Project Manual & Specifications

Renovations to

Windsor Locks Passenger Station Exterior Masory Restoration

Windsor Locks, CT

September 24, 2018

Owner:	Town of Windsor Locks By:_____
Architect:	Crosskey Architects, LLC By:_____
Contractor:	By:_____
Bonding Company:	By:_____

Crosskey Architects LLC
Architecture, Preservation and Interiors

750 Main Street, Suite 150, Hartford, CT 06103 **Phone: (860)724-3000**

SECTION 00012

PROJECT DIRECTORY & IDENTIFICATION OF PARTIES

PROJECT:	The Windsor Locks Passenger Station Exterior Mansonry Restoration Main Street (Rte 159) Windsor Locks, CT 06096
OWNER:	Town of Windsor Locks 50 Church Street Windsor Locks, CT 06096
ARCHITECT:	Crosskey Architects LLC 750 Main Street Suite 150 Hartford, CT 06103 Phone: (860) 724-3000
STRUCTURAL ENGINEER:	Cirrus Structural Engineering, LLC 19 Lower Woodland Terrace Columbia, CT 06237
SITE SURVEYER:	Fuss & O'Neill 146 Hartford Road Manchester, CT 06040 Phone: (860) 646-2469
GENERAL CONTRACTOR:	

SECTION 00013

TABLE OF CONTENTS

DIVISION 7 - THERMAL & MOISTURE PROTECTION

EXHIBITS

END OF SECTION

SECTION 00014

LIST OF DRAWINGS

GENERAL DRAWINGS

Cover	Project Information & Abbreviations

ARCHITECTURAL DRAWINGS

A-2.1	Masonry Restoration Elevations (1 of 2)
A-2.2	Masonry Restoration Elevations (2 of 2)

END OF SECTION

DOCUMENT 00020

INVITATION TO BIDDERS

OWNER: Town of Windsor Locks
50 Church Street
Windsor Locks, CT 06096

ARCHITECT: Crosskey Architects LLC
750 Main Street
Suite 150
Hartford, CT 06103

TO ALL BIDDERS

1. The Owner will receive bids in triplicate on or before 1:00 p.m. on October 17th 2018 at the office of the Owner, Town of Windsor Locks First Selectman's Office, 50 Church Street, Windsor Locks, CT 06096.

2. There will be a pre-bid meeting at 1:00 p.m. October 4th, 2018 at the job site, located at 225 Main Street, Windsor Locks, CT 06096. **All General Contractors submitting a bid are required to attend.** Subcontractors are welcome to attend.

3. Bids will be received for furnishing all labor, materials, tools and equipment necessary to construct and finish complete Windsor Locks Passenger Station, consisting of exterior masonry restoration and associated work.

4. The Contract will include existing building exterior renovations and all other work necessary for or incidental to the completion of the project.

5. The successful bidder will be required to furnish 100% Performance and Payment Bond or Bonds, in the forms included in the Specifications, as well as a certified statement of financial condition, as of a date not exceeding ninety (90) days prior to the date thereof.

6. Proposed form of Contract Documents, including Plans and Specifications, are on file at the office of the above mentioned Architect.

7. General contractors may obtain two copies of the Plans and Specifications by depositing Twenty Dollars ($20.00) per set with said Architect. The amount of the deposit will be refunded to each bidder who returns the Plans and Specifications in good condition within fifteen (15) days after the bid due date. Digital bid documents are available free of charge. Contact the Architect.

8. The Owner reserves the right to reject any or all bids and to waive any informalities in bidding. All Bid Documents must be completely filled in when submitted.

9. A satisfactory Bid Security, in the form of a Bid Bond, certified check or Letter of Credit in an amount equal to five percent (5%) of the bid shall be submitted with each such document. The Bid Security shall be made payable to the Owner and shall be properly executed by the bidder and acceptable sureties.

10. No bid shall be withdrawn for a period of ninety (90) days subsequent to the opening of bids or until the next work day immediately following said period, if such period ends on a weekend or a State holiday, without the consent of the above mentioned Owner.

11. The Contractor who is selected to perform this State project must comply with CONN. GEN. STAT. §§ 4a-60, 40a-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.

12. The Contractor shall be required to make good faith efforts to place a minium of twenty-five (25%) percent of the subcontractos awarded by the general contractor/construction manager at risk with eligible contractors holding currene certification from the Connecticut Department of Administrative Services (“DAS”) under provisions of CONN. GEN. STAT. § 41-60g, as amended. (25% of the work with DAS certified Small and Minority owned business(s) and 25% of that work with DAS certified Minority, Women and/or Disabled owned businesses.)

13. This project will require prevailing wage rates. The latest rates from DOL will be furnished via a forthcoming addendum.

14. The Contractor will be required to provide product samples and mock-ups of all masonry materials for review and approval by the Architect and the State Historic Preservation Office prior to the commencement of the Work. Mock-ups shall include, but not be limited to, brick, mortar, repointing, brownstone replacement, brownstone restoration, and masonry cleaning.

Crosskey Architects LLC

per:

William W. Crosskey II, A.I.A.

enc.

END OF DOCUMENT

DOCUMENT 00100

INSTRUCTIONS TO BIDDERS

1. SUMMARY

1.01 DOCUMENT INCLUDES

A. Invitation
   1. Bid Submission
   2. Intent
   3. Work Identified in the Contract Documents
   4. Contract Time

B. Bid Documents and Contract Documents
   1. Definitions
   2. Contract Documents Identification
   3. Availability
   4. Examination
   5. Queries/Addenda
   6. Product/System Substitutions

C. Site Assessment
   1. Site Examination
   2. Preview of the site

D. Qualifications
   1. Qualifications
   2. Subcontractors/Suppliers/Others

E. Bid Submission
   1. Submission Procedure
   2. Bid Ineligibility

F. Bid Enclosures/Requirements
   1. Security Deposit
   2. Performance Assurance
   3. Bid Form Requirements
   4. Fees for Changes in the Work
   5. Bid Form Signature
   6. Additional Bid Information

G. Offer Acceptance/Rejection
   1. Duration of Offer
   2. Acceptance of Offer

1.02 RELATED DOCUMENTS

A. Document 00020 - Invitation to Bid.
B. Document 00310 - Bid Form.
C. Document 00400 - Supplements to Bid Form.

2. INVITATION

2.01 BID SUBMISSION

A. Bids signed and under seal, executed, and dated will be received by the Owner at the office of the Owner, Town of Windsor Locks, First Selectman's Office, 50 Church Street, Windsor Locks, CT 06096 before 1:00 p.m. local time on the 17th day of October, 2018.
B. Offers submitted after the above time may be returned to the Bidder unopened.

C. Amendments to the submitted offer will be permitted if received in writing prior to Bid closing and if endorsed by the same party or parties who signed and sealed the offer.
D. Owner reserves the right to reject any or all bids and waive any bid procedures or formalities.

2.02 INTENT

A. Contract in accordance with the Contract Documents.

2.03 WORK IDENTIFIED IN THE CONTRACT DOCUMENTS

A. Work of this proposed Contract comprises general construction & renovation, site development, environmental abatement, demolition, structural, mechanical, electrical work, etc.
B. Location: Main Street (Rte 159), Windsor Locks CT.

2.04 CONTRACT TIME

A. Contractor to propose number of calendar days to complete the project considering the building is vacant at the start of construction. Number of calendar days cannot exceed 180. This shall not include the period of time between contract signing and construction start.
B. Provide a proposed completion schedule for each building.

3. BID DOCUMENTS AND CONTRACT DOCUMENTS

3.01 DEFINITIONS

A. Bid Documents: Contract Documents supplemented with Invitation to Bid, Instructions to Bidders, Bid Form and Appendix A, Bid securities, identified herein.
B. Contract Documents: Defined in AIA A201 Article 1 including issued Addenda.
C. Bid, Offer, or Bidding: Act of submitting an offer under seal.
D. Bid Price: Monetary sum identified by the Bidder in the Bid Form.

3.02 CONTRACT DOCUMENTS IDENTIFICATION

A. The Contract Documents are identified as Main Street (Rte 159), Windsor Locks CT, as prepared by the Architect, Crosskey Architects LLC, located at One Union Place, Hartford, CT and identified in the Project Manual.

3.03 AVAILABILITY

A. Bid Documents may be obtained at the office of the Architect, Crosskey Architects LLC, located at 750 Main Street, Suite 150, Hartford, CT.
B. Two sets of Bid Documents can be obtained by general contract Bidders upon receipt of a refundable deposit, in the amount of $20.00 per set.
C. Deposit will be refunded if Bid Documents are returned complete, undamaged, unmarked and reusable, within 15 calendar days of Bid submission. Failure to comply will result in forfeiture of deposit.
D. Bid Documents are made available only for the purpose of obtaining offers for this project. Their use does not grant a license for other purposes.
E. Digital Bid Documents are available free of charge. Contact Architect

3.04 EXAMINATION

A. Bid Documents may be viewed at the office of the Architect.
B. Upon receipt of Bid Documents verify that documents are complete. Notify Architect should the documents be incomplete.

C. Immediately notify the Architect upon finding discrepancies or omissions in the Bid Documents.

3.05 QUERIES/ADDENDA

A. Direct questions in writing to Michael Weissbrod, email mweissbrod@crosskey.com
B. Addenda may be issued during the Bidding period. All Addenda become part of the Contract Documents. Include resultant costs in the Bid Price.
C. Verbal answers are not binding on any party.
D. Clarifications requested by Bidders must be in writing not less than 7 days before date set for receipt of Bids. The reply will be in the form of an Addendum, a copy of which will be forwarded to known recipients.

3.06 PRODUCT/SYSTEM SUBSTITUTIONS

A. Substitute products will be considered if submitted as an attachment to the Bid Form.
B. The submission shall provide sufficient information to determine acceptability of such products.
C. Provide complete information on required revisions to other Work to accommodate each substitution, the value of additions to or reductions from the Bid Price, including revisions to other Work.
D. Provide Products as specified unless substitutions are submitted in this manner and subsequently accepted.
E. Approval to submit substitutions prior to submission of Bids is not required.
F. **Contractor shall reimburse Owner for Architect's time spent reviewing substitutions.**

4. SITE ASSESSMENT

4.01 SITE EXAMINATION

A. Examine the project site before submitting a bid.
B. The Bidder is required to contact the Owner at the following address and phone number in order to arrange a date and time to visit the project site:

Town of Windsor Locks
50 Church Street
Windsor Locks, CT 06096
860-627-1444

4.02 PREBID CONFERENCE

A. A mandatory pre-bid walk-thru of the site will be conducted on the 4th day of October, 2018 at 1:00pm. All General Contractors submitting a bid to the Owner must attend the walk-thru.
B. All general contract and major subcontract Bidders are invited.
C. Representatives of the Owner and Architect will be in attendance.
D. Information relevant to the Bid Documents will be recorded in an Addendum, issued to conference attendants.

5. QUALIFICATIONS

5.01 SUBCONTRACTORS/SUPPLIERS/OTHERS

A. The Owner reserves the right to reject a proposed Subcontractor for reasonable cause.
B. Refer to AIA Article 5 of General Conditions.

6. BID SUBMISSION

6.01 SUBMISSION PROCEDURE

A. Bidders shall be solely responsible for the delivery of their Bids in the manner and time prescribed.

B. Submit three copies of the executed offer on the Bid Forms provided, signed and sealed with the required security in a closed opaque envelope, clearly identified with Bidder's name, project name and Owner's name on the outside.

C. Improperly completed information, irregularities in security deposit or bid bond, may be cause not to open the Bid Form envelope and declare the Bid invalid or informal.

D. An abstract summary of submitted Bids will be made available to all Bidders following Bid opening.

6.02 BID INELIGIBILITY

A. Bids that are unsigned, improperly signed or sealed, conditional, illegible, obscure, contain arithmetical errors, erasures, alterations, or irregularities of any kind, may at the discretion of the Owner, be declared unacceptable.

B. Bid Forms, Appendices, and enclosures which are improperly prepared may, at the discretion of the Owner, be declared unacceptable.

C. Failure to provide security deposit, bonding or insurance requirements may at the discretion of the Owner, invalidate the Bid.

D. Bids must be submitted with the "CHRO Contract Compliance Regulations Notification to Bidders" Form. Bids not including this completed form will be rejected.

7. BID ENCLOSURES/REQUIREMENTS

7.01 SECURITY DEPOSIT

A. Bids shall be accompanied by a security deposit as follows:

1. Bid Bond of a sum no less than ____ percent of the Bid Price/Sum on AIA A310 Bid Bond Form.

OR

2. Certified check in the amount of ____ percent of the Bid Price.

B. Endorse the Bid Bond in the name of the Owner as obligee, signed and sealed by the Contractor as principal and the Surety.

OR

Endorse the certified check in the name of the Owner.

C. The security deposit will be returned after delivery to the Owner of the required Performance and Labor and Materials Payment Bond(s) by the accepted Bidder.

D. Do not include the cost of Bid Security in the Bid Price.

E. After a Bid has been accepted, all securities will be returned to the respective Bidders.

G. If no contract is awarded, all security deposits will be returned.

H. Bonding Company must be listed on the most recent IRS Circular 570.

7.02 PERFORMANCE ASSURANCE

A. Accepted Bidder: Provide a Performance and Payment bond as described in Document 00811 - Supplementary Conditions.

B. Include the cost of performance assurance bonds in the Bid Price and identify the cost when requested by the Owner.

7.03 BID FORM REQUIREMENTS

A. Complete all requested information in the Bid Form and Appendices.

7.04 FEES FOR CHANGES IN THE WORK

A. Include in the Bid Form, the overhead and profit fees on own Work and Work by Subcontractors, applicable for Changes in the Work, whether additions to or deductions from the Work on which the Bid Price is based.

B. Include in the Bid Form, the fees proposed for subcontract work for changes (both additions and deductions) in the Work. The Contractor shall apply fees as noted, to the Subcontractor's gross (net plus fee) costs on additional work.

7.05 BID FORM SIGNATURE

A. The Bid Form shall be signed by the Bidder, as follows:

1. Sole Proprietorship: Signature of sole proprietor in the presence of a witness who will also sign. Insert the words "Sole Proprietor" under the signature. Affix seal.
2. Partnership: Signature of all partners in the presence of a witness who will also sign. Insert the word "Partner" under each signature. Affix seal to each signature.
3. Corporation: Signature of a duly authorized signing officer(s) in their normal signatures. Insert the officer's capacity in which the signing officer acts, under each signature. Affix the corporate seal. If the Bid is signed by officials other than the President and Secretary of the company, or the President/Secretary/Treasurer of the company, a copy of the by-law resolution of the Board of Directors authorizing them to do so, must also be submitted with the Bid Form in the Bid envelope.
4. Joint Venture: Each party of the joint venture shall execute the Bid Form under their respective seals in a manner appropriate to such party as described above, similar to the requirements of a Partnership.

7.06 ADDITIONAL BID INFORMATION

A. Submit the following Supplements at the time of Bid submission:

1. Document 00401 - Supplement A - Unit Prices: Include a listing of unit prices specifically requested by the Contract Documents.
2. Document 00402 - Supplement B - Alternates: Include the cost variation to the Bid Price applicable to the Work described in Section 01019.
3. Document 00403 - Supplement C - Allowances: Include the listing of allowances specifically requested in the Contract Documents.
4. Document 00404 - Supplement D – CHRO Form: Provide completed forms included herein.
5. Document 00407 – Supplement E – Bidder’s Qualification Statement: Provide completed forms for each Contractor and Subcontractor.

8. OFFER ACCEPTANCE/REJECTION

8.01 DURATION OF OFFER

A. Bids shall remain open to acceptance and shall be irrevocable for a period of ninety (90) days after the Bid closing date.

8.02 ACCEPTANCE OF OFFER

A. The Owner reserves the right to accept or reject any or all offers.

B. After acceptance by the Owner, the Architect on behalf of the Owner, will issue to the successful Bidder, a written Bid Acceptance.

END OF DOCUMENT

DOCUMENT 00310

BID FORM

To: Town of Windsor Locks
50 Church Street
Windsor Locks, CT 06096

Project: Windsor Locks Passenger Station Exterior Masonry Restoration
Main Street (Rte 159)
Windsor Locks, CT 06096

Date: _____

Submitted by:
(full name)

_____

(full address)

_____

_____

1. OFFER

Having examined the Place of the Work and all matters referred to in the Instructions to Bidders and the Contract Documents prepared by Crosskey Architects LLC, Architect for the above mentioned project, we, the undersigned, hereby offer to enter into a Contract to perform the Work for the Price of:

$ _____ ($ _____) dollars.

We have included herewith, the required security deposit/Bid Bond as required by the Instruction to Bidders.

All taxes have been included in the Bid Price, as the Owner is not tax exempt.

All Cash Allowances described in Section 01019 - Contract Considerations are included in the Bid Price.

2. ACCEPTANCE

This offer shall be open to acceptance and is irrevocable for 90 days from the Bid closing date.

If this Bid is accepted by the Owner within the time period stated above, we will:

Execute the Agreement within 15 days of receipt of acceptance of this Bid.

Furnish the required Performance and Labor & Material Bonds within 7 days of receipt of acceptance of this Bid.

Commence work within 30 days after executing the agreement.

If this Bid is accepted within the time stated, and we fail to commence the Work or we fail to provide the required Bond(s), the security deposit shall be forfeited as damages to the Owner by reason of our failure, limited in amount to the lesser of the face value of the security deposit or the difference between this Bid and the Bid upon which the Contract is signed.

