Services.
 This report must not be reproduced except in full as defined by the attached chain of custody.

Phyllis Shiller, Laboratory Director

March 22, 2018

Reviewed and Released by: Deb Lawrie, Project Manager



Environmental Laboratories, Inc.
 587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
 Tel. (860) 645-1102 Fax (860) 645-0823

Analysis Report
 March 22, 2018

FOR: Attn: Mr. Wayne Durocher
 Hebron Elementary School
 92 Church Street
 Hebron, CT 06248
 PWS #0670112

Sample Information

Matrix: DRINKING WATER
 Location Code: HEBRON
 Rush Request: Standard
 P.O.#:

Custody Information

Collected by: WD
 Received by: CP
 Analyzed by: see "By" below

Date

03/16/18
 03/16/18

Time

7:30
 11:51

Laboratory Data

SDG ID: GCA03846
 Phoenix ID: CA03847

Project ID: LEAD & COPPER IN HOUSE ONLY
 Client ID: RM 3 HESLC 016

Parameter	Result	RL/ PQL	DIL	Units	AL	MCL	MCLG	Date/Time	By	Reference
Copper	0.210	0.002	1	mg/L	1.3			03/20/18	EK	E200.7
Lead	0.0019	0.0010	1	mg/L	0.015			03/20/18	EK	E200.5
Total Metal Digestion	Completed							03/19/18	CB/CB	E200.5/E200.7

RL/PQL=Reporting/Practical Quantitation Level DIL=Dilution (analysis required diluting to evaluate) ND=Not Detected
 BRL=Below Reporting Level (less than the reporting level, the lowest amount the laboratory can detect and report.)
 AL = Action Level MCL = Maximum Contaminant Level MCLG = Maximum Contaminant Level Goal

Comments:

Maximum Contaminant Level (MCL) (Lower of): 40 CFR Part 141; CT Public Health Code 19-13-B102. The highest level of a contaminant that is allowed in drinking water. MCLs are enforceable standards.

Action Level (AL): 40 CFR Part 141.80.

Secondary DW Maximum Contaminant Level Goal (MCLG): (Lower of): 40 CFR Part 141; 40 CFR Part 143; CT Public Health Code 19-13-B102. The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs are non-enforceable public health goals.

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Phyllis Shiller, Laboratory Director

March 22, 2018

Reviewed and Released by: Deb Lawrie, Project Manager



Environmental Laboratories, Inc.
 587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
 Tel. (860) 645-1102 Fax (860) 645-0823

Analysis Report
 March 22, 2018

FOR: Attn: Mr. Wayne Durocher
 Hebron Elementary School
 92 Church Street
 Hebron, CT 06248
 PWS #0670112

<u>Sample Information</u>		<u>Custody Information</u>		<u>Date</u>	<u>Time</u>
Matrix:	DRINKING WATER	Collected by:	WD	03/16/18	7:30
Location Code:	HEBRON	Received by:	CP	03/16/18	11:51
Rush Request:	Standard	Analyzed by:	see "By" below		
P.O.#:					

Laboratory Data

SDG ID: GCA03846
 Phoenix ID: CA03848

Project ID: LEAD & COPPER IN HOUSE ONLY
 Client ID: RM 8 HESLC 007

Parameter	Result	RL/ PQL	DIL	Units	AL	MCL	MCLG	Date/Time	By	Reference
Copper	0.238	0.002	1	mg/L	1.3			03/20/18	EK	E200.7
Lead	< 0.0010	0.0010	1	mg/L	0.015			03/20/18	EK	E200.5
Total Metal Digestion	Completed							03/19/18	CB/CB	E200.5/E200.7

RL/PQL=Reporting/Practical Quantitation Level DIL=Dilution (analysis required diluting to evaluate) ND=Not Detected
 BRL=Below Reporting Level (less than the reporting level, the lowest amount the laboratory can detect and report.)
 AL = Action Level MCL = Maximum Contaminant Level MCLG = Maximum Contaminant Level Goal

Comments:

Maximum Contaminant Level (MCL) (Lower of): 40 CFR Part 141; CT Public Health Code 19-13-B102. The highest level of a contaminant that is allowed in drinking water. MCLs are enforceable standards.

Action Level (AL): 40 CFR Part 141.80.

Secondary DW Maximum Contaminant Level Goal (MCLG): (Lower of): 40 CFR Part 141; 40 CFR Part 143; CT Public Health Code 19-13-B102. The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs are non-enforceable public health goals.

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Phyllis Shiller, Laboratory Director

March 22, 2018

Reviewed and Released by: Deb Lawrie, Project Manager



Environmental Laboratories, Inc.
 587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
 Tel. (860) 645-1102 Fax (860) 645-0823

Analysis Report
 March 22, 2018

FOR: Attn: Mr. Wayne Durocher
 Hebron Elementary School
 92 Church Street
 Hebron, CT 06248
 PWS #0670112

Sample Information

Matrix: DRINKING WATER
 Location Code: HEBRON
 Rush Request: Standard
 P.O.#:

Custody Information

Collected by: WD
 Received by: CP
 Analyzed by: see "By" below

Date

03/16/18
 03/16/18

Time

7:30
 11:51

Laboratory Data

SDG ID: GCA03846
 Phoenix ID: CA03849

Project ID: LEAD & COPPER IN HOUSE ONLY
 Client ID: RM10 HESLC 017

Parameter	Result	RL/ PQL	DIL	Units	AL	MCL	MCLG	Date/Time	By	Reference
Copper	0.043	0.002	1	mg/L	1.3			03/20/18	EK	E200.7
Lead	< 0.0010	0.0010	1	mg/L	0.015			03/20/18	EK	E200.5
Total Metal Digestion	Completed							03/19/18	CB/CB	E200.5/E200.7

RL/PQL=Reporting/Practical Quantitation Level DIL=Dilution (analysis required diluting to evaluate) ND=Not Detected
 BRL=Below Reporting Level (less than the reporting level, the lowest amount the laboratory can detect and report.)
 AL = Action Level MCL = Maximum Contaminant Level MCLG = Maximum Contaminant Level Goal

Comments:

Maximum Contaminant Level (MCL) (Lower of): 40 CFR Part 141; CT Public Health Code 19-13-B102. The highest level of a contaminant that is allowed in drinking water. MCLs are enforceable standards.

Action Level (AL): 40 CFR Part 141.80.

Secondary DW Maximum Contaminant Level Goal (MCLG): (Lower of): 40 CFR Part 141; 40 CFR Part 143; CT Public Health Code 19-13-B102. The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs are non-enforceable public health goals.

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Phyllis Shiller, Laboratory Director

March 22, 2018

Reviewed and Released by: Deb Lawrie, Project Manager



Environmental Laboratories, Inc.
 587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
 Tel. (860) 645-1102 Fax (860) 645-0823

Analysis Report
 March 22, 2018

FOR: Attn: Mr. Wayne Durocher
 Hebron Elementary School
 92 Church Street
 Hebron, CT 06248
 PWS #0670112

<u>Sample Information</u>		<u>Custody Information</u>		<u>Date</u>	<u>Time</u>
Matrix:	DRINKING WATER	Collected by:	WD	03/16/18	7:30
Location Code:	HEBRON	Received by:	CP	03/16/18	11:51
Rush Request:	Standard	Analyzed by:	see "By" below		
P.O.#:					

Laboratory Data

SDG ID: GCA03846
 Phoenix ID: CA03850

Project ID: LEAD & COPPER IN HOUSE ONLY
 Client ID: RM14 HESLC 009

Parameter	Result	RL/ PQL	DIL	Units	AL	MCL	MCLG	Date/Time	By	Reference
Copper	0.111	0.002	1	mg/L	1.3			03/20/18	EK	E200.7
Lead	< 0.0010	0.0010	1	mg/L	0.015			03/20/18	EK	E200.5
Total Metal Digestion	Completed							03/19/18	CB/CB	E200.5/E200.7

RL/PQL=Reporting/Practical Quantitation Level DIL=Dilution (analysis required diluting to evaluate) ND=Not Detected
 BRL=Below Reporting Level (less than the reporting level, the lowest amount the laboratory can detect and report.)
 AL = Action Level MCL = Maximum Contaminant Level MCLG = Maximum Contaminant Level Goal

Comments:

Maximum Contaminant Level (MCL) (Lower of): 40 CFR Part 141; CT Public Health Code 19-13-B102. The highest level of a contaminant that is allowed in drinking water. MCLs are enforceable standards.