In the event our Bid is not accepted within the time stated above, the required security deposit shall be returned to the undersigned, in accordance with the provisions of the Instructions to Bidders; unless a mutually satisfactory arrangement is made for its retention and validity for an extended period of time.

3. CONTRACT TIME

If this Bid is accepted, we will:

Complete the Work in one hundred (100) calendar days from acceptance of this Bid.

4. CHANGES TO THE WORK

When the Architect establishes that the method of valuation for Changes in the Work will be net cost plus a percentage fee in accordance with General Conditions, our percentage fee will be:

_____ percent overhead and profit on the net cost of our own Work;

_____ percent on the cost of work done by any Subcontractor.

On work deleted from the Contract, our credit to the Owner shall be the Architect approved net cost plus

_____ of the overhead and profit percentage noted above.

5. ADDENDA

The following Addenda have been received. The modifications to the Bid Documents noted therein have been considered and all costs thereto are included in the Bid Price.

Addendum #_____Dated_____

Addendum #_____Dated_____

Addendum #_____Dated_____

6. APPENDICES

Submit Appendices in Document 00400 - Supplements to Bid Forms as directed in Document 00100 – Instructions to Bidders.

7. BID FORM SIGNATURE(S)

The Corporate Seal of

_____

(Bidder - please print the full name of your Proprietorship, Partnership, or Corporation)

was hereunto affixed in the presence of:

(Authorized signing officer (Title)

(Seal)

(Authorized signing officer (Title)

If the Bid is a joint venture or partnership, add additional forms of execution for each member of the joint venture in the appropriate form or forms as above.

END OF DOCUMENT

DOCUMENT 00400

SUPPLEMENTS TO BID FORM

To: Town of Windsor Locks
50 Church Street
Windsor Locks, CT 06096

Project: Windsor Locks Passenger Station Exterior Masonry Restoration
Main Street (Rte 159)
Windsor Locks, CT 06096

Date:_____

Submitted by:
(full name)

_____

(full address)

_____

_____

In accordance with Document 00100 - Instructions to Bidders and Document 00310 - Bid Form, we include the Supplements To Bid Form Appendices listed below. The information provided shall be considered an integral part of the Bid Form.

These Appendices are as follows:

Document 00401 - Supplement A - Unit Prices: nclude a listing of unit prices specifically requested by the Contract Documents.
Document 00402 - Supplement B - Alternates: Include the cost variation to the Bid Price applicable to the Work described in Section 01019.
Document 00403 - Supplement C - Allowances: Include the listing of allowances specifically requested in the Contract Documents.
Document 00404 - Supplement D – CHRO Form: Provide completed forms included herein.
Document 00407 - Supplement E – Bidder's Qualification Statement: Provide completed forms included herein, for each Contractor and Subcontractor.

SUPPLEMENTS TO BID FORM SIGNATURE(S)

The Corporate Seal of

_____

(Bidder - please print the full name of your Proprietorship, Partnership, or Corporation)

was hereunto affixed in the presence of:

_____

(Authorized signing officer Title)

(Seal)

_____

(Authorized signing officer Title)

(Seal)

END OF SUPPLEMENTS TO BID FORM

DOCUMENT 00401

SUPPLEMENT A - LIST OF UNIT PRICES

The following is the list of Unit Prices referenced in the bid submitted by:

(Bidder)_____

To: Town of Windsor Locks
50 Church Street
Windsor Locks, CT 06096

Project: Windsor Locks Passenger Station Exterior Masonry Restoration
Main Street (Rte 159)
Windsor Locks, CT 06096

Dated _____ and which is an integral part of the Bid Form.

We propose and agree that, should the amount of work required be increased or decreased, by a request of the Owner, the following Unit Prices will be the basic price for computing extra cost or credit. It is understood that the right is reserved by the above mentioned Owner to reject or negotiate any or all of the Unit Prices.

Each Unit Price includes all equipment, tools, labor, permits, fees, overhead and profit, etc. incidental to completion of the work involved and the disposal of surplus or unsuitable material in accordance with the Plans and Specifications or as directed by the Architect. Unit Prices will be decreased ten percent (10%) if change requested is a reduction in work.

UNIT PRICES:

ITEM DESCRIPTION	PRICE/UNIT
1. Provide unit pricing to repoint existing masonry.	$_____per square ft.
2. Provide unit pricing to replace existing masonry (each wythe).	$_____per square ft.
3. Provide unit pricing per sill to replace existing stone window sill.	$_____per sill.
4. Provide unit pricing per sill to restore damage brownstone.	$_____per sill.
5. Provide unit pricing to clean stained brownstone.	$_____per square ft.

END OF SECTION

DOCUMENT 00402

SUPPLEMENT B - LIST OF ALTERNATES

The following is the list of Alternates referenced in the bid submitted by:

(Bidder)_____

To: Town of Windsor Locks
50 Church Street
Windsor Locks, CT 06096

Project: Windsor Locks Passenger Station Exterior Masonry Restoration
Main Street (Rte 159)
Windsor Locks, CT 06096

Dated _____ and which is an integral part of the Bid Form.

The following amounts shall be added to or deducted from the Bid Price. Refer to Section 01019 - Contract Considerations: Schedule of Alternates. This form requests a "difference" in bid price by adding to or deducting from the base bid price using the Alternates listed below.

1. Remove and replace existing light $_____
2. Rain leader extensions $_____
3. Relocate alarm horn $_____
4. Permanent chainlink fencing $_____
5. Apply clear sealer to first 3’-0” of masonry above grade at all elevations $_____
6. Apply clear sealer to all masonry on west elevation $_____
7. Deduct East Elevation restoration $_____
8. Deduct North Elevation restoration $_____
9. Deduct South Elevation restoration $_____
10. Deduct all brown stone replace and restoration $_____

END OF SECTION

DOCUMENT 00403

SUPPLEMENT C - LIST OF ALLOWANCES

The following is the list of Allowances referenced in the bid submitted by:

(Bidder)_____

To: Town of Windsor Locks
50 Church Street
Windsor Locks, CT 06096

Project: Windsor Locks Passenger Station Exterior Masonry Shell Restoration
Main Street (Rte 159)
Windsor Locks, CT 06096

Dated _____ and which is an integral part of the Bid Form.

Each allowance includes all equipment, tools, labor, permits, fees, overhead and profit, etc. incidental to completion of the work involved and the disposal of surplus or unsuitable material in accordance with the Plans and Specifications or as directed by the Architect.

UNIT PRICES:

ITEM DESCRIPTION	ALLOWANCE
1. Inspection & Testing Services per section 01019.	$3,000.00
2. Signage and/or lane closures on Route 159, to be coordinated with the Town of Windsor Locks police department.	$5,000.00
3. Amtrak Requirements Allowance This allowance shall include: · Engineering, flag protection and/or other protection services provided by Amtrak. · Amtrak's Contractor Safety Orientation Training. · Additional insurance required by Amtrak, above and beyond the Contract's requirements. · Permit and other applicable fees required by Amtrak.	$5,000.00

END OF SECTION

DOCUMENT 00404

SUPPLEMENT D – CHRO FORM

Attached are the completed Equal Employment Opportunity forms referenced in the bid submitted by:

(Bidder)_____

To: Town of Windsor Locks
50 Church Street
Windsor Locks, CT 06096

Project: Windsor Locks Passenger Station Exterior Masonry Restoration
Main Street (Rte 159)
Windsor Locks, CT 06096

Dated _____ and which is an integral part of the Bid Form.

Each bid submitted must be accompanied by "CHRO Form" completed form.

END OF SECTION

COMMISSION ON HUMAN RIGHTS AND OPPORTUNITIES
CONTRACT COMPLIANCE REGULATIONS
NOTIFICATION TO BIDDERS
(Revised 09/17/07)

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 ten 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.

2) Description of Job Categories (as used in Part IV Bidder Employment Information) (Page 2)

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.

3) Definition of Racial and Ethnic Terms (as used in Part IV Bidder Employment Information) (Page 3)

White (not of Hispanic Origin)- All persons having origins in any of the original peoples of Europe, North Africa, or the Middle East. Black(not of Hispanic Origin)- All persons having origins in any of the Black racial groups of Africa. Hispanic- All persons of Mexican, Puerto Rican, Cuban, Central or South American, or other Spanish culture or origin, regardless of race.	Asian or Pacific Islander- 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. American Indian or Alaskan Native- All persons having origins in any of the original peoples of North America, and who maintain cultural identification through tribal affiliation or community recognition.

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 is certified as above by State of CT Yes__ No__
Bidder Parent Company (If any)	
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-discrim ination 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. _____ _____

Part III - Bidder Subcontracting Practices

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)

PART V - Bidder Hiring and Recruitment Practices (Page 5)

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)

FAQs Regarding Contract Compliance Requirements for Municipalities For Municipal Public Works Contracts Under June 2015 Special Session P.A. 15-5

1. What municipal contracts are covered by the new contract compliance requirements effective October 1, 2015?

   Municipal Public Works contracts funded in whole or in part by the state are the contracts subject to the contract compliance requirements and set-aside goals. Other municipal contracts are not subject to the new requirements.

2. How can a municipality meet contract compliance requirements and set-aside goals?

   The municipality solicits bids for a General Contractor (GC) or a Construction Manager at Risk (CMR). It is the GC or CMR that is responsible for meeting the set-aside goals and vetting the SBE/MBE subcontractors.

   Municipalities must include contract compliance and set-aside language in all bid documents for a municipal public works contract to inform contractors of their obligation to meet contract compliance requirements and demonstrate good faith effort to achieve set-aside goals. All contracts must also contain contract compliance and set-aside language. It is the CONTRACTORS' responsibility to meet the requirements.

3. If a municipal public works contract is contracted for less than $50,000 and change orders push the contract value greater than $50,000 will the set-aside requirements apply?

   Projects under $50,000 are not subject to set-aside requirements. Change orders that increase a contract over $50,000 may be subject to further review by the CHRO when the change orders substantially increase the value of the contract.

   If the contract is less than $50,000 a municipality must still include the anti-discrimination language in the contract.

4. How often would municipalities be required to report to CHRO?

   Municipalities should contact CHRO:
   - **When a municipal public works contract is funded in whole or in part by the state**
   - **When the municipality has a pre-bid meeting for the public works project**
   - **When the municipality selects a bidder**

project, the list of contractors solicited for bids, the location of the project in relation to the subcontractors solicited and other project-specific factors.

10. Is there specific language that must be included in the bid documents and contracts?

    YES. The language will be available on the CHRO website.

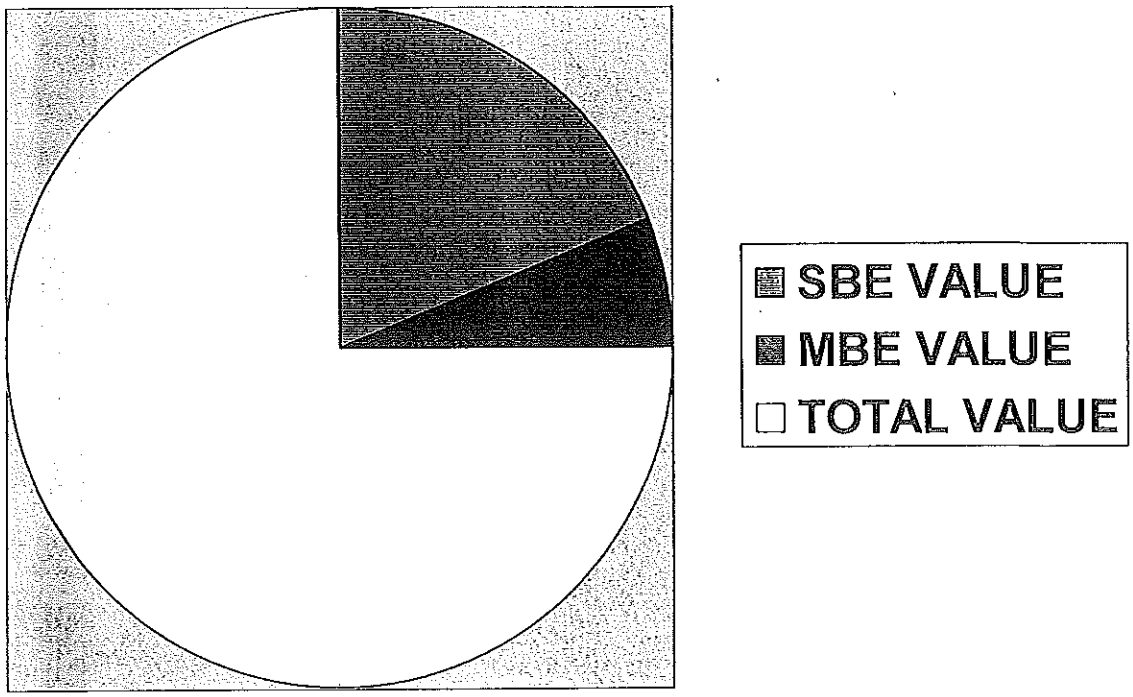
11. Are there specific forms that must be completed?

    YES. The forms are available on the CHRO website.

12. There appear to be conflicting views on how to calculate the set-aside. Please explain the requirements using an example with funds to show how contractors must comply.

    The law requires set-asides be placed on the portion of a municipal public works contract that is funded by the state; however, many awarding agencies and contractors choose to calculate the set-aside requirements based on the total value of the contract regardless of funding source(s). The CHRO encourages municipalities to find ways to maximize the diversity of the workforce so job opportunities are opened for small business, minority business, women's business, and disability-owned business enterprises.

    Please see example of calculation for set-aside below using the statutory formula on the next page:



SBE + MBE = 25%

TO: Contract Compliance Unit
Commission on Human Rights and Opportunities
CHRO Form CC052

FROM: Click here to enter text.

DATE: Click here to enter a date.

SUBJECT: Notification of Contract Award

As required by Connecticut Contract Compliance Regulations Sec. 46a-68-31 this is to notify the Commission that the following contract has been awarded.

CONTRACT NUMBER: Click here to enter text.

PROJECT NAME: Click here to enter text.

PROJECT LOCATION: Click here to enter text.

DURATION OF CONTRACT: Click here to enter text.

DOLLAR VALUE OF CONTRACT: Click here to enter text.

SET-ASIDE VALUE: SBE Click here.% Click here.$

MBE Click here.% Click here.$

THIS IS A PUBLIC WORKS CONTRACT ☐
THIS IS NOT A PUBLIC WORKS CONTRACT ☐

CONTRACTOR INFORMATION

NAME OF CONTRACTOR: Click here to enter text.

MAIN OFFICE ADDRESS: Click here to enter text.
Click here to enter text.

TELEPHONE NUMBER: Click here to enter text.

NUMBER OF EMPLOYEES: Click here to enter text.
(If known)

SUBCONTRACTOR INFORMATION: Please list any subcontractors who were listed by the Contractor for this project:
Click here to enter text.

WERE THE FOLLOWING FACTORS CONSIDERED IN THE SELECTION OF THIS CONTRACTOR?

1. The bidder's success in implementing an affirmative action plan:
   ☐Yes ☐No ☐ Unknown

2. The bidder's success in developing an apprenticeship program complying with Sections 46a-68-1 to 46a-68-17, inclusive:
   ☐Yes ☐No ☐ Unknown

3. The bidder's promise to develop and implement a successful affirmative action plan:
   ☐Yes ☐No ☐ Unknown

4. The bidder's submission of EEO-1 data indicating that the composition of the workforce is at or near parity when compared to the racial and gender composition of the workforce in the relevant labor market area:
   ☐Yes ☐No ☐ Unknown

5. The bidder's promise to set aside a portion of the contract for legitimate minority business enterprises:
   ☐Yes ☐No ☐ Unknown

AGENCY CONTACT PERSON

NAME: Click here to enter text.

JOB TITLE: Click here to enter text.

ADDRESS: Click here to enter text.

TELEPHONE: Click here to enter text.

August 4, 2015 Number 15-16
Municipal Management Bulletin

STATE SET-ASIDE REQUIREMENTS EXPANDED TO MUNICIPALITIES

New Requirements Effective October 1, 2015

The Special Session omnibus "budget implementer" bill (PA 15-5, Sections 58-71 & 88), among other things, requires towns and cities to comply with the state small business/minority business set-aside requirements. The new law will apply to state-funded municipal public works contracts in excess of $50,000 for the "construction, rehabilitation, conversion, extension, demolition, or repairing of a public building or highway, or other changes or improvements in real property." The purchase of goods and services by a municipality are not subject to the set-aside provisions under the Act.

New Set-Aside Requirements

- 25% of the total value of the contract must be set-aside for a certified Small Business Enterprise (SBE), of which 6.25% must be awarded to a certified Minority Business Enterprise (MBE) --women-owned businesses are included under the definition of minority owned business;

- Municipalities must state in any notice for competitive bids, or request for proposals or qualifications, that the general or trade contractor must comply with the State set-aside nondiscrimination and affirmative action requirements.

The program will be administered by the Commission on Human Rights and Opportunities (CHRO). CHRO will provide training for municipalities on the requirements and implementation of the program. The date and location of this session has not been set. CCM will provide additional information when it becomes available.

The Office of Legislative Research (OLR) has provided a summary of the new set aside law.

CCM is working with CHRO to flesh out the requirements of the new law. CHRO is in the process of determining exactly how the new law will be implemented. CCM will keep you appraised.

***

If you have questions regarding this bulletin, please contact Randy Collins (rcollins@ccm-ct.org) or Mike Muszynski (mmuszynski@ccm-ct.org) at (203) 498-3000.

This bulletin has been sent to CCM-member mayors, first selectmen, town managers, purchasing agents, municipal attorneys and public works directors.

BID NOTICE LANGUAGE (for print media)

This contract is subject to state set-aside and contract compliance requirements.

BID LANGUAGE (for bid documents)

The contractor who is selected to perform this State project must comply with CONN. GEN. STAT. §§ 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.

The contractor shall be required to make good faith efforts to place a minimum of twenty-five (25%) percent of the subcontracts awarded by the general contractor/construction manager at risk with eligible contractors holding current certification from the Connecticut Department of Administrative Services ("DAS") under the provisions of CONN. GEN. STAT. § 4a-60g, as amended. (25% of the work with DAS certified Small and Minority owned business(s) and 25% of that work with DAS certified Minority, Women and/or Disabled owned businesses.)

SAMPLE
CHECKLIST FOR CONTRACTING
2015

_____ POST THE BID NOTICE WITH CHRO LANGUAGE INCLUDED

_____ PRE-BID MEETING (IF APPLICABLE)

_____ PROVIDE BID DOCUMENTS WITH CHRO LANGUAGE INCLUDED

_____ SCREEN BIDS
- _____ CHECK CHRO WEBSITE FOR CONTRACTOR AFFIDAVIT LIST
- _____ CHECK WITH CT LAW JOURNAL TO ENSURE CONTRACTOR IS NOT DEBARRED

_____ SELECT BIDDER

_____ SEND NOTICE TO CHRO AND SELECTED BIDDER:
- _____ $50,000 TO $499,999 CONTACT AWARD NOTICE
- _____ $500,000 AND ABOVE INTENT TO AWARD CONTRACT NOTICE

_____ EXECUTE CONTRACT WITH CONTRACT COMPLIANCE AND SET-ASIDE LANGUAGE
- _____ $50,000 TO $499,999 WHEN AWARDED
- _____ $500,000 AND ABOVE ONLY WHEN:
  - _____ CONTRACTOR HAS SUBMITTED AN APPROVED AFFIRMATIVE ACTION PLAN TO CHRO
  - _____ REQUESTED APPROVAL FROM CHRO TO AWARD CONTRACT AND RETAIN 2% PER MONTH OF THE TOTAL CONTRACT VALUE UNTIL CONTRACTOR HAS SUBMITTED AN APPROVED AFFIRMATIVE ACTION PLAN TO CHRO AND CHRO HAS GRANTED APPROVAL.

_____ ENSURE A COPY OF A LETTER OF TRANSMITTAL FROM THE CONTRACTOR WAS RECEIVED CONFIRMING AN AFFIRMATIVE ACTION PLAN WAS FILED WITH CHRO

SECTION 00407

SUPPLEMENT E - BIDDER'S QUALIFICATION STATEMENT

Attached is the completed Bidder's Qualification Statement referenced in the bid submitted by:

(Bidder)_____

OWNER: Town of Windsor Locks
50 Church Street
Windsor Locks, CT 06096

PROJECT: The Windsor Locks Passenger Station
Exterior Masonry Restoration
Main Street (Rte 159)
Windsor Locks, CT 06096

Dated _____and which is an integral part of the Bid Form.

Each bid submitted must be accompanied by the attached Bidder Qualification Statement.

END OF SECTION

BIDDER QUALIFICATION STATEMENT

THE WINDSOR LOCKS PASSENGER STATION
EXTERIOR MASONRY RESTORATION
WINDSOR LOCKS, CONNECTICUT

A separate form shall be submitted for each contractor and subcontractor to be used on the project. Additional information relevant to the bidder's qualifications for this project may be submitted with the bid.

Name of Bidder_____

Address_____

Phone No._____

Principal Business of Firm_____

List categories of work that your firm normally performs with its own forces:

_____
_____
_____

1. Date firm organized_____

2. Names and addresses of directors, members or partners:

_____
_____
_____
_____

3. How many years has your organization been in business under your present name?_____
What was your organization's previous business name (if applicable)?_____

4. If you have defaulted on a contract or failed to complete work, please list any such contracts. Provide a list of judgments, claims arbitration rulings, lawsuits against your organization or its principals.

5. Has any officer or partner of your organization ever failed to complete a contract handled in his own name?____
If yes, give details on attached sheet.

6. Have any liens or lawsuits of any kind been filed against any of your contracts?_____

If yes, give details on attached sheet.

7. List surety companies which have bonded you.

NAME	ADDRESS	AMOUNT OF BOND

8. List all contracts which you are now performing or for which you have signed contracts but not started work. Indicate which, if any, that were financed by public funds.

NAME OF OWNER	TYPE OF WORK	AMOUNT	EST. COMPLETION DATE

9. List equipment owned by you for use in this contract (or attach list).

TYPE	AGE

10. List five similar contracts involving properties that are listed on the National Register of Historic Places, which you have completed recently and in which you followed the U.S. Secretary of the Interior's Standards for the Treatment of Historic Properties. Indicate which, if any, were financed by public funds.

A. NAME OF OWNER_____ CONTACT NAME_____ PHONE #_____

_____ _____ _____

DESCRIPTION OF WORK___ DOLLAR AMOUNT_____ DATE COMPLETED

_____ _____ _____

B. NAME OF OWNER_____ CONTACT NAME_____ PHONE #_____

_____ _____ _____

DESCRIPTION OF WORK___ DOLLAR AMOUNT_____ DATE COMPLETED

_____ _____ _____

C. NAME OF OWNER_____ CONTACT NAME_____ PHONE #_____

_____ _____ _____

DESCRIPTION OF WORK___ DOLLAR AMOUNT_____ DATE COMPLETED

_____ _____ _____

D. NAME OF OWNER_____ CONTACT NAME_____ PHONE #_____

_____ _____ _____

DESCRIPTION OF WORK___ DOLLAR AMOUNT_____ DATE COMPLETED

_____ _____ _____

E. NAME OF OWNER_____ CONTACT NAME_____ PHONE #_____

_____ _____ _____

DESCRIPTION OF WORK___ DOLLAR AMOUNT_____ DATE COMPLETED

_____ _____ _____

11. Please provide resumes of project superintendent/project manager to be assigned to the project.

12. Bank References:_____

13. Additional References/Remarks:

_____

_____

_____

_____

_____

_____

_____

_____

14. Acknowledgement that bidder can and will meet Town's insurance requirements:

_____

15. Please include with bid current financial statement.

16. Please provide letter from a bonding company acknowledging that they will supply a performance bond and labor and material payment bond for the project.

The foregoing is a true statement of facts to the best of my knowledge and belief.

NOTARIZED_____ SIGNED_____

_____ _____

_____ _____

DATE_____

DOCUMENT 00501

AGREEMENT - AIA

1 AGREEMENT

AIA Document A101 Standard Form of Agreement Between Owner and Contractor [2007 Edition] where the basis of payment is a Stipulated Sum and as amended below and with the attached 'Construction Contract Rider', forms the basis of Contract between the Owner and Contractor.

Note: The Contract will not include liquidated damages.

END OF AGREEMENT

DRAFT

AIA® Document A101™ – 2007

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

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

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

«Town of Windsor Locks»« »
«50 Church Street
Windsor Locks, CT 06096
»
« »
« »

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

« »« »
« »
« »
« »

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

«Windsor Locks Passenger Station ExteriorMasonry Restoration»
«Main Street (Rte 159)
Windsor Locks, CT 06096»
« »

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

«Crosskey Architects, LLC»« »
«750 Main Street, Suite 150
Hartford, CT 06103»
« »
« »

The Owner and Contractor agree as follows.

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.

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

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

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

TABLE OF ARTICLES

ARTICLE 1 THE CONTRACT DOCUMENTS

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

ARTICLE 2 THE WORK OF THIS CONTRACT

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

ARTICLE 3 DATE OF COMMENCEMENT AND SUBSTANTIAL COMPLETION

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

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

« »

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

« »

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

§ 3.3 The Contractor shall achieve Substantial Completion of the entire Work not later than « » (« ») days from the date of commencement, or as follows:

(Insert number of calendar days. Alternatively, a calendar date may be used when coordinated with the date of commencement. If appropriate, insert requirements for earlier Substantial Completion of certain portions of the Work.)

« »

Portion of Work	Substantial Completion Date

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

« »

ARTICLE 4 CONTRACT SUM

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

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

« »

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

Item	Units and Limitations	Price Per Unit ($0.00)

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

Item	Price

ARTICLE 5 PAYMENTS

§ 5.1 PROGRESS PAYMENTS

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

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

« »

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

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

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

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

.1 Take that portion of the Contract Sum properly allocable to completed Work as determined by multiplying the percentage completion of each portion of the Work by the share of the Contract Sum allocated to that portion of the Work in the schedule of values, less retainage of « » percent (« » %). Pending final determination of cost to the Owner of changes in the Work, amounts not in dispute shall be included as provided in Section 7.3.9 of AIA Document A201™–2007, General Conditions of the Contract for Construction;

.2 Add that portion of the Contract Sum properly allocable to materials and equipment delivered and suitably stored at the site for subsequent incorporation in the completed construction (or, if approved in advance by the Owner, suitably stored off the site at a location agreed upon in writing), less retainage of « » percent (« » %);

.3 Subtract the aggregate of previous payments made by the Owner; and

.4 Subtract amounts, if any, for which the Architect has withheld or nullified a Certificate for Payment as provided in Section 9.5 of AIA Document A201–2007.

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

.1 Add, upon Substantial Completion of the Work, a sum sufficient to increase the total payments to the full amount of the Contract Sum, less such amounts as the Architect shall determine for incomplete Work, retainage applicable to such work and unsettled claims; and
(Section 9.8.5 of AIA Document A201–2007 requires release of applicable retainage upon Substantial Completion of Work with consent of surety, if any.)

.2 Add, if final completion of the Work is thereafter materially delayed through no fault of the Contractor, any additional amounts payable in accordance with Section 9.10.3 of AIA Document A201–2007.

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

« »

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

§ 5.2 FINAL PAYMENT

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

.1 the Contractor has fully performed the Contract except for the Contractor's responsibility to correct Work as provided in Section 12.2.2 of AIA Document A201–2007, and to satisfy other requirements, if any, which extend beyond final payment; and

.2 a final Certificate for Payment has been issued by the Architect.

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

« »

ARTICLE 6 DISPUTE RESOLUTION

§ 6.1 INITIAL DECISION MAKER

The Architect will serve as Initial Decision Maker pursuant to Section 15.2 of AIA Document A201–2007, unless the parties appoint below another individual, not a party to this Agreement, to serve as Initial Decision Maker.

(If the parties mutually agree, insert the name, address and other contact information of the Initial Decision Maker, if other than the Architect.)

« »
« »
« »
« »

§ 6.2 BINDING DISPUTE RESOLUTION

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

[« »] Arbitration pursuant to Section 15.4 of AIA Document A201–2007

[« »] Litigation in a court of competent jurisdiction

[« »] Other *(Specify)*

« »

ARTICLE 7 TERMINATION OR SUSPENSION

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

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

ARTICLE 8 MISCELLANEOUS PROVISIONS

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

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

« » % « »

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

« »
«50 Church Street
Windsor Locks, CT 06096
»
« »
« »
« »
« »

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

« »
« »

« »
« »
« »
« »

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

§ 8.6 Other provisions:

« »

ARTICLE 9 ENUMERATION OF CONTRACT DOCUMENTS

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

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

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

§ 9.1.3 The Supplementary and other Conditions of the Contract:

Document	Title	Date	Pages

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

« »

Section	Title	Date	Pages

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

« »

Number	Title	Date

§ 9.1.6 The Addenda, if any:

Number	Date	Pages

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

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

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

« »

.2 Other documents, if any, listed below:

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

« »

ARTICLE 10 INSURANCE AND BONDS

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

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

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

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

OWNER *(Signature)*	CONTRACTOR *(Signature)*
« »« »	« »« »
(Printed name and title)	*(Printed name and title)*

DOCUMENT 00600

PERFORMANCE BOND & PAYMENT BOND - AIA

1. GENERAL CONDITIONS

AIA Document A312 PERFORMANCE BOND & PAYMENT BOND (2010 Edition), are the Bond Forms to be provided for this project.

Bonding company for Performance & Payment bond to posses a rating of 'A' or better and be listed on the most recent IRS Circular 570.

END OF PERFORMANCE & PAYMENT BOND

DRAFT

AIA® Document A312™ – 2010

Performance Bond

CONTRACTOR:
(Name, legal status and address)

« »« »
« »

SURETY:
(Name, legal status and principal place of business)

« »« »
« »

OWNER:
(Name, legal status and address)

«Town of Windsor Locks»« »
«50 Church Street
Windsor Locks, CT 06096
»

CONSTRUCTION CONTRACT
Date: « »
Amount: $ « »
Description:
(Name and location)

« Windsor Locks Passenger Station Exterior Masonry Restoration»
«Main Street (Rte 159)
Windsor Locks, CT 06096»

BOND
Date:
(Not earlier than Construction Contract Date)
« »
Amount: $ « »
Modifications to this Bond: « » None « » See Section 16

CONTRACTOR AS PRINCIPAL		SURETY	
Company:	*(Corporate Seal)*	Company:	*(Corporate Seal)*
Signature:		Signature:	
Name and Title:	« »« »	Name and Title:	« »« »

(Any additional signatures appear on the last page of this Performance Bond.)

(FOR INFORMATION ONLY — Name, address and telephone)

AGENT or BROKER:

« »
« »
« »

OWNER'S REPRESENTATIVE:
(Architect, Engineer or other party:)

« »
«50 Church Street
Windsor Locks, CT 06096
»
« »
« »
« »
« »

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.

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.

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

§ 1 The Contractor and 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.

§ 2 If the Contractor performs the Construction Contract, the Surety and the Contractor shall have no obligation under this Bond, except when applicable to participate in a conference as provided in Section 3.

§ 3 If there is no Owner Default under the Construction Contract, the Surety's obligation under this Bond shall arise after

.1 the Owner first provides notice to the Contractor and the Surety that the Owner is considering declaring a Contractor Default. Such notice shall indicate whether the Owner is requesting a conference among the Owner, Contractor and Surety to discuss the Contractor's performance. If the Owner does not request a conference, the Surety may, within five (5) business days after receipt of the Owner's notice, request such a conference. If the Surety timely requests a conference, the Owner shall attend. Unless the Owner agrees otherwise, any conference requested under this Section 3.1 shall be held within ten (10) business days of the Surety's receipt of the Owner's notice. 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;

.2 the Owner declares a Contractor Default, terminates the Construction Contract and notifies the Surety; and

.3 the Owner has agreed to pay the Balance of the Contract Price in accordance with the terms of the Construction Contract to the Surety or to a contractor selected to perform the Construction Contract.

§ 4 Failure on the part of the Owner to comply with the notice requirement in Section 3.1 shall not constitute a failure to comply with a condition precedent to the Surety's obligations, or release the Surety from its obligations, except to the extent the Surety demonstrates actual prejudice.

§ 5 When the Owner has satisfied the conditions of Section 3, the Surety shall promptly and at the Surety's expense take one of the following actions:

§ 5.1 Arrange for the Contractor, with the consent of the Owner, to perform and complete the Construction Contract;

§ 5.2 Undertake to perform and complete the Construction Contract itself, through its agents or independent contractors;

§ 5.3 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 a 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 Section 7 in excess of the Balance of the Contract Price incurred by the Owner as a result of the Contractor Default; or

§ 5.4 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, make payment to the Owner; or

.2 Deny liability in whole or in part and notify the Owner, citing the reasons for denial.

§ 6 If the Surety does not proceed as provided in Section 5 with reasonable promptness, the Surety shall be deemed to be in default on this Bond seven 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 Section 5.4, and the Owner refuses the payment 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 If the Surety elects to act under Section 5.1, 5.2 or 5.3, 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. Subject to the commitment by the Owner to pay the Balance of the Contract Price, the Surety is obligated, without duplication, for

.1 the responsibilities of the Contractor for correction of defective work and completion of the Construction Contract;

.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 Section 5; and

.3 liquidated damages, or if no liquidated damages are specified in the Construction Contract, actual damages caused by delayed performance or non-performance of the Contractor.

§ 8 If the Surety elects to act under Section 5.1, 5.3 or 5.4, the Surety's liability is limited to the amount of this Bond.

§ 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, successors and assigns.

§ 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.

§ 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 years after a declaration of Contractor Default or within two years after the Contractor ceased working or within two 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.

§ 12 Notice to the Surety, the Owner or the Contractor shall be mailed or delivered to the address shown on the page on which their signature appears.

§ 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. When so furnished, the intent is that this Bond shall be construed as a statutory bond and not as a common law bond.

§ 14 Definitions

§ 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.

§ 14.2 Construction Contract. The agreement between the Owner and Contractor identified on the cover page, including all Contract Documents and changes made to the agreement and the Contract Documents.

§ 14.3 Contractor Default. Failure of the Contractor, which has not been remedied or waived, to perform or otherwise to comply with a material term of the Construction Contract.

§ 14.4 Owner Default. Failure of the Owner, which has not been remedied or waived, to pay the Contractor as required under the Construction Contract or to perform and complete or comply with the other material terms of the Construction Contract.

§ 14.5 Contract Documents. All the documents that comprise the agreement between the Owner and Contractor.