Action Level (AL): 40 CFR Part 141.80.

Secondary DW Maximum Contaminant Level Goal (MCLG): (Lower of): 40 CFR Part 141; 40 CFR Part 143; CT Public Health Code 19-13-B102. The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs are non-enforceable public health goals.

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Phyllis Shiller, Laboratory Director

March 22, 2018

Reviewed and Released by: Deb Lawrie, Project Manager



Environmental Laboratories, Inc.
 587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
 Tel. (860) 645-1102 Fax (860) 645-0823

Analysis Report
 March 22, 2018

FOR: Attn: Mr. Wayne Durocher
 Hebron Elementary School
 92 Church Street
 Hebron, CT 06248
 PWS #0670112

Sample Information

Matrix: DRINKING WATER
 Location Code: HEBRON
 Rush Request: Standard
 P.O.#:

Custody Information

Collected by: WD
 Received by: CP
 Analyzed by: see "By" below

Date

03/16/18
 03/16/18

Time

7:30
 11:51

Laboratory Data

SDG ID: GCA03846
 Phoenix ID: CA03851

Project ID: LEAD & COPPER IN HOUSE ONLY
 Client ID: RM15 HESLC 022

Parameter	Result	RL/ PQL	DIL	Units	AL	MCL	MCLG	Date/Time	By	Reference
Copper	0.062	0.002	1	mg/L	1.3			03/20/18	EK	E200.7
Lead	0.0018	0.0010	1	mg/L	0.015			03/20/18	EK	E200.5
Total Metal Digestion	Completed							03/19/18	CB/CB	E200.5/E200.7

RL/PQL=Reporting/Practical Quantitation Level DIL=Dilution (analysis required diluting to evaluate) ND=Not Detected
 BRL=Below Reporting Level (less than the reporting level, the lowest amount the laboratory can detect and report.)
 AL = Action Level MCL = Maximum Contaminant Level MCLG = Maximum Contaminant Level Goal

Comments:

Maximum Contaminant Level (MCL) (Lower of): 40 CFR Part 141; CT Public Health Code 19-13-B102. The highest level of a contaminant that is allowed in drinking water. MCLs are enforceable standards.

Action Level (AL): 40 CFR Part 141.80.

Secondary DW Maximum Contaminant Level Goal (MCLG): (Lower of): 40 CFR Part 141; 40 CFR Part 143; CT Public Health Code 19-13-B102. The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs are non-enforceable public health goals.

If there are any questions regarding this data, please call Phoenix Client Services.
 This report must not be reproduced except in full as defined by the attached chain of custody.

Phyllis Shiller, Laboratory Director

March 22, 2018

Reviewed and Released by: Deb Lawrie, Project Manager



Environmental Laboratories, Inc.
 587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
 Tel. (860) 645-1102 Fax (860) 645-0823

Analysis Report
 March 22, 2018

FOR: Attn: Mr. Wayne Durocher
 Hebron Elementary School
 92 Church Street
 Hebron, CT 06248
 PWS #0670112

Sample Information

Matrix: DRINKING WATER
 Location Code: HEBRON
 Rush Request: Standard
 P.O.#:

Custody Information

Collected by: WD
 Received by: CP
 Analyzed by: see "By" below

Date

03/16/18
 03/16/18

Time

7:30
 11:51

Laboratory Data

SDG ID: GCA03846
 Phoenix ID: CA03852

Project ID: LEAD & COPPER IN HOUSE ONLY
 Client ID: RM25 HESLC 024

Parameter	Result	RL/ PQL	DIL	Units	AL	MCL	MCLG	Date/Time	By	Reference
Copper	0.055	0.002	1	mg/L	1.3			03/20/18	MA	E200.7
Lead	< 0.0010	0.0010	1	mg/L	0.015			03/20/18	MA	E200.5
Total Metal Digestion	Completed							03/19/18	CB/CB	E200.5/E200.7

RL/PQL=Reporting/Practical Quantitation Level DIL=Dilution (analysis required diluting to evaluate) ND=Not Detected
 BRL=Below Reporting Level (less than the reporting level, the lowest amount the laboratory can detect and report.)
 AL = Action Level MCL = Maximum Contaminant Level MCLG = Maximum Contaminant Level Goal

Comments:

Maximum Contaminant Level (MCL) (Lower of): 40 CFR Part 141; CT Public Health Code 19-13-B102. The highest level of a contaminant that is allowed in drinking water. MCLs are enforceable standards.

Action Level (AL): 40 CFR Part 141.80.

Secondary DW Maximum Contaminant Level Goal (MCLG): (Lower of): 40 CFR Part 141; 40 CFR Part 143; CT Public Health Code 19-13-B102. The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs are non-enforceable public health goals.

If there are any questions regarding this data, please call Phoenix Client Services.
 This report must not be reproduced except in full as defined by the attached chain of custody.

Phyllis Shiller, Laboratory Director

March 22, 2018

Reviewed and Released by: Deb Lawrie, Project Manager



Environmental Laboratories, Inc.
587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
Tel. (860) 645-1102 Fax (860) 645-0823



Analysis Comments

March 22, 2018

SDG I.D.: GCA03846

The following analysis comments are made regarding exceptions to criteria not already noted in the Analysis Report or QA/QC Report: None.



Friday, February 02, 2018

Attn: Mr. Wayne Durocher
Hebron Elementary School
92 Church Street
Hebron, CT 06248
PWS #0670112

Project ID:
Sample ID#: BZ82324 - BZ82330

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. This report is incomplete unless all pages indicated in the pagination at the bottom of the page are included.

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 black ink that reads "Phyllis Shiller". The signature is fluid and cursive, with the first name being more prominent.

Phyllis Shiller
Laboratory Director

NELAC - #NY11301
CT Lab Registration #PH-0618
MA Lab Registration #M-CT007
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
UT Lab Registration #CT00007
VT Lab Registration #VT11301



Environmental Laboratories, Inc.
 587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
 Tel. (860) 645-1102 Fax (860) 645-0823

Analysis Report
 February 02, 2018

FOR: Attn: Mr. Wayne Durocher
 Hebron Elementary School
 92 Church Street
 Hebron, CT 06248
 PWS #0670112

<u>Sample Information</u>		<u>Custody Information</u>		<u>Date</u>	<u>Time</u>
Matrix:	DRINKING WATER	Collected by:	WD	01/31/18	7:30
Location Code:	HEBRON	Received by:	LB	01/31/18	10:03
Rush Request:	48 Hour	Analyzed by:	see "By" below		
P.O.#:					

Laboratory Data

SDG ID: GBZ82324
 Phoenix ID: BZ82324

Project ID:
 Client ID: HESLC010 RM 2 SECOND DRAW

Parameter	Result	RL/ PQL	DIL	Units	AL	MCL	MCLG	Date/Time	By	Reference
Copper	0.193	0.050	10	mg/L	1.3			02/02/18	CPP	200.8-5.4
Lead	0.0062	0.0005	1	mg/L	0.015			02/02/18	CPP	200.8-5.4
Potable Water Digestion	Completed							02/01/18		E200.8

RL/PQL=Reporting/Practical Quantitation Level DIL=Dilution (analysis required diluting to evaluate) ND=Not Detected
 BRL=Below Reporting Level (less than the reporting level, the lowest amount the laboratory can detect and report.)
 AL = Action Level MCL = Maximum Contaminant Level MCLG = Maximum Contaminant Level Goal

Comments:

Maximum Contaminant Level (MCL) (Lower of): 40 CFR Part 141; CT Public Health Code 19-13-B102. The highest level of a contaminant that is allowed in drinking water. MCLs are enforceable standards.