§ 15 If this Bond is issued for an agreement between a Contractor and subcontractor, the term Contractor in this Bond shall be deemed to be Subcontractor and the term Owner shall be deemed to be Contractor.

§ 16 Modifications to this bond are as follows:

« »

(Space is provided below for additional signatures of added parties, other than those appearing on the cover page.)

CONTRACTOR AS PRINCIPAL		SURETY	
Company:	*(Corporate Seal)*	Company:	*(Corporate Seal)*
Signature:		Signature:	
Name and Title:	« »« »	Name and Title:	« »« »
Address:	« »	Address:	« »

DRAFT

AIA® Document A312™ – 2010

Payment Bond

CONTRACTOR:
(Name, legal status and address)

« »« »
« »

SURETY:
(Name, legal status and principal place of business)

« »« »
« »

OWNER:
(Name, legal status and address)

«Town of Windsor Locks»« »
«50 Church Street
Windsor Locks, CT 06096
»

CONSTRUCTION CONTRACT
Date: « »
Amount: $ « »
Description:
(Name and location)

« Windsor Locks Passenger Station Exterior Masonry Restoration»
«Main Street (Rte 159)
Windsor Locks, CT 06096»

BOND
Date:
(Not earlier than Construction Contract Date)
« »
Amount: $ « »
Modifications to this Bond: « » None « » See Section 18

CONTRACTOR AS PRINCIPAL		SURETY	
Company:	*(Corporate Seal)*	Company:	*(Corporate Seal)*
Signature:		Signature:	
Name and Title:	« »« »	Name and Title:	« »« »

(Any additional signatures appear on the last page of this Payment Bond.)

(FOR INFORMATION ONLY — Name, address and telephone)

AGENT or BROKER:

« »
« »
« »

OWNER'S REPRESENTATIVE:
(Architect, Engineer or other party:)

« »
«50 Church Street
Windsor Locks, CT 06096
»
« »
« »
« »
« »

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.

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.

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

§ 1 The Contractor and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors and assigns to the Owner to pay for labor, materials and equipment furnished for use in the performance of the Construction Contract, which is incorporated herein by reference, subject to the following terms.

§ 2 If the Contractor promptly makes payment of all sums due to Claimants, and defends, indemnifies and holds harmless the Owner from claims, demands, liens or suits by any person or entity seeking payment for labor, materials or equipment furnished for use in the performance of the Construction Contract, then the Surety and the Contractor shall have no obligation under this Bond.

§ 3 If there is no Owner Default under the Construction Contract, the Surety's obligation to the Owner under this Bond shall arise after the Owner has promptly notified the Contractor and the Surety (at the address described in Section 13) of claims, demands, liens or suits against the Owner or the Owner's property by any person or entity seeking payment for labor, materials or equipment furnished for use in the performance of the Construction Contract and tendered defense of such claims, demands, liens or suits to the Contractor and the Surety.

§ 4 When the Owner has satisfied the conditions in Section 3, the Surety shall promptly and at the Surety's expense defend, indemnify and hold harmless the Owner against a duly tendered claim, demand, lien or suit.

§ 5 The Surety's obligations to a Claimant under this Bond shall arise after the following:

§ 5.1 Claimants, who do not have a direct contract with the Contractor,

.1 have furnished a written notice of non-payment to the Contractor, stating with substantial accuracy the amount claimed and the name of the party to whom the materials were, or equipment was, furnished or supplied or for whom the labor was done or performed, within ninety (90) days after having last performed labor or last furnished materials or equipment included in the Claim; and

.2 have sent a Claim to the Surety (at the address described in Section 13).

§ 5.2 Claimants, who are employed by or have a direct contract with the Contractor, have sent a Claim to the Surety (at the address described in Section 13).

§ 6 If a notice of non-payment required by Section 5.1.1 is given by the Owner to the Contractor, that is sufficient to satisfy a Claimant's obligation to furnish a written notice of non-payment under Section 5.1.1.

§ 7 When a Claimant has satisfied the conditions of Sections 5.1 or 5.2, whichever is applicable, the Surety shall promptly and at the Surety's expense take the following actions:

§ 7.1 Send an answer to the Claimant, with a copy to the Owner, within sixty (60) days after receipt of the Claim, stating the amounts that are undisputed and the basis for challenging any amounts that are disputed; and

§ 7.2 Pay or arrange for payment of any undisputed amounts.

§ 7.3 The Surety's failure to discharge its obligations under Section 7.1 or Section 7.2 shall not be deemed to constitute a waiver of defenses the Surety or Contractor may have or acquire as to a Claim, except as to undisputed amounts for which the Surety and Claimant have reached agreement. If, however, the Surety fails to discharge its obligations under Section 7.1 or Section 7.2, the Surety shall indemnify the Claimant for the reasonable attorney's fees the Claimant incurs thereafter to recover any sums found to be due and owing to the Claimant.

§ 8 The Surety's total obligation shall not exceed the amount of this Bond, plus the amount of reasonable attorney's fees provided under Section 7.3, and the amount of this Bond shall be credited for any payments made in good faith by the Surety.

§ 9 Amounts owed by the Owner to the Contractor under the Construction Contract shall be used for the performance of the Construction Contract and to satisfy claims, if any, under any construction performance bond. By the Contractor furnishing and the Owner accepting this Bond, they agree that all funds earned by the Contractor in the performance of the Construction Contract are dedicated to satisfy obligations of the Contractor and Surety under this Bond, subject to the Owner's priority to use the funds for the completion of the work.

§ 10 The Surety shall not be liable to the Owner, Claimants or others for obligations of the Contractor that are unrelated to the Construction Contract. The Owner shall not be liable for the payment of any costs or expenses of any Claimant under this Bond, and shall have under this Bond no obligation to make payments to, or give notice on behalf of, Claimants or otherwise have any obligations to Claimants under this Bond.

§ 11 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.

§ 12 No suit or action shall be commenced by a Claimant under this Bond other than in a court of competent jurisdiction in the state in which the project that is the subject of the Construction Contract is located or after the expiration of one year from the date (1) on which the Claimant sent a Claim to the Surety pursuant to Section 5.1.2 or 5.2, or (2) on which the last labor or service was performed by anyone or the last materials or equipment were furnished by anyone under the Construction Contract, whichever of (1) or (2) first occurs. 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.

§ 13 Notice and Claims to the Surety, the Owner or the Contractor shall be mailed or delivered to the address shown on the page on which their signature appears. Actual receipt of notice or Claims, however accomplished, shall be sufficient compliance as of the date received.

§ 14 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. When so furnished, the intent is that this Bond shall be construed as a statutory bond and not as a common law bond.

§ 15 Upon request by any person or entity appearing to be a potential beneficiary of this Bond, the Contractor and Owner shall promptly furnish a copy of this Bond or shall permit a copy to be made.

§ 16 Definitions

§ 16.1 Claim. A written statement by the Claimant including at a minimum:

.1 the name of the Claimant;
.2 the name of the person for whom the labor was done, or materials or equipment furnished;
.3 a copy of the agreement or purchase order pursuant to which labor, materials or equipment was furnished for use in the performance of the Construction Contract;
.4 a brief description of the labor, materials or equipment furnished;
.5 the date on which the Claimant last performed labor or last furnished materials or equipment for use in the performance of the Construction Contract;
.6 the total amount earned by the Claimant for labor, materials or equipment furnished as of the date of the Claim;
.7 the total amount of previous payments received by the Claimant; and
.8 the total amount due and unpaid to the Claimant for labor, materials or equipment furnished as of the date of the Claim.

§ 16.2 Claimant. An individual or entity having a direct contract with the Contractor or with a subcontractor of the Contractor to furnish labor, materials or equipment for use in the performance of the Construction Contract. The term Claimant also includes any individual or entity that has rightfully asserted a claim under an applicable mechanic's lien or similar statute against the real property upon which the Project is located. The intent of this Bond shall be to include without limitation in the terms "labor, materials or equipment" that part of water, gas, power, light, heat, oil, gasoline, telephone service or rental equipment used in the Construction Contract, architectural and engineering services required for performance of the work of the Contractor and the Contractor's subcontractors, and all other items for which a mechanic's lien may be asserted in the jurisdiction where the labor, materials or equipment were furnished.

§ 16.3 Construction Contract. The agreement between the Owner and Contractor identified on the cover page, including all Contract Documents and all changes made to the agreement and the Contract Documents.

§ 16.4 Owner Default. Failure of the Owner, which has not been remedied or waived, to pay the Contractor as required under the Construction Contract or to perform and complete or comply with the other material terms of the Construction Contract.

§ 16.5 Contract Documents. All the documents that comprise the agreement between the Owner and Contractor.

§ 17 If this Bond is issued for an agreement between a Contractor and subcontractor, the term Contractor in this Bond shall be deemed to be Subcontractor and the term Owner shall be deemed to be Contractor.

§ 18 Modifications to this bond are as follows:

« »

(Space is provided below for additional signatures of added parties, other than those appearing on the cover page.)

CONTRACTOR AS PRINCIPAL		SURETY	
Company:	*(Corporate Seal)*	Company:	*(Corporate Seal)*
Signature:		Signature:	
Name and Title:	« »« »	Name and Title:	« »« »
Address:	« »	Address:	« »

DOCUMENT 00701

GENERAL CONDITIONS - AIA

1. GENERAL CONDITIONS

AIA Document A201 General Conditions of the Contract for Construction (2007 Edition) and AIA Document A201/SC Federal Supplementary Conditions of the Contract, are the General Conditions between the Owner and Contractor.

END OF GENERAL CONDITIONS

DRAFT

AIA® Document A201™ – 2007

General Conditions of the Contract for Construction

for the following PROJECT:
(Name and location or address)
« Windsor Locks Passenger Station Exterior Masonry Restoration»
«Main Street (Rte 159)
Windsor Locks, CT 06096»

THE OWNER:
(Name, legal status and address)
«Town of Windsor Locks»« »
«50 Church Street
Windsor Locks, CT 06096
»

THE ARCHITECT:
(Name, legal status and address)
«Crosskey Architects, LLC»« »
«750 Main Street, Suite 150
Hartford, CT 06103»

TABLE OF ARTICLES

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.

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

INDEX
(Topics and numbers in bold are section headings.)

ARTICLE 1 GENERAL PROVISIONS

§ 1.1 BASIC DEFINITIONS

§ 1.1.1 THE CONTRACT DOCUMENTS

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

§ 1.1.2 THE CONTRACT

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

§ 1.1.3 THE WORK

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

§ 1.1.4 THE PROJECT

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

§ 1.1.5 THE DRAWINGS

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

§ 1.1.6 THE SPECIFICATIONS

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

§ 1.1.7 INSTRUMENTS OF SERVICE

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

§ 1.1.8 INITIAL DECISION MAKER

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

§ 1.2 CORRELATION AND INTENT OF THE CONTRACT DOCUMENTS

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

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

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

§ 1.3 CAPITALIZATION

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

§ 1.4 INTERPRETATION

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

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

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

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

§ 1.6 TRANSMISSION OF DATA IN DIGITAL FORM

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

ARTICLE 2 OWNER

§ 2.1 GENERAL

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

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

§ 2.2 INFORMATION AND SERVICES REQUIRED OF THE OWNER

§ 2.2.1 Prior to commencement of the Work, the Contractor may request in writing that the Owner provide reasonable evidence that the Owner has made financial arrangements to fulfill the Owner's obligations under the Contract. Thereafter, the Contractor may only request such evidence if (1) the Owner fails to make payments to the Contractor as the Contract Documents require; (2) a change in the Work materially changes the Contract Sum; or (3) the Contractor identifies in writing a reasonable concern regarding the Owner's ability to make payment when due. The Owner shall furnish such evidence as a condition precedent to commencement or continuation of the Work or the portion of the Work affected by a material change. After the Owner furnishes the evidence, the Owner shall not materially vary such financial arrangements without prior notice to the Contractor.

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

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

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

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

§ 2.3 OWNER'S RIGHT TO STOP THE WORK

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

§ 2.4 OWNER'S RIGHT TO CARRY OUT THE WORK

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

ARTICLE 3 CONTRACTOR

§ 3.1 GENERAL

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

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

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

§ 3.2 REVIEW OF CONTRACT DOCUMENTS AND FIELD CONDITIONS BY CONTRACTOR

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

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

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

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

§ 3.3 SUPERVISION AND CONSTRUCTION PROCEDURES

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

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

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

§ 3.4 LABOR AND MATERIALS

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

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

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

§ 3.5 WARRANTY

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

§ 3.6 TAXES

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

§ 3.7 PERMITS, FEES, NOTICES AND COMPLIANCE WITH LAWS

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

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

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

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

§ 3.7.5 If, in the course of the Work, the Contractor encounters human remains or recognizes the existence of burial markers, archaeological sites or wetlands not indicated in the Contract Documents, the Contractor shall immediately suspend any operations that would affect them and shall notify the Owner and Architect. Upon receipt of such notice, the Owner shall promptly take any action necessary to obtain governmental authorization required to resume the operations. The Contractor shall continue to suspend such operations until otherwise instructed by the Owner but shall continue with all other operations that do not affect those remains or features. Requests for adjustments in the Contract Sum and Contract Time arising from the existence of such remains or features may be made as provided in Article 15.

§ 3.8 ALLOWANCES

§ 3.8.1 The Contractor shall include in the Contract Sum all allowances stated in the Contract Documents. Items covered by allowances shall be supplied for such amounts and by such persons or entities as the Owner may direct,

but the Contractor shall not be required to employ persons or entities to whom the Contractor has reasonable objection.

§ 3.8.2 Unless otherwise provided in the Contract Documents,

.1 Allowances shall cover the cost to the Contractor of materials and equipment delivered at the site and all required taxes, less applicable trade discounts;

.2 Contractor's costs for unloading and handling at the site, labor, installation costs, overhead, profit and other expenses contemplated for stated allowance amounts shall be included in the Contract Sum but not in the allowances; and

.3 Whenever costs are more than or less than allowances, the Contract Sum shall be adjusted accordingly by Change Order. The amount of the Change Order shall reflect (1) the difference between actual costs and the allowances under Section 3.8.2.1 and (2) changes in Contractor's costs under Section 3.8.2.2.

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

§ 3.9 SUPERINTENDENT

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

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

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

§ 3.10 CONTRACTOR'S CONSTRUCTION SCHEDULES

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

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

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

§ 3.11 DOCUMENTS AND SAMPLES AT THE SITE

The Contractor shall maintain at the site for the Owner one copy of the Drawings, Specifications, Addenda, Change Orders and other Modifications, in good order and marked currently to indicate field changes and selections made during construction, and one copy of approved Shop Drawings, Product Data, Samples and similar required submittals. These shall be available to the Architect and shall be delivered to the Architect for submittal to the Owner upon completion of the Work as a record of the Work as constructed.

§ 3.12 SHOP DRAWINGS, PRODUCT DATA AND SAMPLES

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

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

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

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

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

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

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

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

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

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

to rely upon the adequacy, accuracy and completeness of the services, certifications and approvals performed or provided by such design professionals, provided the Owner and Architect have specified to the Contractor all performance and design criteria that such services must satisfy. Pursuant to this Section 3.12.10, the Architect will review, approve or take other appropriate action on submittals only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents. The Contractor shall not be responsible for the adequacy of the performance and design criteria specified in the Contract Documents.

§ 3.13 USE OF SITE

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

§ 3.14 CUTTING AND PATCHING

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

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

§ 3.15 CLEANING UP

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

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

§ 3.16 ACCESS TO WORK

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

§ 3.17 ROYALTIES, PATENTS AND COPYRIGHTS

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

§ 3.18 INDEMNIFICATION

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

other rights or obligations of indemnity that would otherwise exist as to a party or person described in this Section 3.18.

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

ARTICLE 4 ARCHITECT

§ 4.1 GENERAL

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

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

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

§ 4.2 ADMINISTRATION OF THE CONTRACT

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

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

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

§ 4.2.4 COMMUNICATIONS FACILITATING CONTRACT ADMINISTRATION

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

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

§ 4.2.6 The Architect has authority to reject Work that does not conform to the Contract Documents. Whenever the Architect considers it necessary or advisable, the Architect will have authority to require inspection or testing of the

Work in accordance with Sections 13.5.2 and 13.5.3, whether or not such Work is fabricated, installed or completed. However, neither this authority of the Architect nor a decision made in good faith either to exercise or not to exercise such authority shall give rise to a duty or responsibility of the Architect to the Contractor, Subcontractors, material and equipment suppliers, their agents or employees, or other persons or entities performing portions of the Work.

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

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

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

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

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

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

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

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

ARTICLE 5 SUBCONTRACTORS

§ 5.1 DEFINITIONS

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

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

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

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

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

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

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

§ 5.3 SUBCONTRACTUAL RELATIONS

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

§ 5.4 CONTINGENT ASSIGNMENT OF SUBCONTRACTS

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

.1 assignment is effective only after termination of the Contract by the Owner for cause pursuant to Section 14.2 and only for those subcontract agreements that the Owner accepts by notifying the Subcontractor and Contractor in writing; and

.2 assignment is subject to the prior rights of the surety, if any, obligated under bond relating to the Contract.