Action Level (AL): 40 CFR Part 141.80.

Secondary DW Maximum Contaminant Level Goal (MCLG): (Lower of): 40 CFR Part 141; 40 CFR Part 143; CT Public Health Code 19-13-B102. The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs are non-enforceable public health goals.

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Phyllis Shiller, Laboratory Director
 February 02, 2018

Reviewed and Released by: Deb Lawrie, Project Manager



Environmental Laboratories, Inc.
 587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
 Tel. (860) 645-1102 Fax (860) 645-0823

Analysis Report
 February 02, 2018

FOR: Attn: Mr. Wayne Durocher
 Hebron Elementary School
 92 Church Street
 Hebron, CT 06248
 PWS #0670112

Sample Information

Matrix: DRINKING WATER
 Location Code: HEBRON
 Rush Request: 48 Hour
 P.O.#:

Custody Information

Collected by: WD
 Received by: LB
 Analyzed by: see "By" below

Date

01/31/18
 01/31/18

Time

7:30
 10:03

Laboratory Data

SDG ID: GBZ82324
 Phoenix ID: BZ82325

Project ID:
 Client ID: HESLC016 RM 3 SECOND DRAW

Parameter	Result	RL/ PQL	DIL	Units	AL	MCL	MCLG	Date/Time	By	Reference
Copper	0.143	0.050	10	mg/L	1.3			02/02/18	CPP	200.8-5.4
Lead	0.0016	0.0005	1	mg/L	0.015			02/02/18	CPP	200.8-5.4
Potable Water Digestion	Completed							02/01/18		E200.8

RL/PQL=Reporting/Practical Quantitation Level DIL=Dilution (analysis required diluting to evaluate) ND=Not Detected
 BRL=Below Reporting Level (less than the reporting level, the lowest amount the laboratory can detect and report.)
 AL = Action Level MCL = Maximum Contaminant Level MCLG = Maximum Contaminant Level Goal

Comments:

Maximum Contaminant Level (MCL) (Lower of): 40 CFR Part 141; CT Public Health Code 19-13-B102. The highest level of a contaminant that is allowed in drinking water. MCLs are enforceable standards.

Action Level (AL): 40 CFR Part 141.80.

Secondary DW Maximum Contaminant Level Goal (MCLG): (Lower of): 40 CFR Part 141; 40 CFR Part 143; CT Public Health Code 19-13-B102. The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs are non-enforceable public health goals.

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Phyllis Shiller, Laboratory Director
 February 02, 2018

Reviewed and Released by: Deb Lawrie, Project Manager



Environmental Laboratories, Inc.
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 Tel. (860) 645-1102 Fax (860) 645-0823

Analysis Report
 February 02, 2018

FOR: Attn: Mr. Wayne Durocher
 Hebron Elementary School
 92 Church Street
 Hebron, CT 06248
 PWS #0670112

Sample Information

Matrix: DRINKING WATER
 Location Code: HEBRON
 Rush Request: 48 Hour
 P.O.#:

Custody Information

Collected by: WD
 Received by: LB
 Analyzed by: see "By" below

Date

01/31/18
 01/31/18

Time

7:30
 10:03

Laboratory Data

SDG ID: GBZ82324
 Phoenix ID: BZ82326

Project ID:
 Client ID: HESLC007 RM 8 SECOND DRAW

Parameter	Result	RL/ PQL	DIL	Units	AL	MCL	MCLG	Date/Time	By	Reference
Copper	0.145	0.050	10	mg/L	1.3			02/02/18	CPP	200.8-5.4
Lead	0.0015	0.0005	1	mg/L	0.015			02/02/18	CPP	200.8-5.4
Potable Water Digestion	Completed							02/01/18		E200.8

RL/PQL=Reporting/Practical Quantitation Level DIL=Dilution (analysis required diluting to evaluate) ND=Not Detected
 BRL=Below Reporting Level (less than the reporting level, the lowest amount the laboratory can detect and report.)
 AL = Action Level MCL = Maximum Contaminant Level MCLG = Maximum Contaminant Level Goal

Comments:

Maximum Contaminant Level (MCL) (Lower of): 40 CFR Part 141; CT Public Health Code 19-13-B102. The highest level of a contaminant that is allowed in drinking water. MCLs are enforceable standards.

Action Level (AL): 40 CFR Part 141.80.

Secondary DW Maximum Contaminant Level Goal (MCLG): (Lower of): 40 CFR Part 141; 40 CFR Part 143; CT Public Health Code 19-13-B102. The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs are non-enforceable public health goals.

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Phyllis Shiller, Laboratory Director
 February 02, 2018

Reviewed and Released by: Deb Lawrie, Project Manager



Environmental Laboratories, Inc.
 587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
 Tel. (860) 645-1102 Fax (860) 645-0823

Analysis Report
 February 02, 2018

FOR: Attn: Mr. Wayne Durocher
 Hebron Elementary School
 92 Church Street
 Hebron, CT 06248
 PWS #0670112

<u>Sample Information</u>		<u>Custody Information</u>		<u>Date</u>	<u>Time</u>
Matrix:	DRINKING WATER	Collected by:	WD	01/31/18	7:30
Location Code:	HEBRON	Received by:	LB	01/31/18	10:03
Rush Request:	48 Hour	Analyzed by:	see "By" below		
P.O.#:					

Laboratory Data

SDG ID: GBZ82324
 Phoenix ID: BZ82327

Project ID:
 Client ID: HESLC017 RM 10 SECOND DRAW

Parameter	Result	RL/ PQL	DIL	Units	AL	MCL	MCLG	Date/Time	By	Reference
Copper	0.053	0.005	1	mg/L	1.3			02/02/18	CPP	200.8-5.4
Lead	0.0024	0.0005	1	mg/L	0.015			02/02/18	CPP	200.8-5.4
Potable Water Digestion	Completed							02/01/18		E200.8

RL/PQL=Reporting/Practical Quantitation Level DIL=Dilution (analysis required diluting to evaluate) ND=Not Detected
 BRL=Below Reporting Level (less than the reporting level, the lowest amount the laboratory can detect and report.)
 AL = Action Level MCL = Maximum Contaminant Level MCLG = Maximum Contaminant Level Goal

Comments:

Maximum Contaminant Level (MCL) (Lower of): 40 CFR Part 141; CT Public Health Code 19-13-B102. The highest level of a contaminant that is allowed in drinking water. MCLs are enforceable standards.

Action Level (AL): 40 CFR Part 141.80.

Secondary DW Maximum Contaminant Level Goal (MCLG): (Lower of): 40 CFR Part 141; 40 CFR Part 143; CT Public Health Code 19-13-B102. The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs are non-enforceable public health goals.

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Phyllis Shiller, Laboratory Director
 February 02, 2018

Reviewed and Released by: Deb Lawrie, Project Manager



Environmental Laboratories, Inc.
 587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
 Tel. (860) 645-1102 Fax (860) 645-0823

Analysis Report
 February 02, 2018

FOR: Attn: Mr. Wayne Durocher
 Hebron Elementary School
 92 Church Street
 Hebron, CT 06248
 PWS #0670112

Sample Information

Matrix: DRINKING WATER
 Location Code: HEBRON
 Rush Request: 48 Hour
 P.O.#:

Custody Information

Collected by: WD
 Received by: LB
 Analyzed by: see "By" below

Date

01/31/18
 01/31/18

Time

7:30
 10:03

Laboratory Data

SDG ID: GBZ82324
 Phoenix ID: BZ82328

Project ID:
 Client ID: HESLC009 RM 14 SECOND DRAW

Parameter	Result	RL/ PQL	DIL	Units	AL	MCL	MCLG	Date/Time	By	Reference
Copper	0.196	0.050	10	mg/L	1.3			02/02/18	CPP	200.8-5.4
Lead	0.0026	0.0005	1	mg/L	0.015			02/02/18	CPP	200.8-5.4
Potable Water Digestion	Completed							02/01/18		E200.8

RL/PQL=Reporting/Practical Quantitation Level DIL=Dilution (analysis required diluting to evaluate) ND=Not Detected
 BRL=Below Reporting Level (less than the reporting level, the lowest amount the laboratory can detect and report.)
 AL = Action Level MCL = Maximum Contaminant Level MCLG = Maximum Contaminant Level Goal

Comments:

Maximum Contaminant Level (MCL) (Lower of): 40 CFR Part 141; CT Public Health Code 19-13-B102. The highest level of a contaminant that is allowed in drinking water. MCLs are enforceable standards.

Action Level (AL): 40 CFR Part 141.80.

Secondary DW Maximum Contaminant Level Goal (MCLG): (Lower of): 40 CFR Part 141; 40 CFR Part 143; CT Public Health Code 19-13-B102. The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs are non-enforceable public health goals.

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Phyllis Shiller, Laboratory Director
 February 02, 2018

Reviewed and Released by: Deb Lawrie, Project Manager



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 Tel. (860) 645-1102 Fax (860) 645-0823

Analysis Report
 February 02, 2018

FOR: Attn: Mr. Wayne Durocher
 Hebron Elementary School
 92 Church Street
 Hebron, CT 06248
 PWS #0670112

Sample Information

Matrix: DRINKING WATER
 Location Code: HEBRON
 Rush Request: 48 Hour
 P.O.#:

Custody Information

Collected by: WD
 Received by: LB
 Analyzed by: see "By" below

Date

01/31/18
 01/31/18

Time

7:30
 10:03

Laboratory Data

SDG ID: GBZ82324
 Phoenix ID: BZ82329

Project ID:
 Client ID: HESLC022 RM 15 SECOND DRAW

Parameter	Result	RL/ PQL	DIL	Units	AL	MCL	MCLG	Date/Time	By	Reference
Copper	0.142	0.050	10	mg/L	1.3			02/02/18	CPP	200.8-5.4
Lead	0.0040	0.0005	1	mg/L	0.015			02/02/18	CPP	200.8-5.4
Potable Water Digestion	Completed							02/01/18		E200.8

RL/PQL=Reporting/Practical Quantitation Level DIL=Dilution (analysis required diluting to evaluate) ND=Not Detected
 BRL=Below Reporting Level (less than the reporting level, the lowest amount the laboratory can detect and report.)
 AL = Action Level MCL = Maximum Contaminant Level MCLG = Maximum Contaminant Level Goal

Comments:

Maximum Contaminant Level (MCL) (Lower of): 40 CFR Part 141; CT Public Health Code 19-13-B102. The highest level of a contaminant that is allowed in drinking water. MCLs are enforceable standards.

Action Level (AL): 40 CFR Part 141.80.

Secondary DW Maximum Contaminant Level Goal (MCLG): (Lower of): 40 CFR Part 141; 40 CFR Part 143; CT Public Health Code 19-13-B102. The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs are non-enforceable public health goals.

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Phyllis Shiller, Laboratory Director
 February 02, 2018

Reviewed and Released by: Deb Lawrie, Project Manager



Environmental Laboratories, Inc.
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 Tel. (860) 645-1102 Fax (860) 645-0823

Analysis Report
 February 02, 2018

FOR: Attn: Mr. Wayne Durocher
 Hebron Elementary School
 92 Church Street
 Hebron, CT 06248
 PWS #0670112

<u>Sample Information</u>		<u>Custody Information</u>		<u>Date</u>	<u>Time</u>
Matrix:	DRINKING WATER	Collected by:	WD	01/31/18	7:30
Location Code:	HEBRON	Received by:	LB	01/31/18	10:03
Rush Request:	48 Hour	Analyzed by:	see "By" below		
P.O.#:					

Laboratory Data

SDG ID: GBZ82324
 Phoenix ID: BZ82330

Project ID:
 Client ID: HESLC024 RM 25 SECOND DRAW

Parameter	Result	RL/ PQL	DIL	Units	AL	MCL	MCLG	Date/Time	By	Reference
Copper	0.062	0.005	1	mg/L	1.3			02/02/18	CPP	200.8-5.4
Lead	< 0.0005	0.0005	1	mg/L	0.015			02/02/18	CPP	200.8-5.4
Potable Water Digestion	Completed							02/01/18		E200.8

RL/PQL=Reporting/Practical Quantitation Level DIL=Dilution (analysis required diluting to evaluate) ND=Not Detected
 BRL=Below Reporting Level (less than the reporting level, the lowest amount the laboratory can detect and report.)
 AL = Action Level MCL = Maximum Contaminant Level MCLG = Maximum Contaminant Level Goal

Comments:

Maximum Contaminant Level (MCL) (Lower of): 40 CFR Part 141; CT Public Health Code 19-13-B102. The highest level of a contaminant that is allowed in drinking water. MCLs are enforceable standards.

Action Level (AL): 40 CFR Part 141.80.

Secondary DW Maximum Contaminant Level Goal (MCLG): (Lower of): 40 CFR Part 141; 40 CFR Part 143; CT Public Health Code 19-13-B102. The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs are non-enforceable public health goals.

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Phyllis Shiller, Laboratory Director

February 02, 2018

Reviewed and Released by: Deb Lawrie, Project Manager

Friday, February 02, 2018

Criteria: CT: DW

State: CT

SampNo Acode Phoenix Analyte

Sample Criteria Exceedances Report

GBZ82324 - HEBRON

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.



Environmental Laboratories, Inc.
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Tel. (860) 645-1102 Fax (860) 645-0823



Analysis Comments

February 02, 2018

SDG I.D.: GBZ82324

The following analysis comments are made regarding exceptions to criteria not already noted in the Analysis Report or QA/QC Report: None.

Cooler: Yes No
 Coolant: IPK ICE No
 Temp 17.5 Pg of

CHAIN OF CUSTODY RECORD



587 East Middle Turnpike, P.O. Box 370, Manchester, CT 06040
 Email: info@phoenixlabs.com Fax (860) 645-0823
 Client Services (860) 645-8726

Data Delivery:
 Fax #:
 Email: us.duracher@phoenixlabs.com

Customer: Hegron Elementary School
 Address: 92 Church Street
Hegron CT 06248

Project: Report to: Wayne Duracher and Brendan Rowley
 Invoice to: @Hungerford-CT.com
 Phone #:
 Fax #:

This section MUST be completed with Bottle Quantities.