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

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

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

ARTICLE 6 CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS

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

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

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

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

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

§ 6.2 MUTUAL RESPONSIBILITY

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

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

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

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

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

§ 6.3 OWNER'S RIGHT TO CLEAN UP

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

ARTICLE 7 CHANGES IN THE WORK

§ 7.1 GENERAL

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

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

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

§ 7.2 CHANGE ORDERS

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

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

§ 7.3 CONSTRUCTION CHANGE DIRECTIVES

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

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

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

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

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

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

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

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

.1 Costs of labor, including social security, old age and unemployment insurance, fringe benefits required by agreement or custom, and workers' compensation insurance;

.2 Costs of materials, supplies and equipment, including cost of transportation, whether incorporated or consumed;

.3 Rental costs of machinery and equipment, exclusive of hand tools, whether rented from the Contractor or others;

.4 Costs of premiums for all bonds and insurance, permit fees, and sales, use or similar taxes related to the Work; and

.5 Additional costs of supervision and field office personnel directly attributable to the change.

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

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

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

§ 7.4 MINOR CHANGES IN THE WORK

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

ARTICLE 8 TIME

§ 8.1 DEFINITIONS

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

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

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

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

§ 8.2 PROGRESS AND COMPLETION

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

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

furnished by the Contractor and Owner. The date of commencement of the Work shall not be changed by the effective date of such insurance.

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

§ 8.3 DELAYS AND EXTENSIONS OF TIME

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

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

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

ARTICLE 9 PAYMENTS AND COMPLETION

§ 9.1 CONTRACT SUM

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

§ 9.2 SCHEDULE OF VALUES

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

§ 9.3 APPLICATIONS FOR PAYMENT

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

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

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

§ 9.3.2 Unless otherwise provided in the Contract Documents, payments shall be made on account of materials and equipment delivered and suitably stored at the site for subsequent incorporation in the Work. If approved in advance by the Owner, payment may similarly be made for materials and equipment suitably stored off the site at a location agreed upon in writing. Payment for materials and equipment stored on or off the site shall be conditioned upon compliance by the Contractor with procedures satisfactory to the Owner to establish the Owner's title to such materials and equipment or otherwise protect the Owner's interest, and shall include the costs of applicable insurance, storage and transportation to the site for such materials and equipment stored off the site.

§ 9.3.3 The Contractor warrants that title to all Work covered by an Application for Payment will pass to the Owner no later than the time of payment. The Contractor further warrants that upon submittal of an Application for Payment all Work for which Certificates for Payment have been previously issued and payments received from the

Owner shall, to the best of the Contractor's knowledge, information and belief, be free and clear of liens, claims, security interests or encumbrances in favor of the Contractor, Subcontractors, material suppliers, or other persons or entities making a claim by reason of having provided labor, materials and equipment relating to the Work.

§ 9.4 CERTIFICATES FOR PAYMENT

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

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

§ 9.5 DECISIONS TO WITHHOLD CERTIFICATION

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

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

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

§ 9.5.3 If the Architect withholds certification for payment under Section 9.5.1.3, the Owner may, at its sole option, issue joint checks to the Contractor and to any Subcontractor or material or equipment suppliers to whom the Contractor failed to make payment for Work properly performed or material or equipment suitably delivered. If the Owner makes payments by joint check, the Owner shall notify the Architect and the Architect will reflect such payment on the next Certificate for Payment.

§ 9.6 PROGRESS PAYMENTS

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

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

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

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

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

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

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

§ 9.7 FAILURE OF PAYMENT

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

§ 9.8 SUBSTANTIAL COMPLETION

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

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

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

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

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

§ 9.9 PARTIAL OCCUPANCY OR USE

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

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

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

§ 9.10 FINAL COMPLETION AND FINAL PAYMENT

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

§ 9.10.2 Neither final payment nor any remaining retained percentage shall become due until the Contractor submits to the Architect (1) an affidavit that payrolls, bills for materials and equipment, and other indebtedness connected with the Work for which the Owner or the Owner's property might be responsible or encumbered (less amounts withheld by Owner) have been paid or otherwise satisfied, (2) a certificate evidencing that insurance required by the Contract Documents to remain in force after final payment is currently in effect and will not be canceled or allowed to expire until at least 30 days' prior written notice has been given to the Owner, (3) a written statement that the Contractor knows of no substantial reason that the insurance will not be renewable to cover the period required by the Contract Documents, (4) consent of surety, if any, to final payment and (5), if required by the Owner, other data establishing payment or satisfaction of obligations, such as receipts, releases and waivers of liens, claims, security interests or encumbrances arising out of the Contract, to the extent and in such form as may be designated by the Owner. If a Subcontractor refuses to furnish a release or waiver required by the Owner, the Contractor may furnish a bond satisfactory to the Owner to indemnify the Owner against such lien. If such lien remains unsatisfied after payments are made, the Contractor shall refund to the Owner all money that the Owner may be compelled to pay in discharging such lien, including all costs and reasonable attorneys' fees.

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

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

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

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

ARTICLE 10 PROTECTION OF PERSONS AND PROPERTY

§ 10.1 SAFETY PRECAUTIONS AND PROGRAMS

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

§ 10.2 SAFETY OF PERSONS AND PROPERTY

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

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

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

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

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

§ 10.2.5 The Contractor shall promptly remedy damage and loss (other than damage or loss insured under property insurance required by the Contract Documents) to property referred to in Sections 10.2.1.2 and 10.2.1.3 caused in whole or in part by the Contractor, a Subcontractor, a Sub-subcontractor, or anyone directly or indirectly employed by any of them, or by anyone for whose acts they may be liable and for which the Contractor is responsible under Sections 10.2.1.2 and 10.2.1.3, except damage or loss attributable to acts or omissions of the Owner or Architect or anyone directly or indirectly employed by either of them, or by anyone for whose acts either of them may be liable, and not attributable to the fault or negligence of the Contractor. The foregoing obligations of the Contractor are in addition to the Contractor's obligations under Section 3.18.

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

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

§ 10.2.8 INJURY OR DAMAGE TO PERSON OR PROPERTY

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

§ 10.3 HAZARDOUS MATERIALS

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

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

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

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

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

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

§ 10.4 EMERGENCIES

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

ARTICLE 11 INSURANCE AND BONDS

§ 11.1 CONTRACTOR'S LIABILITY INSURANCE

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

.1 Claims under workers' compensation, disability benefit and other similar employee benefit acts that are applicable to the Work to be performed;

.2 Claims for damages because of bodily injury, occupational sickness or disease, or death of the Contractor's employees;

.3 Claims for damages because of bodily injury, sickness or disease, or death of any person other than the Contractor's employees;

.4 Claims for damages insured by usual personal injury liability coverage;

.5 Claims for damages, other than to the Work itself, because of injury to or destruction of tangible property, including loss of use resulting therefrom;

.6 Claims for damages because of bodily injury, death of a person or property damage arising out of ownership, maintenance or use of a motor vehicle;

.7 Claims for bodily injury or property damage arising out of completed operations; and

.8 Claims involving contractual liability insurance applicable to the Contractor's obligations under Section 3.18.

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

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

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

§ 11.2 OWNER'S LIABILITY INSURANCE

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

§ 11.3 PROPERTY INSURANCE

§ 11.3.1 Unless otherwise provided, the Owner shall purchase and maintain, in a company or companies lawfully authorized to do business in the jurisdiction in which the Project is located, property insurance written on a builder's

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

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

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

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

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

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

§ 11.3.2 BOILER AND MACHINERY INSURANCE

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

§ 11.3.3 LOSS OF USE INSURANCE

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

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

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

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

§ 11.3.7 WAIVERS OF SUBROGATION

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

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

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

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

§ 11.4 PERFORMANCE BOND AND PAYMENT BOND

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

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

ARTICLE 12 UNCOVERING AND CORRECTION OF WORK

§ 12.1 UNCOVERING OF WORK

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

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

§ 12.2 CORRECTION OF WORK

§ 12.2.1 BEFORE OR AFTER SUBSTANTIAL COMPLETION

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

§ 12.2.2 AFTER SUBSTANTIAL COMPLETION

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

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

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

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

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

§ 12.2.5 Nothing contained in this Section 12.2 shall be construed to establish a period of limitation with respect to other obligations the Contractor has under the Contract Documents. Establishment of the one-year period for correction of Work as described in Section 12.2.2 relates only to the specific obligation of the Contractor to correct the Work, and has no relationship to the time within which the obligation to comply with the Contract Documents may be sought to be enforced, nor to the time within which proceedings may be commenced to establish the Contractor's liability with respect to the Contractor's obligations other than specifically to correct the Work.

§ 12.3 ACCEPTANCE OF NONCONFORMING WORK

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

ARTICLE 13 MISCELLANEOUS PROVISIONS

§ 13.1 GOVERNING LAW

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

§ 13.2 SUCCESSORS AND ASSIGNS

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

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

§ 13.3 WRITTEN NOTICE

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

§ 13.4 RIGHTS AND REMEDIES

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

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

§ 13.5 TESTS AND INSPECTIONS

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

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

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

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

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

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

§ 13.6 INTEREST

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

§ 13.7 TIME LIMITS ON CLAIMS

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

ARTICLE 14 TERMINATION OR SUSPENSION OF THE CONTRACT

§ 14.1 TERMINATION BY THE CONTRACTOR

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

.1 Issuance of an order of a court or other public authority having jurisdiction that requires all Work to be stopped;

.2 An act of government, such as a declaration of national emergency that requires all Work to be stopped;

.3 Because the Architect has not issued a Certificate for Payment and has not notified the Contractor of the reason for withholding certification as provided in Section 9.4.1, or because the Owner has not made payment on a Certificate for Payment within the time stated in the Contract Documents; or

.4 The Owner has failed to furnish to the Contractor promptly, upon the Contractor's request, reasonable evidence as required by Section 2.2.1.

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

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

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

§ 14.2 TERMINATION BY THE OWNER FOR CAUSE

§ 14.2.1 The Owner may terminate the Contract if the Contractor

.1 repeatedly refuses or fails to supply enough properly skilled workers or proper materials;

.2 fails to make payment to Subcontractors for materials or labor in accordance with the respective agreements between the Contractor and the Subcontractors;

.3 repeatedly disregards applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of a public authority; or

.4 otherwise is guilty of substantial breach of a provision of the Contract Documents.

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

.1 Exclude the Contractor from the site and take possession of all materials, equipment, tools, and construction equipment and machinery thereon owned by the Contractor;

.2 Accept assignment of subcontracts pursuant to Section 5.4; and

.3 Finish the Work by whatever reasonable method the Owner may deem expedient. Upon written request of the Contractor, the Owner shall furnish to the Contractor a detailed accounting of the costs incurred by the Owner in finishing the Work.

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

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

§ 14.3 SUSPENSION BY THE OWNER FOR CONVENIENCE

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

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

.1 that performance is, was or would have been so suspended, delayed or interrupted by another cause for which the Contractor is responsible; or

.2 that an equitable adjustment is made or denied under another provision of the Contract.

§ 14.4 TERMINATION BY THE OWNER FOR CONVENIENCE

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

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

.1 cease operations as directed by the Owner in the notice;

.2 take actions necessary, or that the Owner may direct, for the protection and preservation of the Work; and

.3 except for Work directed to be performed prior to the effective date of termination stated in the notice, terminate all existing subcontracts and purchase orders and enter into no further subcontracts and purchase orders.

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

ARTICLE 15 CLAIMS AND DISPUTES

§ 15.1 CLAIMS

§ 15.1.1 DEFINITION

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

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

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

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

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

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

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

.1 damages incurred by the Owner for rental expenses, for losses of use, income, profit, financing, business and reputation, and for loss of management or employee productivity or of the services of such persons; and

.2 damages incurred by the Contractor for principal office expenses including the compensation of personnel stationed there, for losses of financing, business and reputation, and for loss of profit except anticipated profit arising directly from the Work.

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

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

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

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

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

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

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

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

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

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

§ 15.3 MEDIATION

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

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

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

§ 15.4 ARBITRATION

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

party filing a notice of demand for arbitration must assert in the demand all Claims then known to that party on which arbitration is permitted to be demanded.

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

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

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

§ 15.4.4 CONSOLIDATION OR JOINDER

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

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

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

DOCUMENT 00811

SUPPLEMENTARY GENERAL CONDITIONS

SUPPLEMENTARY CONDITIONS

These Supplementary Conditions amend or supplement the General Conditions of the Contract for Construction (AIA A201 - 2007 Edition) and other provisions of the Contract Documents as indicated below. All provisions which are not so amended or supplemented remain in full force and effect.

The terms used in these Supplementary Conditions which are defined in the General Conditions of the Contract for Construction (AIA A201 2007 Edition) have the meanings assigned to them in the General Conditions.

Supplementary General Conditions in accordance with:

00811.2 Temporary Permits to Enter Upon Amtrak Property (PTEs)
00811.3 Amtrak – Contractor Orientation Training Request

END OF SECTION

Amtrak
Engineering Construction
4th Floor - South Tower
30th Street Station (Mail Box 64)
Philadelphia, PA 19104

Temporary Permits to Enter Upon Amtrak Property (PTEs)

Requests for Temporary Permits to Enter Upon Amtrak Property (PTEs) must be submitted to Amtrak in writing and include the following information:

1. Name of company requesting the permit (include address and telephone number)
2. Who's attention the permit should be addressed to
3. Permittee's e-mail address
4. Exact location of work (including railroad milepost, if known)
5. Specific work activity being performed on railroad property (please provide dollar value of the contract if work being performed is other than surveys or bridge inspections)
6. Projected duration of work being performed on railroad property
7. Contact, phone and address where invoices should be sent for payment by Permittee.

Note: ***Temporary Permits for performing any environmental or geotechnical tests or studies (e.g., air, soil or water sampling) may be issued subsequent to completion of Amtrak's environmental review and approval process. Requests are reviewed on a case-by-case basis. Depending on the site specific circumstances, a separate Site Access Agreement that addresses environmental liability issues may be required prior to any Temporary Permit.***

All PTE Requests must be submitted to the Amtrak Engineering Construction Department by fax, e-mail or mail as noted below:

- Faxed to (215) 349-3550 or MCGRATM@AMTRAK.COM
- Email to mcgratm@amtrak.com
- Mailed to the following address:

  Director I&C Projects
  National Railroad Passenger Corporation
  30th Street Station (Mail Box 64)
  Philadelphia, PA 19104

Due to the heavy volume of requests for Temporary Permits to Enter Upon Amtrak Property, the processing time for initial Permit requests is approximately 30 business days.

Rev. 8/05/13

AMTRAK
HR – Employee Development
30th and Market Streets – 3 North – Box 1
Philadelphia, PA 19104
Fax Number 215-349-3731

Contractor Orientation Training Request

This is in response to your request for Amtrak's Contractor Orientation Training. *Note: Our training delivery has changed.* Starting October 1, 2012, Instructor Led classroom training will ***no longer be offered*** and has been replaced with a computer based training program that is available 24 hours / 7 days per week. Offered at a cost of $18.00 per person, this training can be completed at **www.amtrakcontractor.com** and requires participants to register on the website before accessing the course. Participants completing this course are required to be able to ***Read, Comprehend and Demonstrate in English their understanding of the materials presented, as well as all the safety instructions, briefings and warnings.*** Before taking this course, participants will be required to provide a current photo and have the capability of uploading the photo electronically. At the end of this course, participants are required to pass a comprehensive test to receive a temporary certificate that is valid for three weeks. A Photo ID card, which is valid for one calendar year from the date of issue, will be mailed to the participant. Each participant will be given three (3) opportunities to pass the test. If unable to pass on the 3rd attempt, the participant will be unable to retake the test for 30 days.

The safety of Amtrak's passengers and all employees working on the property (Amtrak and Contractor personnel) remains our highest priority. For your protection, Amtrak requires that your employees comply with all safety regulations ("Specifications Regarding Safety and Protection of the Railroad Traffic Property").

All contractors must notify the Amtrak Project Manager or Engineer assigned to your project before entering onto railroad property and before coming within twenty-five (25 feet) of the centerline of the track or energized wire. Amtrak's Project Manager or Engineer assigned to your project will assist you with obtaining a temporary "Permit to Enter upon Property" and will arrange for protection if needed. Safety violations will result in the immediate suspension of work within the railroad's property limits.

Thank You

HR - Employee Development

SECTION 01010

SUMMARY OF WORK

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Contract Description.
B. Work Sequence.

1.2 CONTRACT DESCRIPTION

A. Contract Type: Stipulated Price as described in Document 00501.

1.3 WORK SEQUENCE

A. Construct work to accommodate Owner's occupancy requirements.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF SECTION

SECTION 01019

CONTRACT CONSIDERATIONS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Inspection and testing allowances.
B. Schedule of Values.
C. Application for Payment.
D. Change procedures.
E. Defect Assessment.
F. Measurement and Payment - Unit Prices.
G. Alternates.

1.02 RELATED SECTIONS

A. Owner - Contractor Agreement: Contract sum/price including allowances.
B. Section 01300 - Submittals: Schedule of Values.
C. Section 01600 - Material and Equipment: Product substitutions and alternates.

1.03 INSPECTION AND TESTING ALLOWANCES

A. Costs Included in Allowances: Cost of engaging an inspection or testing firm, execution of inspection or tests, reporting results.
B. Costs Not Included in the Allowance:
    1. Incidental labor and facilities required to assist inspection or testing firm.
    2. Costs of testing laboratory services required by Contractor separate from Contract Document requirements.
    3. Costs of retesting upon failure of previous tests as determined by Architect/Engineer.
C. Payment Procedures:
    1. Submit one copy of the inspection or testing firm's invoice with next application for payment.
    2. Pay invoice on approval by Architect/Engineer.
D. Include the sum of $3,000.00 for payment of inspection and testing laboratory services specified in Section 01400. Differences in cost will be adjusted by change order.