Sampler's Signature: Wayne Duracher Date: 1-31-18

Client Sample - Information - Identification
 Matrix Code: DW=Drinking Water GW=Ground Water SW=Surface Water WW=Waste Water
 RW=Raw Water SE=Sediment SL=Sludge S=Soil SD=Solid W=Wipe
 OIL=Oil B=Bulk L=Liquid

PHOENIX USE ONLY SAMPLE #	Customer Sample Identification	Sample Matrix	Date Sampled	Time Sampled
HESL0010	RM2 SECOND DRAW		1-31-18	7:30AM
HESL0016	RM3 SECOND DRAW			
HESL0007	RM8 SECOND DRAW			
HESL0017	RM10 SECOND DRAW			
HESL0009	RM14 SECOND DRAW			
HESL0022	RM15 SECOND DRAW			
HESL0024	RM25 SECOND DRAW			

Analysis Request

Handwritten: Lead + Copper

Soil VOA Vial [methanol] 1oz	<input checked="" type="checkbox"/>	GI Amber 1000ml [As Is] [HCl]	<input checked="" type="checkbox"/>	PL H2SO4 [1250ml] [As Is] [HCl]	<input checked="" type="checkbox"/>	PL HNO3 250ml [1500ml] [1900ml]	<input checked="" type="checkbox"/>	Bacteria (as Is)	<input checked="" type="checkbox"/>
GI Soil container	<input checked="" type="checkbox"/>	GI Amber 1000ml [As Is] [HCl]	<input checked="" type="checkbox"/>	PL H2SO4 [1250ml] [As Is] [HCl]	<input checked="" type="checkbox"/>	PL HNO3 250ml [1500ml] [1900ml]	<input checked="" type="checkbox"/>	Bacteria (as Is)	<input checked="" type="checkbox"/>

82324	82325	82326	82327	82328	82329	82330
-------	-------	-------	-------	-------	-------	-------

Relinquished by: Wayne Duracher Accepted by: [Signature]
 Date: 1-31-18 Time: 10:03
 Turnaround:
 1 Day*
 2 Days*
 3 Days*
 Standard
 Other
 * SURCHARGE APPLIES
 Comments, Special Requirements or Regulations:
-18 hr Turn AROUND PLEASE

State where samples were collected: _____

RI Direct Exposure (Residential)
 GW
 Other

CT RCP Cert
 GW Protection
 SW Protection
 GA Mobility
 GB Mobility
 Residential DEC
 I/C DEC
 Other

MA MCP Certification
 GW-1
 GW-2
 GW-3
 S-1
 S-2
 S-3
 MWRA eSMART
 Other

Data Format
 Excel
 PDF
 GIS/Key
 EQUIS
 Other
 Data Package
 Tier II Checklist
 Full Data Package*
 Phoenix Std Report
 Other
 * SURCHARGE APPLIES



Monday, February 05, 2018

Attn: Mr. Wayne Durocher
Hebron Elementary School
92 Church Street
Hebron, CT 06248
PWS #0670112

Project ID: SPECIAL SAMPLING
Sample ID#: BZ82317 - BZ82323

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. This report is incomplete unless all pages indicated in the pagination at the bottom of the page are included.

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 black ink that reads "Phyllis Shiller". The signature is fluid and cursive, with the first name being more prominent.

Phyllis Shiller
Laboratory Director

NELAC - #NY11301
CT Lab Registration #PH-0618
MA Lab Registration #M-CT007
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
UT Lab Registration #CT00007
VT Lab Registration #VT11301



Environmental Laboratories, Inc.
 587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
 Tel. (860) 645-1102 Fax (860) 645-0823

Analysis Report
 February 05, 2018

FOR: Attn: Mr. Wayne Durocher
 Hebron Elementary School
 92 Church Street
 Hebron, CT 06248
 PWS #0670112

Sample Information

Matrix: DRINKING WATER
 Location Code: HEBRON
 Rush Request: 48 Hour
 P.O.#:

Custody Information

Collected by: WD
 Received by: LB
 Analyzed by: see "By" below

Date

01/31/18
 01/31/18

Time

7:00
 10:03

Laboratory Data

SDG ID: GBZ82317
 Phoenix ID: BZ82317

Project ID: SPECIAL SAMPLING
 Client ID: HESLC010-RM 2 FIRST DRAW

Parameter	Result	RL/ PQL	DIL	Units	AL	MCL	MCLG	Date/Time	By	Reference
Copper	0.154	0.050	10	mg/L	1.3			02/02/18	CPP	200.8-5.4
Lead	0.0035	0.0005	1	mg/L	0.015			02/02/18	CPP	200.8-5.4
Potable Water Digestion	Completed							02/01/18		E200.8

RL/PQL=Reporting/Practical Quantitation Level DIL=Dilution (analysis required diluting to evaluate) ND=Not Detected
 BRL=Below Reporting Level (less than the reporting level, the lowest amount the laboratory can detect and report.)
 AL = Action Level MCL = Maximum Contaminant Level MCLG = Maximum Contaminant Level Goal

Comments:

Maximum Contaminant Level (MCL) (Lower of): 40 CFR Part 141; CT Public Health Code 19-13-B102. The highest level of a contaminant that is allowed in drinking water. MCLs are enforceable standards.

Action Level (AL): 40 CFR Part 141.80.

Secondary DW Maximum Contaminant Level Goal (MCLG): (Lower of): 40 CFR Part 141; 40 CFR Part 143; CT Public Health Code 19-13-B102. The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs are non-enforceable public health goals.

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Phyllis Shiller, Laboratory Director

February 05, 2018

Reviewed and Released by: Deb Lawrie, Project Manager



Environmental Laboratories, Inc.
 587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
 Tel. (860) 645-1102 Fax (860) 645-0823

Analysis Report
 February 05, 2018

FOR: Attn: Mr. Wayne Durocher
 Hebron Elementary School
 92 Church Street
 Hebron, CT 06248
 PWS #0670112

Sample Information

Matrix: DRINKING WATER
 Location Code: HEBRON
 Rush Request: 48 Hour
 P.O.#:

Custody Information

Collected by: WD
 Received by: LB
 Analyzed by: see "By" below

Date

01/31/18
 01/31/18

Time

7:00
 10:03

Laboratory Data

SDG ID: GBZ82317
 Phoenix ID: BZ82318

Project ID: SPECIAL SAMPLING
 Client ID: HESLC016-RM 3 FIRST DRAW

Parameter	Result	RL/ PQL	DIL	Units	AL	MCL	MCLG	Date/Time	By	Reference
Copper	0.257	0.050	20	mg/L	1.3			02/02/18	CPP	200.8-5.4
Lead	0.0072	0.0005	2	mg/L	0.015			02/02/18	CPP	200.8-5.4
Total Metal Digestion	Completed							02/01/18	AG/BF	E200.8

RL/PQL=Reporting/Practical Quantitation Level DIL=Dilution (analysis required diluting to evaluate) ND=Not Detected
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 AL = Action Level MCL = Maximum Contaminant Level MCLG = Maximum Contaminant Level Goal

Comments:

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Action Level (AL): 40 CFR Part 141.80.

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Phyllis Shiller, Laboratory Director
 February 05, 2018

Reviewed and Released by: Deb Lawrie, Project Manager



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 587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
 Tel. (860) 645-1102 Fax (860) 645-0823

Analysis Report
 February 05, 2018

FOR: Attn: Mr. Wayne Durocher
 Hebron Elementary School
 92 Church Street
 Hebron, CT 06248
 PWS #0670112

Sample Information

Matrix: DRINKING WATER
 Location Code: HEBRON
 Rush Request: 48 Hour
 P.O.#:

Custody Information

Collected by: WD
 Received by: LB
 Analyzed by: see "By" below

Date

01/31/18
 01/31/18

Time

7:00
 10:03

Laboratory Data

SDG ID: GBZ82317
 Phoenix ID: BZ82319

Project ID: SPECIAL SAMPLING
 Client ID: HESLC07-RM 8 FIRST DRAW

Parameter	Result	RL/ PQL	DIL	Units	AL	MCL	MCLG	Date/Time	By	Reference
Copper	0.202	0.050	10	mg/L	1.3			02/02/18	CPP	200.8-5.4
Lead	0.0035	0.0005	1	mg/L	0.015			02/02/18	CPP	200.8-5.4
Potable Water Digestion	Completed							02/01/18		E200.8

RL/PQL=Reporting/Practical Quantitation Level DIL=Dilution (analysis required diluting to evaluate) ND=Not Detected
 BRL=Below Reporting Level (less than the reporting level, the lowest amount the laboratory can detect and report.)
 AL = Action Level MCL = Maximum Contaminant Level MCLG = Maximum Contaminant Level Goal

Comments:

Maximum Contaminant Level (MCL) (Lower of): 40 CFR Part 141; CT Public Health Code 19-13-B102. The highest level of a contaminant that is allowed in drinking water. MCLs are enforceable standards.

Action Level (AL): 40 CFR Part 141.80.

Secondary DW Maximum Contaminant Level Goal (MCLG): (Lower of): 40 CFR Part 141; 40 CFR Part 143; CT Public Health Code 19-13-B102. The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs are non-enforceable public health goals.

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Phyllis Shiller, Laboratory Director

February 05, 2018

Reviewed and Released by: Deb Lawrie, Project Manager



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 Tel. (860) 645-1102 Fax (860) 645-0823

Analysis Report
 February 05, 2018

FOR: Attn: Mr. Wayne Durocher
 Hebron Elementary School
 92 Church Street
 Hebron, CT 06248
 PWS #0670112

<u>Sample Information</u>		<u>Custody Information</u>		<u>Date</u>	<u>Time</u>
Matrix:	DRINKING WATER	Collected by:	WD	01/31/18	7:00
Location Code:	HEBRON	Received by:	LB	01/31/18	10:03
Rush Request:	48 Hour	Analyzed by:	see "By" below		
P.O.#:					

Laboratory Data

SDG ID: GBZ82317
 Phoenix ID: BZ82320

Project ID: SPECIAL SAMPLING
 Client ID: HESLC017-RM 10 FIRST DRAW

Parameter	Result	RL/ PQL	DIL	Units	AL	MCL	MCLG	Date/Time	By	Reference
Copper	0.084	0.005	1	mg/L	1.3			02/02/18	CPP	200.8-5.4
Lead	0.0024	0.0005	1	mg/L	0.015			02/02/18	CPP	200.8-5.4
Potable Water Digestion	Completed							02/01/18		E200.8

RL/PQL=Reporting/Practical Quantitation Level DIL=Dilution (analysis required diluting to evaluate) ND=Not Detected
 BRL=Below Reporting Level (less than the reporting level, the lowest amount the laboratory can detect and report.)
 AL = Action Level MCL = Maximum Contaminant Level MCLG = Maximum Contaminant Level Goal

Comments:

Maximum Contaminant Level (MCL) (Lower of): 40 CFR Part 141; CT Public Health Code 19-13-B102. The highest level of a contaminant that is allowed in drinking water. MCLs are enforceable standards.

Action Level (AL): 40 CFR Part 141.80.

Secondary DW Maximum Contaminant Level Goal (MCLG): (Lower of): 40 CFR Part 141; 40 CFR Part 143; CT Public Health Code 19-13-B102. The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs are non-enforceable public health goals.

If there are any questions regarding this data, please call Phoenix Client Services.
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Phyllis Shiller, Laboratory Director
 February 05, 2018

Reviewed and Released by: Deb Lawrie, Project Manager



Environmental Laboratories, Inc.
 587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
 Tel. (860) 645-1102 Fax (860) 645-0823

Analysis Report
 February 05, 2018

FOR: Attn: Mr. Wayne Durocher
 Hebron Elementary School
 92 Church Street
 Hebron, CT 06248
 PWS #0670112

Sample Information

Matrix: DRINKING WATER
 Location Code: HEBRON
 Rush Request: 48 Hour
 P.O.#:

Custody Information

Collected by: WD
 Received by: LB
 Analyzed by: see "By" below

Date

01/31/18
 01/31/18

Time

7:00
 10:03

Laboratory Data

SDG ID: GBZ82317
 Phoenix ID: BZ82321

Project ID: SPECIAL SAMPLING
 Client ID: HESLC009-RM 14 FIRST DRAW

Parameter	Result	RL/ PQL	DIL	Units	AL	MCL	MCLG	Date/Time	By	Reference
Copper	0.176	0.050	10	mg/L	1.3			02/02/18	CPP	200.8-5.4
Lead	0.0090	0.0005	1	mg/L	0.015			02/02/18	CPP	200.8-5.4
Potable Water Digestion	Completed							02/01/18		E200.8

RL/PQL=Reporting/Practical Quantitation Level DIL=Dilution (analysis required diluting to evaluate) ND=Not Detected
 BRL=Below Reporting Level (less than the reporting level, the lowest amount the laboratory can detect and report.)
 AL = Action Level MCL = Maximum Contaminant Level MCLG = Maximum Contaminant Level Goal

Comments:

Maximum Contaminant Level (MCL) (Lower of): 40 CFR Part 141; CT Public Health Code 19-13-B102. The highest level of a contaminant that is allowed in drinking water. MCLs are enforceable standards.

Action Level (AL): 40 CFR Part 141.80.

Secondary DW Maximum Contaminant Level Goal (MCLG): (Lower of): 40 CFR Part 141; 40 CFR Part 143; CT Public Health Code 19-13-B102. The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs are non-enforceable public health goals.

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Phyllis Shiller, Laboratory Director

February 05, 2018

Reviewed and Released by: Deb Lawrie, Project Manager



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 587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
 Tel. (860) 645-1102 Fax (860) 645-0823

Analysis Report
 February 05, 2018

FOR: Attn: Mr. Wayne Durocher
 Hebron Elementary School
 92 Church Street
 Hebron, CT 06248
 PWS #0670112

Sample Information

Matrix: DRINKING WATER
 Location Code: HEBRON
 Rush Request: 48 Hour
 P.O.#:

Custody Information

Collected by: WD
 Received by: LB
 Analyzed by: see "By" below

Date

01/31/18
 01/31/18

Time

7:00
 10:03

Laboratory Data

SDG ID: GBZ82317
 Phoenix ID: BZ82322

Project ID: SPECIAL SAMPLING
 Client ID: HESLC022-RM 15 FIRST DRAW

Parameter	Result	RL/ PQL	DIL	Units	AL	MCL	MCLG	Date/Time	By	Reference
Copper	0.180	0.050	10	mg/L	1.3			02/02/18	CPP	200.8-5.4
Lead	0.0256	0.0005	1	mg/L	0.015			02/02/18	CPP	200.8-5.4
*** Lead exceeds Action Level of 0.015 ***										
Potable Water Digestion	Completed							02/01/18		E200.8

RL/PQL=Reporting/Practical Quantitation Level DIL=Dilution (analysis required diluting to evaluate) ND=Not Detected
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 AL = Action Level MCL = Maximum Contaminant Level MCLG = Maximum Contaminant Level Goal

Comments:

Maximum Contaminant Level (MCL) (Lower of): 40 CFR Part 141; CT Public Health Code 19-13-B102. The highest level of a contaminant that is allowed in drinking water. MCLs are enforceable standards.