1.04 SCHEDULE OF VALUES

A. Submit typed schedule on AIA Form G103 Application & Certificate for Payment Continuation sheet. Contractor’s standard form or electronic media print-out will be considered.
B. Submit Schedule of Values in duplicate within 15 days after date of Owner-Contractor Agreement.
C. Format: Utilize the Table of Contents of this Project Manual. At a minimum, provide a labor value and a material value for each specification Section or item. Identify each line item with number and title of the major specification Section. Identify bonds, insurance and site mobilization costs.
D. Include in each line item, the amount of each Allowance specified in this Section.
E. Revise schedule to list approved Change Orders, with each Application For Payment.

1.05 APPLICATIONS FOR PAYMENT

A. Submit five copies of each application on AIA Form G702 Application& Certificate for Payment.

B. Content and Format: Utilize Schedule of Values for listing items in Application for Payment.

1.06 CHANGE PROCEDURES

A. The Architect/Engineer will advise of minor changes in the Work not involving an adjustment to Contract Sum/Price or Contract Time as authorized and will issue supplemental instructions.

B. The Architect/Engineer may issue a Proposal Request which includes a detailed description of a proposed change with supplementary or revised Drawings and specifications, a change in Contract Time for executing the change the period of time during which the requested price will be considered valid. Contractor will prepare and submit an estimate within seven days.

C. The Contractor may propose a change by submitting request for change to the Architect/Engineer, describing the proposed change and its full effect on the Work. Include a statement describing the reason for the change, and the effect on the Contract Sum/Price and Contract Time with full documentation in the form of unit costs and quantities for Material and Labor.. Document any requested substitutions in accordance with Section 01600.

D. Stipulated Sum/Price Change Order: Based on Proposal Request and Contractor's fixed price quotation.

E. Unit Price Change Order: For pre-determined unit prices and quantities, the Change Order will be executed on a fixed unit price basis. For unit costs or quantities of units of work which are not pre-determined, execute Work under a Construction Change Authorization. Changes in Contract Sum/Price or Contract Time will be computed as specified for Time and Material Change Order.

F. Construction Change Authorization: Architect/Engineer may issue a directive, on CHFA Form 2437 Request for Construction Change signed by the Owner, instructing the Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order. Document will describe changes in the Work, and designate method of determining any change in Contract Sum/Price or Contract Time. Promptly execute the change.

G. Change Order Forms: AIA G701 Change Order.

H. Execution of Change Orders: Architect will issue change orders for signature of parties as provided in the Conditions of the Contract.

I. **Contractor shall reimburse Owner for Architect's time spent reviewing proposed change orders more than twice (original and 1 revision) for the same item or scope of work.**

1.07 DEFECT ASSESSMENT

A. Replace the Work, or portions of the Work, not conforming to specified requirements.

B. If, in the opinion of the Architect, it is not practical to remove and replace the Work, the Architect will direct an appropriate remedy or adjust payment.

1.08 MEASUREMENT AND PAYMENT - UNIT PRICES

A. Authority: Measurement methods are delineated in the individual specification sections.

B. Take measurements and compute quantities. The Architect will verify measurements and quantities.

C. Unit Quantities: Actual quantities shall determine add/deduct adjustment to the contract price.
D. Payment Includes: Full compensation for required labor, Products, tools, equipment, plant and facilities, transportation, services and incidentals; erection, application or installation of an item of the Work; supervision, general conditions, overhead and profit.
E. Unit Price Schedule: See Section 00401

1.09 ALTERNATES

A. Alternates quoted on Bid Forms will be reviewed and accepted or rejected at the Owner's option. Accepted Alternates will be identified in Owner-Contractor Agreement.
B. Coordinate related work and modify surrounding work as required.
C. Schedule of Alternates: See Section 00402.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

END OF SECTION

SECTION 01039

COORDINATION AND MEETINGS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Coordination.
B. Field engineering
C. Pre-construction conference.
D. Site mobilization conference.
E. Progress meetings.
F. Pre-installation conferences.

1.02 COORDINATION

A. Coordinate scheduling, submittals, and Work of the various Sections of Specifications to assure efficient and orderly sequence of installation of interdependent construction elements, with provisions for accommodating items installed later.
B. Verify that utility requirement characteristics of operating equipment are compatible with building utilities. Coordinate work of various Sections having interdependent responsibilities for installing, connecting to, and placing in service, such equipment.
C. Coordinate space requirements and installation of mechanical and electrical work which are indicated diagrammatically on Drawings. Follow routing shown for pipes, ducts, and conduit, as closely as practicable; place runs parallel with line of building. Utilize spaces efficiently to maximize accessibility for other installations, for maintenance, and for repairs.
D. In finished areas except as otherwise indicated, conceal pipes, ducts, and wiring within the construction. Coordinate locations of fixtures and outlets with finish elements.
E. Coordinate completion and clean up of Work of separate sections in preparation for Substantial Completion.
F. After Owner occupancy of premises, coordinate access to site for correction of defective Work and Work not in accordance with Contract Documents, to minimize disruption of Owner's activities.
G. Tenant Work: See Specification Section 01500.

1.03 PRECONSTRUCTION CONFERENCE

A. Owner will schedule a conference after Notice of Award.
B. Attendance Required: Owner, Architect/Engineer, and Contractor.
C. Agenda:
    1. Execution of Owner-Contractor Agreement.
    2. Submission of executed bonds and insurance certificates.
    3. Distribution of Contract Documents.
    4. Submission of list of Subcontractors, list of Products, schedule of values, and progress schedule.
    5. Designation of personnel representing the parties in Contract, and the Architect/Engineer.
    6. Procedures and processing of field decisions, submittals, substitutions, applications for payments, proposal request, Change Orders and Contract closeout procedures.
    7. Scheduling.

1.04 SITE MOBILIZATION CONFERENCE

A. Owner will schedule a conference at the Project site prior to Contractor occupancy.

B. Attendance Required: Owner, Architect/Engineer, and Contractor, Contractor's Superintendent, and major Subcontractors.

C. Agenda:

1. Use of premises by Owner and Contractor.
2. Owner's requirements.
3. Construction facilities and controls provided by Owner.
4. Temporary utilities provided by Contractor.
5. Survey and building layout.
6. Security and housekeeping procedures.
7. Schedules.
8. Procedures for testing.
9. Procedures for maintaining record documents.
10. Requirements for start-up of equipment.
11. Inspection and acceptance of equipment put into service during construction period.

1.05 PROGRESS MEETINGS

A. Schedule and administer meetings throughout progress of the Work biweekly.

B. Architect shall administer meetings, prepare agenda with copies for participants, preside at meetings, record minutes, and distribute copies within two days to Engineer, Owner, Contractor, participants, and those affected by decisions made.

C. Attendance Required: Job superintendent, major Subcontractors and suppliers, Owner, Architect/Engineer as appropriate to agenda topics for each meeting.

D. Agenda:

1. Review minutes of previous meetings.
2. Review of Work progress.
3. Field observations, problems, and decisions.
4. Identification of problems which impede planned progress.
5. Review of submittals schedule and status of submittals.
6. Review of off-site fabrication and delivery schedules.
7. Maintenance of progress schedule.
8. Corrective measures to regain projected schedules.
9. Planned progress during succeeding work period.
10. Coordination of projected progress.
11. Maintenance of quality and work standards.
12. Effect of proposed changes on progress schedule and coordination.
13. Other business relating to Work.

1.06 PREINSTALLATION CONFERENCES

A. When required in individual specification Section, convene a pre-installation conference at work site prior to commencing work of the Section.

B. Require attendance of parties directly affecting, or affected by, work of the specific Section.

C. Notify Architect/Engineer four days in advance of meeting date.

D. Prepare agenda, preside at conference, record minutes, and distribute copies within two days after conference to participants, with two copies to Architect/Engineer.

E. Review conditions of installation, preparation and installation procedures, and coordination with related work.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

END OF SECTION

SECTION 01120

ALTERATION PROJECT PROCEDURES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Products and installation for patching and extending Work.
B. Transition and adjustments.
C. Repair of damaged surfaces, finishes, and cleaning.

1.02 RELATED SECTIONS

A. Section 01039 - Coordination and Meetings: Work sequence, Owner occupancy, Maintenance of utility services.
B. Section 01039 - Coordination and Meetings, Cutting and patching.
C. Section 01500 - Construction Facilities and Temporary Controls: Temporary enclosures, Protection of installed work, Cleaning during construction.

PART 2 PRODUCTS

2.01 PRODUCTS FOR PATCHING AND EXTENDING WORK

A. New Materials: As specified in product Sections; match existing Products and work for patching and extending work.
B. Type and Quality of Existing Products: Determine by inspection and testing Products where necessary, referring to existing Work as a standard.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that demolition is complete, and areas are ready for installation of new Work.
B. Beginning of restoration work means acceptance of existing conditions.

3.02 PREPARATION

A. Cut, move, or remove items as necessary for access to alterations and renovation Work. Replace and restore at completion.
B. Remove unsuitable material not marked for salvage, such as rotted wood, corroded metals, and deteriorated masonry and concrete. Replace materials as specified for finished Work.
C. Remove debris and abandoned items from area and from concealed spaces.
D. Prepare surface and remove surface finishes to provide for proper installation of new work and finishes.
E. Close openings in exterior surfaces to protect existing work and salvage items from weather and extremes of temperature and humidity. Insulate ductwork and piping to prevent condensation in exposed areas.

3.03 INSTALLATION

A. Coordinate work of alterations and renovations to expedite completion sequentially and to accommodate Owner occupancy.

B. Project and Finishes: Complete in all respects including operational mechanical and electrical work.
C. Remove, cut, and patch Work in a manner to minimize damage and to provide a means of restoring Products and finishes to original or specified condition.
D. Refinish visible existing surfaces to remain in renovated rooms and spaces, to specified condition for each material, with a neat transition to adjacent finishes.
E. Install Products as specified in individual Sections.

3.04 TRANSITIONS

A. Where new Work abuts or aligns with existing, perform a smooth and even transition. Patched Work to match existing adjacent Work in texture and appearance.
B. When finished surfaces are cut so that a smooth transition with new work is not possible, terminate existing surface along a straight line at a natural line of division and make recommendation to Architect/Engineer.

3.05 ADJUSTMENTS

A. Where removal of partitions or walls results in adjacent spaces becoming one, rework floors, walls, and ceilings to a smooth plane without breaks, steps, or bulkheads.
B. Where a change of plane of 1/4 inch or more occurs, submit recommendation for providing a smooth transition for Architect/Engineer review or request instructions from Architect/Engineer.
C. Trim existing doors as necessary to clear new floor finish. Refinish trim as required.
D. Fit work at penetrations of surfaces.

3.06 REPAIR OF DAMAGED SURFACES

A. Patch or replace portions of existing surfaces which are damaged, lifted, discolored, or showing other imperfections.
B. Repair substrate prior to patching finish.

3.07 FINISHES

A. Finish surfaces as specified in individual Product Sections.
B. Finish patches to product uniform finish and texture over entire area. When finish cannot be matched, refinish entire surface to nearest intersections.

3.08 CLEANING

A. Provide cleaning as specified in Section 01500.

END OF SECTION

SECTION 01210

ALLOWANCES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes administrative and procedural requirements governing allowances.
   1. Certain items are specified in the Contract Documents by allowances. Allowances have been established in lieu of additional requirements and to defer selection of actual materials and equipment to a later date when additional information is available for evaluation. If necessary, additional requirements will be issued by Change Order.

B. Types of allowances include the following:
   1. Lump-sum allowances.

C. Related Sections include the following:
   1. Division 1 Section "Contract Modification Procedures" for procedures for submitting and handling Change Orders for allowances.
   2. Divisions 2 through 16 Sections for items of Work covered by allowances.

1.3 SELECTION AND PURCHASE

A. At the earliest practical date after award of the Contract, advise Architect of the date when final selection and purchase of each product or system described by an allowance must be completed to avoid delaying the Work.

B. At Architect's request, obtain proposals for each allowance for use in making final selections. Include recommendations that are relevant to performing the Work.

C. Purchase products and systems selected by Architect from the designated supplier.

1.4 SUBMITTALS

A. Coordinate and process submittals for allowance items in same manner as for other portions of the Work.

1.5 COORDINATION

A. Coordinate allowance items with other portions of the Work. Furnish templates as required to coordinate installation.

1.6 LUMP-SUM ALLOWANCES

A. Allowance shall include cost to Contractor of specific products and materials ordered by Owner under allowance and shall include taxes, freight, and delivery to Project site.

B. Unless otherwise indicated, Contractor's costs for receiving and handling at Project site, labor, installation, overhead and profit, and similar costs related to products and materials ordered by Owner under allowance shall be included as part of the Contract Sum and not part of the allowance.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine products covered by an allowance promptly on delivery for damage or defects. Return damaged or defective products to manufacturer for replacement.

3.2 PREPARATION

A. Coordinate materials and their installation for each allowance with related materials and installations to ensure that each allowance item is completely integrated and interfaced with related work.

3.3 SCHEDULE OF ALLOWANCES

A. Refer to bid form supplements, Section 00403.

END OF SECTION 01210

SECTION 01230

ALTERNATES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes administrative and procedural requirements for alternates.

1.3 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. Execute accepted alternates under the same conditions as other work of the Contract.

C. Schedule: A schedule of alternates is included in Section 00402. 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

END OF SECTION 01230

SECTION 01270

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 1 Specification Sections, apply to this Section.

1.2 SUMMARY

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

B. Related Sections:

1. Division 1 Section “Allowances” for procedures for using unit prices to adjust quantity allowances.
2. Division 1 Section "Contract Modification Procedures" for procedures for submitting and handling Change Orders.
3. Division 1 Section "Quality Requirements" for general testing and inspecting requirements.

PART 2 - PRODUCTS (Not Used)

END OF SECTION 01270

SECTION 01300

SUBMITTALS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Submittal procedures.
B. Construction progress schedules.
C. Proposed Products list.
D. Shop drawings.
E. Product data.
F. Samples.
G. Manufacturers' instructions.
H. Manufacturers' certificates.

1.02 RELATED SECTIONS

A. Section 01400 - Quality Control: Manufacturers' field services and reports.
B. Section 01700 - Contract Closeout: Contract closeout submittals.

1.03 REFERENCES

A. AGC (Associated General Contractors of America) publication "The Use of CPM in Construction - A Manual for General Contractors and the Construction Industry".

1.04 SUBMITTAL PROCEDURES

A. Transmit each submittal with Architect/Engineer accepted form.
B. Sequentially number the transmittal forms. Re-submittals to have original number with an alphabetic suffix.
C. Identify Project, Contractor, Subcontractor or supplier; pertinent Drawing sheet and detail number(s), and specification Section number, as appropriate.
D. Apply Contractor's stamp, signed or initialed certifying that review, verification of Products required, field dimensions, adjacent construction Work, and coordination of information, is in accordance with the requirements of the Work and Contract Documents.
E. Schedule submittals to expedite the Project, and deliver to Architect/Engineer at business address. Coordinate submission of related items.
F. Identify variations from Contract Documents and Product or system limitations which may be detrimental to successful performance of the completed Work.
G. Provide space for Contractor and Architect/Engineer review stamps.
H. Revise and resubmit submittals as required, identify all changes made since previous submittal.
I. Distribute copies of reviewed submittals to concerned parties. Instruct parties to promptly report any inability to comply with provisions.
J. **Contractor shall reimburse Owner for Architect's time spent reviewing proposed change orders more than twice (original and 1 revision) for the same item or scope of work.**

1.05 CONSTRUCTION PROGRESS SCHEDULES

A. Submit initial progress schedule in duplicate within 15 days after date of Owner-Contractor Agreement for Architect/Engineer review.
B. Revise and resubmit as required.
C. Submit revised schedules with each Application for Payment, identifying changes since previous version.
D. Submit a horizontal bar chart with separate line for each section of Work, identifying first work day of each week.
E. Show complete sequence of construction by activity, identifying Work of separate stages and other logically grouped activities. Indicate the early and late start, early and late finish, float dates, and duration.
F. Indicate estimated percentage of completion for each item of Work at each submission.
G. Indicate submittal dates required for shop drawings, product data, samples, and product delivery dates, including those furnished by Owner and under Allowances.

1.06 PROPOSED PRODUCTS LIST

A. Within 15 days after date of Owner-Contractor Agreement submit complete list of major products proposed for use, with name of manufacturer, trade name, and model number or each product.
B. For products specified only by reference standards, give manufacturer, trade name, model or catalog designation, and reference standards.

1.07 SHOP DRAWINGS

A. Submit the number of opaque reproductions which Contractor requires, plus two copies which will be retained by Architect/Engineer.
B. After review, reproduce and distribute in accordance with Article on Procedures above and for Record Documents described in Section 01700 - Contract Closeout.

1.08 PRODUCT DATA

A. Submit the number of copies which the Contractor requires, plus three copies which will be retained by the Architect/Engineer.
B. Mark each copy to identify applicable products, models, options, and other data. Supplement manufacturers' standard data to provide information unique to this Project.
C. After review, distribute in accordance with Article on Procedures above and provide copies for Record Documents described in Section 01700 - Contract Closeout.

1.09 SAMPLES

A. Submit samples to illustrate functional and aesthetic characteristics of the Product, with integral parts and attachment devices. Coordinate sample submittals for interfacing work.
B. Submit samples of finishes from the full range of manufacturers' standard colors or in custom colors selected, textures, and patterns for Architect/Engineer's selection.
C. Include identification on each sample, with full Project information.
D. Submit the number or samples specified in individual specification Sections; one of which will be retained by Architect/Engineer.
E. Reviewed samples which may be used in the Work are indicated in individual specification Sections.