Action Level (AL): 40 CFR Part 141.80.

Secondary DW Maximum Contaminant Level Goal (MCLG): (Lower of): 40 CFR Part 141; 40 CFR Part 143; CT Public Health Code 19-13-B102. The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs are non-enforceable public health goals.

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Phyllis Shiller, Laboratory Director

February 05, 2018

Reviewed and Released by: Deb Lawrie, Project Manager



Environmental Laboratories, Inc.
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Analysis Report
 February 05, 2018

FOR: Attn: Mr. Wayne Durocher
 Hebron Elementary School
 92 Church Street
 Hebron, CT 06248
 PWS #0670112

Sample Information

Matrix: DRINKING WATER
 Location Code: HEBRON
 Rush Request: 48 Hour
 P.O.#:

Custody Information

Collected by: WD
 Received by: LB
 Analyzed by: see "By" below

Date

01/31/18
 01/31/18

Time

7:00
 10:03

Laboratory Data

SDG ID: GBZ82317
 Phoenix ID: BZ82323

Project ID: SPECIAL SAMPLING
 Client ID: HESLC024-RM 25 FIRST DRAW

Parameter	Result	RL/ PQL	DIL	Units	AL	MCL	MCLG	Date/Time	By	Reference
Copper	0.201	0.050	10	mg/L	1.3			02/02/18	CPP	200.8-5.4
Lead	0.0010	0.0005	1	mg/L	0.015			02/02/18	CPP	200.8-5.4
Potable Water Digestion	Completed							02/01/18		E200.8

RL/PQL=Reporting/Practical Quantitation Level DIL=Dilution (analysis required diluting to evaluate) ND=Not Detected
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Comments:

Maximum Contaminant Level (MCL) (Lower of): 40 CFR Part 141; CT Public Health Code 19-13-B102. The highest level of a contaminant that is allowed in drinking water. MCLs are enforceable standards.

Action Level (AL): 40 CFR Part 141.80.

Secondary DW Maximum Contaminant Level Goal (MCLG): (Lower of): 40 CFR Part 141; 40 CFR Part 143; CT Public Health Code 19-13-B102. The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs are non-enforceable public health goals.

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Phyllis Shiller, Laboratory Director
 February 05, 2018

Reviewed and Released by: Deb Lawrie, Project Manager

Monday, February 05, 2018

Criteria: CT: DW

State: CT

Sample Criteria Exceedances Report

GBZ82317 - HEBRON

SampNo	Acode	Phoenix Analyte	Criteria	Result	RL	Criteria	RL	Analysis Units
BZ82322	PB-DW-MS	Lead	EPA / 40 CFR 141 DW / 141.80 Lead & Copper ALs	0.0256	0.0005	0.015	0.001	mg/L

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.



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Analysis Comments

February 05, 2018

SDG I.D.: GBZ82317

The following analysis comments are made regarding exceptions to criteria not already noted in the Analysis Report or QA/QC Report: None.



CHAIN OF CUSTODY RECORD

587 East Middle Turnpike, P.O. Box 370, Manchester, CT 06040
 Email: info@phoenixlabs.com Fax (860) 645-0823
 Client Services (860) 645-8726

Cooler: Yes No
 Coolant: IPK ICE No
 Temp 17°C Pg of

Data Delivery:
 Fax #:
 Email: w Durocher@Hebron.K12.CT.US

Customer: Hebron Elementary School
 Address: 92 Church St.
Hebron CT, 06248

Project: Special Sampling
 Report to: Wayne Durocher and Brandon Fawley
 Invoice to: Munyer Books
 Phone #:
 Fax #:

Project P.O.:

This section MUST be completed with Bottle Quantities.

Client Sample - Information - Identification

Sampler's Signature: Wayne Durocher Date: 1-31-18
 Matrix Code:
 DW=Drinking Water GW=Ground Water SW=Surface Water WW=Waste Water
 RW=Raw Water SE=Sediment SL=Sludge S=Soil SD=Solid W=Wipe
 OIL=Oil B=Bulk L=Liquid

PHOENIX USE ONLY SAMPLE #	Customer Sample Identification	Sample Matrix	Date Sampled	Time Sampled
HESK010	RM 2 First Draw		1-31-18	7:AM
HESK016	RM 3 First Draw			
HESK007	RM 8 First Draw			
HESK017	RM 10 First Draw			
HESK009	RM 14 First Draw			
HESK022	RM 15 First Draw			
HESK024	RM 25 First Draw			

Analysis Request	40 ml VOA Vial () oz	GL Amber 100ml () oz	PL As Is () oz	PL H2SO4 () oz	PL HNO3 250ml () oz	PL HNO3 1250ml () oz	Bacteria (As Is)	Bacteria (White)
Lead + Copper	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
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Hebron Elementary School Lead Sample Results

5/23/18

<u>Location</u>	<u>Report Date</u>	<u>Results</u>
Room 10	5/23/18	<0.0010 mg/l
Room 2	5/23/18	0.0010 mg/l
Room 8	5/23/18	<0.0010 mg/l
Room 3	5/23/18	0.0013 mg/l
Room 14	5/23/18	0.0030 mg/l
Room 25	5/23/18	<0.0010 mg/l
Room 15	5/23/18	0.0029 mg/l
Room 19	5/23/18	0.0033 mg/l
Room 22	5/23/18	0.0014 mg/l
Band Room	5/23/18	0.0056 mg/l
Room 23	5/23/18	0.0024 mg/l
Room 24	5/23/18	<0.0010 mg/l
Room 1	5/23/18	<0.0010 mg/l
Room 9	5/23/18	<0.0010 mg/l
Media Room	5/23/18	<0.0010 mg/l
Art Room	5/23/18	<0.0010 mg/l
Room 17	5/23/18	0.0010 mg/l
Kitchen	5/23/18	<0.0010 mg/l
Room 5	5/23/18	<0.0011 mg/l
Room 20	5/23/18	<0.0010 mg/l

NO samples exceeded the Action Level of 0.015 mg/l for Lead

Hebron Elementary School Lead Sample Results

9/26/18

<u>Location</u>	<u>Report Date</u>	<u>Results</u>	
Room 15	9/25/18	0.210 mg/l	*Exceeds Action Level
Room 5	9/25/18	0.0076 mg/l	
Room 3	9/25/18	0.0044 mg/l	*90 th Percentile sample
Room 2	9/25/18	0.0040 mg/l	
Room 14	9/25/18	0.0021 mg/l	
Room 8	9/25/18	0.0018 mg/l	
Room 1	9/25/18	0.0014 mg/l	
Room 9	9/25/18	<0.0010 mg/l	
Room 10	9/25/18	<0.0010 mg/l	
Room 17	9/25/18	<0.0010 mg/l	
Room 19	9/25/18	<0.0010 mg/l	
Room 20	9/25/18	<0.0010 mg/l	
Room 22	9/25/18	<0.0010 mg/l	
Room 23	9/25/18	<0.0010 mg/l	
Room 24	9/25/18	<0.0010 mg/l	
Room 25	9/25/18	<0.0010 mg/l	
Kitchen	9/25/18	<0.0010 mg/l	
Media RM	9/25/18	<0.0010 mg/l	
Art RM	9/25/18	<0.0010 mg/l	
<u>Band RM</u>	<u>9/25/18</u>	<u><0.0010 mg/l</u>	

The overall sampling Lead results are within the EPA 90th percentile guidelines and meet the State of CT DPH compliance for Lead results.

*One sample, Room 15 exceeded the action level of 0.015 mg/l for Lead at 0.210 mg/l. This sample site will be investigated in order to correct this Action Level Exceedance.