1.10 MANUFACTURER'S INSTRUCTIONS

A. When specified in individual specification Sections, submit manufacturers' printed

instructions for delivery, storage, assembly, installation, start-up, adjusting, and finishing, in quantities specified for Product Data.

B. Identify conflicts between manufacturers' instructions and Contract Documents.

1.11 MANUFACTURER'S CERTIFICATES

A. When specified in individual specification Sections, submit manufacturers' certificate to Architect/Engineer for review, in quantities specified for Product Data.

B. Indicate material or Product conforms to or exceeds specified requirements. Submit supporting reference date, affidavits, and certifications as appropriate.

C. Certificates may be recent or previous test results on material or Product, but must be acceptable to Architect/Engineer.

PART 2 PRODUCTS

(not used)

PART 3 EXECUTION

(not used)

END OF SECTION

SECTION 01400

QUALITY CONTROL

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Quality assurance and control of installation.
B. References.
C. Field samples.
D. Mock-up.
E. Inspection and testing laboratory services.
F. Manufacturers' field services and reports.

1.02 RELATED SECTIONS

A. Section 01300 - Submittals: Submission of Manufacturers' Instructions and Certificates.
B. Section 01600 - Material and Equipment: Requirements for material and product quality.

1.03 QUALITY ASSURANCE/CONTROL OF INSTALLATION

A. Monitor quality control over suppliers, manufacturers, Products, services, site conditions, and workmanship, to produce Work of specified quality.
B. Comply fully with manufacturers' instructions, including each step in sequence.
C. Should manufacturers' instructions conflict with Contract Documents, request clarification from Architect/Engineer before proceeding.
D. Comply with specified standards as a minimum quality for the Work except when more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.
E. Perform work by persons qualified to produce workmanship of specified quality.
F. Secure Products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion or disfigurement.
G. Verify that field measurements are as indicated on shop drawings or as instructed by the manufacturer.

1.04 REFERENCES

A. Conform to reference standard by date of issue current on date for receiving bids.
B. Obtain copies of standards when required by Contract Documents.
C. Should specified reference standards conflict with Contract Documents, request clarification for Architect/Engineer before proceeding.
D. The contractual relationship of the parties to the Contract shall not be altered from the Contract Documents by mention or inference otherwise in any reference document.

1.05 FIELD SAMPLES

A. Install field samples at the site as required by individual specifications Sections for review.
B. Acceptable samples represent a quality level for the Work.
C. Where field sample is specified in individual Sections to be removed, clear area after field sample has been accepted by Architect/Engineer.

1.06 MOCK-UP

A. Tests will be performed under provisions identified in this section and identified in the respective product specification sections.
B. Assemble and erect specified items, with specified attachment and anchorage devices, flashings, seals, and finishes.
C. Where mock-up is specified in individual Sections to be removed, clear area after mock-up has been accepted by Architect/Engineer.

1.07 INSPECTION AND TESTING LABORATORY SERVICES

A. Owner will appoint and employ services of an independent firm to perform inspection and testing. Contractor shall pay for services from an allowance specified in Section 01019.
B. The independent firm will perform inspections, tests, and other services specified in individual specification Sections and as required by the Architect/Engineer.
C. Reports will be submitted by the independent firm to the Architect/Engineer, indicating observations and results of tests and indicating compliance or non-compliance with Contract Documents.
D. Reports will also be submitted by the independent firm to the Connecticut Housing and Finance Authority.
E. Cooperate with independent firm; furnish samples of materials, design mix, equipment, tools, storage and assistance as requested.
    1. Notify Architect/Engineer and independent firm 24 hours prior to expected time for operations requiring services.
    2. Make arrangements with independent firm and pay for additional samples and tests required for Contractor's use.
F. Retesting required because of non-conformance to specified requirements shall be performed by the same independent firm on instructions by the Architect/Engineer. Contractor shall pay for required retesting.
G. Testing and source quality control may occur on or off the project site. Perform off-site testing as required by the Architect or the Owner.
H. Testing does not relieve Contractor to perform Work to contract requirements.

1.08 MANUFACTURERS' FIELD SERVICES AND REPORTS

A. Submit qualifications of observer to Architect/Engineer 30 days in advance of required observations. Observer subject to approval of Architect/Engineer.
B. When specified in individual specification Sections, require material or Product suppliers or manufacturers to provide qualified staff personnel to observe site conditions, conditions of surfaces and installation, quality of workmanship, start-up of equipment, test, adjust, and balance of equipment as applicable, and to initiate instructions when necessary.
C. Individuals to report observations and site decisions or instructions given to applicators or installers that are supplemental or contrary to manufacturers' written instructions.
D. Submit report within 30 days of observation to Architect/Engineer for review.

1.09 TOLERANCES

A. Monitor fabrication and installation tolerance control of Products to produce acceptable Work. Do not permit tolerances to accumulate.
B. Comply with manufacturers' tolerances. Should manufacturers' tolerances conflict with Contract Documents, request clarification from Architect before proceeding.
C. Adjust Products to appropriate dimensions; position before securing Products in place.

PART 2 PRODUCTS

(not used)

PART 3 EXECUTION

(not used)

END OF SECTION

SECTION 01500

CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Temporary Utilities: Electricity, telephone service, water, and sanitary facilities.
B. Temporary Controls: Barriers, enclosures and fencing, protection of the Work, and water control.
C. Construction Facilities: Access roads, parking, progress cleaning, and project signage.

1.02 TEMPORARY ELECTRICITY

A. Electrical Utility Fee Cost: By Owner
B. The Contractor shall provide a for power service required from utility source.
C. There is an electrical connection, which will be available for the Contractor's use, on the North side of the building, adjacent to the a telephone pole. Connection is the Contractor's responsibility. The Owner will pay the electrical fees from the utility company.
D. Provide power outlets for construction operations, with branch wiring and distribution boxes. Provide flexible power cords as required.
E. Permanent convenience receptacles may be utilized during construction.
F. Provide adequate distribution equipment, wiring, and outlets to provide single phase branch circuits for power and lighting, as required.
G. Note: There are powerlines present directly overhead and connectiong to the building. The Contractor shall be responsible for knowledge of and compliance with any and all safety regulations. The Contractor is responsible for coordinating the Work with the utility company, as required.

1.03 TEMPORARY WATER SERVICE

A. The Contractor shall provide, maintain and pay for suitable quality water service required. Connect to existing water source for construction operations at time of project mobilization.
B. Pay cost of water used.
C. Extend branch piping with outlets located so water is available by hoses with threaded connections. Provide temporary pipe insulation to prevent freezing.
D. Note: There is no water service to the building. According to the water company, the main line is on the west side of Main Street. The Contractor will be responsible for coordinating with the utility company and AHJ for water service, as required to perform the Work.

1.04 TELEPHONE & FACSIMILE SERVICE

A. Provide, maintain and pay for telephone and facsimile service to field office at time of project mobilization.

1.05 TEMPORARY SANITARY FACILITIES

A. Provide and maintain required facilities and enclosures. Existing facilities within the construction area may not be used. Maintain daily in clean and sanitary condition.

1.06 BARRIERS

A. Provide barriers to prevent unauthorized entry to construction areas and to protect existing facilities and adjacent properties from damage from construction operations.
B. Provide barricades and covered walkways required by governing authorities for public rights-of-way and for public access to existing building.
C. Provide protection for plant life designated to remain. Replace damaged plant life.
D. Protect non-owned vehicular traffic, stored materials, site and structures from damage.
E. Provide protection for access and egress at occupied tenant spaces.

1.07 TEMPORARY FENCING

A. The Contractor is responsible for temporary construction fencing.
B. Construction: Commercial grade chain link fence.
C. Provide as necessary to secure the site per '1.11 Security'.

1.08 WATER CONTROL

A. Grade site to drain. Maintain excavations free of water. Provide, operate, and maintain pumping equipment.
B. Protect site from puddling or running water. Provide water barriers as required to protect site from soil erosion.

1.09 EXTERIOR ENCLOSURES

A. Provide temporary insulated weather-tight closure of exterior openings to accommodate acceptable working conditions and protection for Products, to allow for temporary heating and maintenance of required ambient temperatures identified in individual specification Sections, and to prevent entry of unauthorized persons. Provide access doors with self-closing hardware and locks.
B. Provide temporary roofing as required.

1.10 PROTECTION OF INSTALLED WORK

A. Protect installed Work and provide special protection where specified in individual specification Sections.
B. Provide temporary and removable protection for installed Products. Control activity in immediate work area to minimize damage.
C. Provide protective coverings at walls, projections, jambs, sills, and soffits of openings.
D. Protect finished floors, stairs, and other surfaces from traffic, dirt, wear, damage, or movement of heavy objects, by protecting with durable sheet materials.
E. Prohibit traffic or storage upon waterproofed or roofed surfaces. If traffic or activity is necessary, obtain recommendations for protection from waterproofing or roofing material manufacturer.
F. Prohibit traffic from landscaped areas.

1.11 SECURITY

A. The Contractor shall provide security and facilities to protect Work and existing facilities from unauthorized entry, vandalism, or theft.

1.12 ACCESS ROADS

A. Provide and maintain access to fire hydrants, free of obstructions.
B. Provide means of removing mud from vehicle wheels before entering streets.

1.13 PARKING

A. Arrange for temporary parking to accommodate construction personnel.
B. When site space is not adequate, provide additional off-site parking.

1.14 PROGRESS CLEANING

A. Maintain areas free of waste materials, debris, and rubbish. Maintain site in a clean and orderly condition.
B. Remove debris and rubbish from pipe chases, plenums, attics, crawl spaces, and other closed or remote spaces, prior to enclosing the space.
C. Broom and vacuum clean interior areas prior to start of surface finishing, and continue cleaning to eliminate dust.
D. Collect and remove waste materials, debris, and rubbish from site periodically and dispose off-site.
E. Open free fall chutes are not permitted. Terminate closed chutes into appropriate containers with lids.

1.15 PROJECT IDENTIFICATION

A. Temporary Signs - Provide one (1) project sign of exterior grade plywood and wood frame construction, painted, with die cut vinyl, self-adhesive letters and self-adhesive logos, to design and colors as shown on the Drawings. Refer to following pages for sign template and logos.
B. Erect on site at location established by Architect/Engineer.
C. No other signs are allowed without Owner permission except those required by law.

1.16 FIELD OFFICES

A. Office: Weather-tight, with lighting, electrical outlets, heating, cooling and ventilating equipment, and equipped with sturdy furniture drawing rack and drawing display table.
B. Provide space for Project meetings, with table and chairs to accommodate 10 persons.
C. Locate office within existing building or job trailer.

1.17 AMTRAK BASIC REQUIREMENTS

A. Below is the basic information for requesting a temporary permit to enter upon Amtrak property:

Contractors who require access to railroad property must submit a letter requesting a Temporary Permit to Enter Upon Property. The letter should include the contact name and mailing address of the prime contractor responsible for all work, and outline the location, nature, scope and estimated duration of work. Refer to Document 00811 for "Temporary Permit to Enter Upon Property" requirement list. If any subsurface work is required, the letter should clearly specify whether the work is geotechnical or environmental in nature.

Prior to any work on or access to Amtrak Right of Way (ROW), the Contractor must first execute Amtrak's then current Temporary Permit to Enter Upon Property. The Temporary Permit will include a force account estimate based on the Contractor's scope of work and

projected duration of work. Amtrak will provide engineering, flag protection and/or other protection services at the sole cost and expense of the Contractor. Advance payment for these services is required. After Amtrak receives a fully executed permit, payment for applicable fees, approval of the proposed work plans and/or access requirements, and verifies that all insurance requirements have been met, Amtrak will notify the appropriate Division Engineer's representative that the work may proceed.

Please note that all Contractor employees who will work on railroad property are required to complete Amtrak's Contractor Safety Orientation Training prior to entry on railroad property. The Contractor must coordinate all access with Amtrak's Division representative. Due to the heavy volume of requests for Temporary Permits to Enter Upon Amtrak Property, please allow up to 30 business days processing time for initial Permit requests.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

END OF SECTION

SECTION 01600

MATERIAL AND EQUIPMENT

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Products.
B. Transportation and handling.
C. Storage and protection.
D. Product options.
E. Substitutions.

1.02 RELATED SECTIONS

A. Instructions to Bidders: Product options and substitution procedures.
B. Section 01400 - Quality Control: Product quality monitoring.

1.03 PRODUCTS

A. Products: Means new material, machinery, components, equipment, fixtures, and systems forming the Work. Does not include machinery and equipment used for preparation, fabrication, conveying and erection of the Work. Products may also include existing materials or components required for reuse.
B. Provide interchangeable components of the same manufacturer, for similar components.

1.04 TRANSPORTATION AND HANDLING

A. Transport and handle Products in accordance with manufacturer's instructions.
B. Promptly inspect shipments to assure that Products comply with requirements, quantities are correct, and Products are undamaged.
C. Provide equipment and personnel to handle Products by methods to prevent soiling, disfigurement, or damage.

1.05 STORAGE AND PROTECTION

A. Store and protect Products in accordance with manufacturer's instructions, with seals and labels intact and legible. Store sensitive Products in weather-tight, climate controlled enclosures.
B. For exterior storage of fabricated Products, place on sloped supports, above ground.
C. Provide off-site storage and protection when site does not permit on-site storage or protection.
D. Cover Products subject to deterioration with impervious sheet covering. Provide ventilation to avoid condensation.
E. Store loose granular materials on solid flat surfaces in a well-drained area. Avoid mixing with foreign matter.
F. Provide equipment and personnel to store Products by methods to prevent soiling, disfigurement, or damage.
G. Arrange storage of Products to permit access for inspection. Periodically inspect to assure Products are undamaged and are maintained under specified conditions.

1.06 PRODUCT OPTIONS

A. Products Specified by Reference Standards or by Description Only: Any Product meeting

those standards or description.

B. Products Specified by Naming One or More Manufacturers: Products of manufacturers named and meeting specifications, no options or substitutions allowed.

C. Products Specified by Naming One or More Manufacturers with a Provision for Substitutions: Submit a request for substitution for any manufacturer not named.

1.07 SUBSTITUTIONS

A. Architect/Engineer will consider requests for Substitutions only within 15 days after date of Owner-Contractor Agreement.

B. Substitutions may be considered when a Product becomes unavailable through no fault of the Contractor.

C. Document each request with complete data substantiating compliance of proposed Substitution with Contract Documents.

D. A request constitutes a representation that the Contractor:

1. Has investigated proposed Product and determined that it meets or exceeds the quality level of the specified Product.
2. Will provide the same warranty for the Substitution as for the specified Product.
3. Will coordinate installation and make changes to other Work which may be required for the Work to be complete with no additional cost to Owner.
4. Waives claims for additional costs or time extension which may subsequently become apparent.
5. Will reimburse Owner for review or redesign services associated with re-approval by authorities.

E. Substitutions will not be considered when they are indicated or implied on shop drawing or product data submittals, without separate written request, or when acceptance will require revision to the Contract Documents.

F. Substitution Submittal Procedure:

1. Submit three copies of request for Substitution for consideration. Limit each request to one proposed Substitution.
2. Submit shop drawings, Product data, and certified test results attesting to the proposed Product equivalence.
3. The Architect/Engineer will notify Contractor, in writing, of decision to accept or reject request.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not used

END OF SECTION

SECTION 01700

CONTRACT CLOSEOUT

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Closeout Procedures.
B. Final Cleaning.
C. Adjusting.
D. Project Record Documents.
E. Operation and Maintenance Data.
F. Warranties.
G. Spare Parts and Maintenance Materials.

1.02 RELATED SECTIONS

A. Section 01500 - Construction Facilities and Temporary Controls: Progress cleaning.

1.03 CLOSEOUT PROCEDURES

A. Submit written certification that Contract Documents have been reviewed, Work has been inspected, and that Work is complete in accordance with Contract Documents and ready for Architect/Engineer's inspection.
B. Provide submittals to Architect/Engineer and Owner that are required by governing or other authorities.
C. Submit final Application for Payment identifying total adjusted Contract Sum, previous payments, and sum remaining due.

1.04 FINAL CLEANING

A. Execute final cleaning prior to final inspection.
B. Clean interior and exterior glass and surfaces exposed to view; remove temporary labels, stains and foreign substances, polish transparent and glossy surfaces, vacuum carpeted and soft surfaces.
C. Clean equipment and fixtures to a sanitary condition.
D. Replace filters of operating equipment.
E. Clean debris from roofs, gutters, downspouts, and drainage systems.
F. Clean site; sweep paved areas, rake clean landscaped surfaces.
G Remove waste and surplus materials, rubbish, and construction facilities from the site.

1.05 ADJUSTING

A. Adjust operating Products and equipment to ensure smooth and unhindered operation.

1.06 PROJECT RECORD DOCUMENTS

A. Maintain on site, one set of the following record documents; record actual revisions to the Work:
   1. Contract Drawings.
   2. Specifications.
   3. Addenda.
   4. Change Orders and other Modifications to the Contract.
   5. Reviewed shop drawings, product data, and samples.