Hebron Elementary School Lead Sample Results

9/29/17

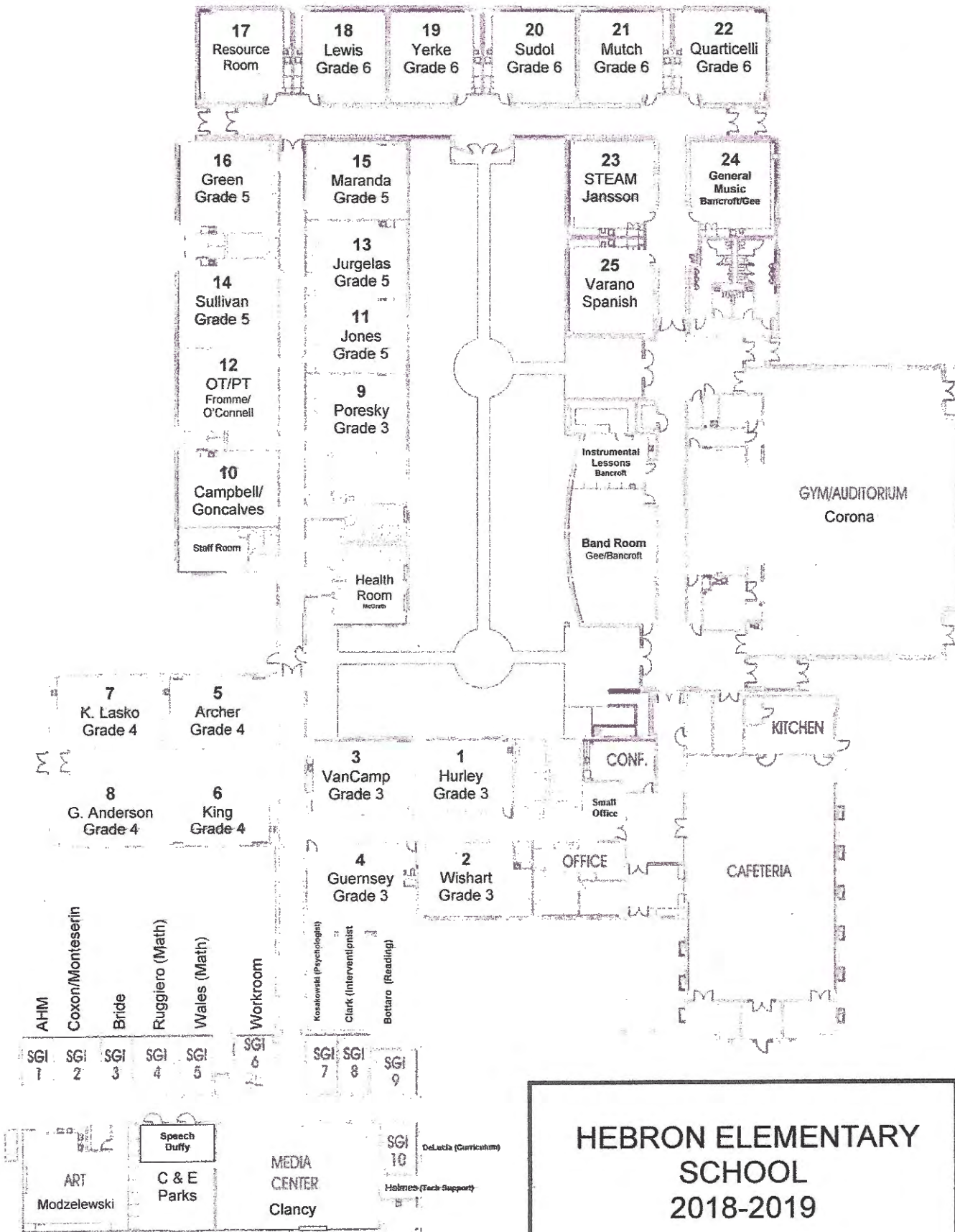
<u>Location</u>	<u>Report Date</u>	<u>Results</u>
Room 10	9/28/17	0.0984 mg/l *
Room 2	9/22/17	0.0447 mg/l *
Room 8	9/22/17	0.0351 mg/l *
Room 3	9/25/17	0.0275 mg/l *
Room 14	9/22/17	0.0247 mg/l *
Room 25	9/28/17	0.0215 mg/l *
Room 15	9/25/17	0.0181 mg/l *
Room 19	9/28/17	0.0074 mg/l
Room 22	9/22/17	0.0054 mg/l
Band Room	9/22/17	0.0045 mg/l
Room 23	9/28/17	0.0040 mg/l
Room 24	9/28/17	0.0037 mg/l
Room 1	9/28/17	0.0035 mg/l
Room 9	9/22/17	0.0033 mg/l
Media Room	9/22/17	0.0019 mg/l
Art Room	9/22/17	0.0012 mg/l
Room 17	9/22/17	<0.0010 mg/l
Kitchen	9/22/17	<0.0010 mg/l
Room 5	9/25/17	<0.0010 mg/l
Room 20	9/25/17	<0.0010 mg/l

*Depicts samples exceeding the Action Level of 0.015 mg/l

Table 1. Lead Water Sampling at Hebron Elementary School, Hebron, CT. Comparison of New and Old Sections.

	June 2017 Not Flushed Pb (mg L ⁻¹)	September 2017 Not Flushed Pb (mg L ⁻¹)	January 2018 (1) Not Flushed Pb (mg L ⁻¹)	January 2018 (2) Flushed Pb (mg L ⁻¹)	March 2018 Flushed Pb (mg L ⁻¹)	September 2018 Flushed Pb (mg L ⁻¹)
Pre- 1988 Building						
1947 Rooms						
1	0.0035	0.0035				0.0014
2	0.0052	0.0447	0.0035	0.0021	0.0062	0.0040
3	0.0063	0.0275	0.0072	0.0019	0.0016	0.0044
4						
Kitchen	ND	ND				ND
<i>Pb Detection (%)</i> 1947	75	75	100	100	100	75
1957 Rooms						
5	0.0064					0.0076
6						
7						
8	0.0033	0.0351	0.0035	ND	0.0015	0.0018
<i>Pb Detection (%)</i> 1957	100	100	100	0	100	100
1963 Rooms						
9	ND	0.0033				ND
10	0.0099	0.0984	0.0024	ND	0.0024	ND
11						
12						
13						
14	0.0016	0.0247	0.0090	ND	0.0026	0.0021
15		0.0181	0.0256	0.0018	0.0040	0.0210
16						
<i>Pb Detection (%)</i> 1963	67	100	100	33	100	50
<i>Pb Sum Detect (%)</i>	77	88	100	50	100	70

	June 2017 Not Flushed Pb (mg L ⁻¹)	September 2017 Not Flushed Pb (mg L ⁻¹)	January 2018 (1) Not Flushed Pb (mg L ⁻¹)	January 2018 (2) Flushed Pb (mg L ⁻¹)	March 2018 Flushed Pb (mg L ⁻¹)	September 2018 Flushed Pb (mg L ⁻¹)
Post – 1988 Building						
17	0.0010	ND				ND
18		0.0074				
19	ND					ND
20		ND				ND
21						
22	ND	0.0054				ND
23	ND	0.0040				ND
24	0.0015	0.0037	0.0010	ND		ND
25		0.0215			ND	ND
26	ND					
27	ND					
Band	0.0022	0.0045				ND
Media	ND	0.0019				ND
Art	ND	0.0012				ND
<i>Detect (%) New Building</i>	30	80	100	0	0	0



**HEBRON ELEMENTARY
SCHOOL
2018-2019**