B. Store Record Documents separate from documents used for construction.
C. Record information concurrent with construction progress.
D. Specifications: Legibly mark and record at each Product section description of actual Products installed, including the following:
   1. Manufacturer's name and product model and number.
   2. Product substitutions or alternates utilized.
   3. Changes made by Addenda and Modifications.
E. Record Documents and Shop Drawings: Legibly mark each item to record actual construction including:
   1. Measured depths of foundations in relation to finish first floor datum.
   2. Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
   3. Measured locations of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of the Work.
   4. Field changes of dimension and detail.
   5. Details not on original Contract Drawings.
F. Delete Architect/Engineer title block and seal from all documents.
G. Submit documents to Architect/Engineer with claim for final Application for Payment.

1.07 OPERATION AND MAINTENANCE DATA

A. Submit three sets prior to final inspection, bound in 8-1/2 x 11 inch (216 x 279 mm) text pages, three D side ring capacity expansion binders with durable plastic covers.
B. Prepare binder covers with printed title "OPERATION AND MAINTENANCE INSTRUCTIONS", title of project, and subject matter of binder when multiple binders are required.
C. Internally subdivide the binder contents with permanent page dividers, logically organized as described below; with tab titling clearly printed under reinforced laminated plastic tabs.
D. Contents: Prepare a Table of Contents for each volume, with each Product or system description identified, type on 30 pound white paper.
   Part 1: Directory, listing names, addresses, and telephone numbers of Architect/Engineer, Contractor, Subcontractors, and major equipment suppliers.
   Part 2: Operation and maintenance instructions, arranged by system and subdivided by specification section. For each category, identify names, addresses, and telephone numbers of Subcontractors and suppliers. Identify the following:
   1. Significant design criteria.
   2. List of equipment.
   3. Parts list for each component.
   4. Operating instructions.
   5. Maintenance instructions for equipment and systems.
   6. Maintenance instructions for special finishes, including recommended cleaning methods and materials and special precautions identifying detrimental agents.
   Part 3: Project documents and certificates, including the following:
   1. Shop drawings and product data.
   2. Air and water balance reports.
   3. Certificates.
   4. Photocopies of warranties and bonds.
E. Submit one copy of completed volumes in final form 15 days prior to final inspection. This copy will be returned after final inspection, with Architect/Engineer comments. Revise content of documents as required prior to final submittal.

F. Submit final volumes revised, within ten days after final inspection.

1.08 WARRANTIES

A. Provide notarized copies.
B. Execute and assemble documents from Subcontractors, suppliers, and manufacturers.
C. Provide Table of Contents and assemble in three D side ring binder with durable plastic cover.
D. Submit prior to final Application for Payment.
E. For items of Work delayed beyond date of Substantial Completion, provide updated submittal within ten days after acceptance, listing date of acceptance as start of warranty period.

1.09 SPARE PARTS AND MAINTENANCE MATERIALS

A. Provide products, spare parts, maintenance and extra materials in quantities specified in individual specification Sections.
B. Deliver to Project site and place in location as directed; obtain receipt prior to final payment.

PART 2 PRODUCTS

\\Not used

PART 3 EXECUTION

\\Not used

END OF SECTION

SECTION 02072

MINOR DEMOLITION FOR REMODELING

PART 1 GENERAL

1.01 WORK INCLUDED

A. Remove designated building equipment and fixtures.
B. Remove designated walls, partitions, portions of floors, stairs and associated components.
C. Cap and identify utilities.
D. Remove all materials necessary to complete the scope of work as shown in the contract documents.

1.02 RELATED WORK

A. Section 01120 - Alteration Project Procedures: Re- installation of removed materials.
B. Section 01500 - Construction Facilities and Temporary Controls: Temporary barriers and enclosures.
C. Section 01500 - Construction Facilities and Temporary Controls: Security.
D. Section 01500 - Construction Facilities and Temporary Controls: Cleaning during construction.
E. Section 01700 - Contract Closeout: Project record documents..

1.03 SUBMITTALS

A. Submit demolition and removal procedures and schedule under provisions of Section 01300.

1.04 REGULATORY REQUIREMENTS

A. Conform to code for demolition work, dust control, products requiring Work schedule.
B. Schedule Work to coincide with new construction.
C. Describe demolition removal procedures and schedule.
D. Demolish in an orderly and careful manner. Protect existing supporting structural members.
E. Remove demolished materials from site except where specifically noted otherwise. Do not burn or bury materials on site.
F. Remove materials as Work progresses. Upon completion of Work, leave areas in clean condition.
G. Remove temporary Work.

1.05 EXISTING CONDITIONS

A. Conduct demolition to minimize interference with adjacent building areas. Maintain protected egress and access at all times.
B. Cease operations immediately if structure appears to be in danger and notify Architect. Do not resume operations until directed.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

3.01 PREPARATION

A. Provide, erect, and maintain temporary barriers and security devices.
B. Erect and maintain weatherproof closures for exterior openings.
C. Protect existing materials which are not to be demolished.
D. Prevent movement of structure; provide bracing and shoring as required.
E. Notify affected utility companies before starting work and comply with their requirements.
F. Mark location and termination of utilities.
G. Identify and indicate capping locations on Project Record Documents.

3.02 EXECUTION

A. Disconnect, remove, and cap designated utility services within demolition areas.
B. Demolish in an orderly and careful manner. Protect existing construction to remain.
C. Except where noted otherwise, immediately remove demolished materials from site.
D. Relics, antiques, and similar objects remain the property of the Owner. Notify Architect prior to removal and obtain acceptance regarding method of removal.
E. Remove materials to be re-installed or retained in manner to prevent damage. Store and protect under provisions of Section 01600.
F. Remove and promptly dispose of contaminated, vermin infested, or dangerous materials encountered.
G. Do not burn or bury materials on site.
H. Remove demolished materials from site as work progresses. Upon completion of work, leave areas of work in clean condition.

END OF SECTION

SECTION 02091

LEAD PAINT AWARENESS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. General Provisions of Contract, including General Supplementary Conditions shall apply to this Section.

B. Fuss & O'Neill EnviroScience, LLC (EnviroScience) Hazardous Material Survey Report, Windsor Locks Train Station Building dated May 6, 2013

C. Asbestos Abatement Section 02080 and Asbestos Roofing Abatement Section 02082.

1.2 SUMMARY OF WORK

A. Work of this Section includes requirements for worker protection and waste disposal related to the demolition involving lead-based paint (LBP)-coated building components and surfaces (the "Work) at the Windsor Locks Train Station Building (the "Site").

B. The procedures referenced herein shall be utilized during required demolition work specified elsewhere that may impact building components coated with LBP. The following painted components were determined to be coated with LBP:

1. Windsor Locks Train Station Building
    a. Exterior wood support/joists/fascia (yellow)
    b. Wood door trim/jamb
    c. Exterior wood stair stringer
    d. Wood window jamb
    e. Wood ceiling-basement.

C. The demolition work impacting LBP may result in dust and debris exposing workers to levels of lead above the Occupational Safety and Health Administration's (OSHA) Action Level. Worker protection, training, and engineering controls referenced herein shall be strictly followed, until completion of exposure assessment with results indicating exposures below the "Action Level". **This Section does not involve lead abatement, but identified worker protection requirements for trades involved in the demolition and disposal procedures if lead is involved in the demolition waste stream.**

D. Construction activities disturbing surfaces with lead-containing paint that are likely to be employed, such as demolition, sanding, grinding, welding, cutting and burning, have been known to expose workers to levels of lead in excess of the OSHA Permissible Exposure Limit (PEL). All work specified in the technical sections of the Contract Documents shall also be in conformance with this Technical specification section 02091 for Lead Paint Awareness.

1.3 DEFINITIONS

A. The following definitions relative to LBP shall apply:

1. Action Level (AL) - The allowable employee exposure, without regard to use of respiratory protection, to an airborne concentration of lead over an eight-hour time-weighted average (TWA) as defined by OSHA. The current action level is thirty micrograms per cubic meter of air (30 $\mu g/m^3$).
2. Area Monitoring - The sampling of lead concentrations, which is representative of the airborne lead concentrations that may reach the breathing zone of personnel potentially exposed to lead.
3. Biological Monitoring - The analysis of a person's blood and/or urine, to determine the level of lead concentration in the body.
4. CDC – The Center for Disease Control

5. Change Room - An area provided with separate facilities for clean protective work clothing and equipment and for street clothes, which prevents cross-contamination.
6. Component Person - A person employed by the Contractor who is capable of identifying existing and predictable lead hazards in the surroundings or working conditions, and who has authorization to take prompt corrective measures to eliminate them as defined by OSHA.
7. Consultant – Fuss & O'Neill EnviroScience, LLC
8. EPA – United States Environmental Protection Agency
9. Exposure Assessment - An assessment conducted by an employer to determine if any employee may be exposed to lead at or above the action level.
10. High Efficiency Particulate Air (HEPA) - A type of filtering system capable of filtering out particles of 0.3 microns diameter from a body of air at 99.97% efficiency or greater.
11. HUD – United States Housing and Urban Development
12. Lead - Refers to metallic lead, inorganic lead compounds, and organic lead soaps. Excluded from this definition are other organic lead compounds.
13. Lead Work Area - An area enclosed in a manner to prevent the spread of lead dust, paint chips, or debris resulting from lead containing paint disturbance.
14. Lead Paint - Refers to paints, glazes, and other surface coverings containing a toxic level of lead.
15. MSHA – Mine Safety and Health Administration
16. NARI – National Association of The Remodeling Industry
17. NIOSH – National Institute of Occupational Safety and Health
18. OSHA – Occupational Safety and Health Administration
19. Owner – Town of South Windsor
20. Permissible Exposure Limit (PEL) - The maximum allowable limit of exposure to an airborne concentration of lead over an eight (8)-hour TWA, as defined by OSHA. The current PEL is fifty micrograms per cubic meter of air (50 $\mu g/m^3$). Extended workdays lower the PEL by the formula: PEL equals 400 divided by the number of hours of work.
21. Personal Monitoring - Sampling of lead concentrations within the breathing zone of an employee to determine the 8 hour time weighted average concentration in accordance with OSHA Title 29 CFR, Parts 1910.1025 and 1926.62. Samples shall be representative of the employee's work tasks. Breathing zone shall be considered an area within a sphere with a radius of 18-inches and centered at the nose or mouth of an employee.
22. Resource Conservation and Recovery Act (RCRA) - RCRA establishes regulatory levels of hazardous chemicals. There are eight (8) heavy metals of concern for disposal: arsenic, barium, cadmium, chromium, lead, mercury, selenium, and silver. Six (6) of the metals are typically in paints, excluding selenium and silver.
23. SDS – Safety Data Sheets
24. TWA – Time Weighted Average
25. Toxic Level of Lead - A level of lead, when present in dried paint or plaster, contains more than 0.50% lead by dry weight as measured by atomic absorption spectrophotometry (AAS) or 1.0 milligram per square centimeter (mg/cm^2) as measured by on site testing utilizing an x ray fluorescence analyzer. (Term is specific to State of CT regulations and HUD guidelines only)

26. Toxicity Characteristic Leaching Procedure (TCLP) - The United States Environmental Protection Agency (EPA) required sample preparation and analysis for determining the hazard characteristics of a waste material.

1.4 REGULATIONS AND STANDARDS

A. The following regulations, standards, and ordinances of federal, state, and local agencies are applicable and made a part of this specification by reference:

1. American National Standards Institute (ANSI)
   a. ANSI 288.2 - 1980 Respiratory Protection
2. Code of Federal Regulation (CFR)
   a. Title 29 CFR, Part 1910.134 - Respiratory Protection
   b. Title 29 CFR, Part 1910.1025 – Lead
   c. Title 29 CFR, Part 1910.1200 - Hazard Communication
   d. Title 29 CFR, Part 1926.55 - Gases, Vapors, Fumes, Dusts, and Mists
   e. Title 29 CFR, Part 1926.57 - Ventilation
   f. Title 29 CFR, Part 1926.59 - Hazard Communication in Construction
   g. Title 29 CFR, Part 1926.62 - Lead in Construction Interim Final Rule
   h. Title 40 CFR, Parts 124 and 270 - Hazardous Waste Permits
   i. Title 40 CFR, Part 172 - Hazardous Materials Tables and Communication Regulations
   j. Title 40 CFR, Part 178 - Shipping Container Specifications
   k. Title 40 CFR, Part 260 - Hazardous Waste Management Systems: General
   l. Title 40 CFR, Part 261 - Identification and Listing of Hazardous Waste
   m. Title 40 CFR, Part 262 - Generators of Hazardous Waste
   n. Title 40 CFR, Part 263 - Transporters of Hazardous Waste
   o. Title 40 CFR, Part 264 - Owner and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities
   p. Title 40 CFR, Part 265 - Interim Statutes for Owner and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities
   q. Title 40 CFR, Part 268 - Lead Disposal Restrictions
   r. Title 49 CFR, Parts 170 - 180
3. Underwriters Laboratories, Inc. (UL)
   a. UL586 - 1990 High Efficiency Particulate Air Filter Units

1.5 QUALITY ASSURANCE

A. Hazard Communication Program
   1. The Contractor shall establish and implement a Hazard Communication Program as required by OSHA Title 29 CFR, Part 1926.59.

B. Compliance Plan (Site-Specific)
   1. The Contractor shall establish a written compliance plan, which is specific to the project site, to include the following:
      a. A description of work activity involving lead including equipment used, material included, controls in place, crew size, employee job responsibilities, operating procedures, and maintenance practices.
      b. Methods of engineering controls to be used to control lead exposure.
      c. The proposed technology the Contractor will implement in meeting the PEL.
      d. Air monitoring data documenting the source of lead emissions.
      e. A detailed schedule for implementing the program, including documentation of appropriate supply of equipment, etc.

f. Proposed work practice which establishes proper protective work clothing, housekeeping methods, hygiene facilities, and practices.
g. Worker rotation schedule, if proposed, to reduce TWA.
h. A description of methods for informing workers of potential lead exposure.

C. Hazardous Waste Management
1. The Contractor shall establish a Hazardous Waste Management Plan, which shall comply with applicable regulations and address the following:
a. Identification of hazardous wastes
b. Estimated quantity of waste to be disposed
c. Names and qualifications of each subcontractor who will be transporting, storing, treating, and disposing of wastes
d. Disposal facility location and 24-hour point of contact
e. Establish EPA state hazardous waste and identification numbers if applicable
f. Names and qualifications (experience and training) of personnel who will be working on site with hazardous wastes
g. List of waste handling equipment to be used in performing the work to include cleaning, volume reduction, if applicable, and transport equipment
h. Qualifications of laboratory to be utilized for TCLP sampling and analysis
i. Spill prevention, containment, and countermeasure plan (SPCC)
j. Work plan and schedule for waste containment, removal, treatment, and disposal.

D. Medical Examinations
1. Before exposure to lead-contaminated dust, provide workers with a comprehensive medical examination as required by OSHA Title 29 CFR, Parts 1910.1025 and 1926.62.
2. The examination shall not be required if adequate records show that employees have been examined as required by OSHA Title 29 CFR, Part 1926.62 within the last year.
3. Medical examination shall include, at a minimum, approval to wear respiratory protection and biological monitoring.

E. Training
1. The Contractor shall ensure that workers are trained to perform lead paint disturbing activities and disposal operations prior to the start of work, in accordance with OSHA Tile 29 CFR, Part 1926.62.

F. Respiratory Protection Program
1. The Contractor shall furnish each employee required to wear a negative pressure respirator with a respirator fit test at the time of initial fitting and at least once every six months thereafter, as required by OSHA Title 29 CFR, Part 1926.62.
2. The Contractor shall establish a Respiratory Protection Program in accordance with ANSI Z88.2, OSHA Title 29 CFR, Parts 1910.134 and 1926.62.

1.6 SUBMITTALS

A. The Contractor shall submit the following to the Consultant in one complete package prior to the pre-construction meeting and at least 10 business days before the start of the Work:

1. Submit a schedule to the Owner and the Consultant, which defines a timetable for executing and completing the project, including work area preparations, removal, cleanup, and decontamination.
2. Submit a current valid certificate of insurance.
3. Submit the name and address of the hauling contractor and location of the landfill to be used. Also submit current valid operating permits and certificates of insurance for the transporter and landfill.
4. Submit video documentation showing the existing building conditions prior to the start of work. The Contractor shall be responsible for all costs associated with damage to the building and its contents that are not shown on the video documentation.
5. Submit the plans and construction details for the construction of the decontamination systems and the isolation of the work areas as may be necessary for compliance with this specification and applicable regulations.
6. Submit copies of medical records for each employee to be used on the project, including results of biological monitoring and a notarized statement by the examining physician that such an examination occurred.
7. Submit workers' valid training certificates.
8. Submit record of successful respirator fit testing performed by a qualified individual within the previous six months, for each employee to be used on this project with the employee's name and social security number with each record.
9. Submit the name and address of Contractor's blood lead testing lab, OSHA CDC listing, and certification in the State of Connecticut.
10. Submit detailed product information on all materials and equipment proposed for demolition work on this project.
11. Submit pertinent information regarding the qualifications of the Project Supervisor (competent person) for this project, as well as a list of past projects completed.
12. Submit a chain-of-command for the project.
13. Submit a site-specific Emergency Action Plan for the project.
14. Submit a written site-specific written Respiratory Protection Program for employees for the Work, including make, model and NIOSH approval numbers of respirators to be used at the Site (if applicable).
15. No work on the Site will be allowed to begin until the Owner and the Consultant as listed herein accept the Pre-Construction Submittals. Any delay caused by the Contractor’s refusal or inability to submit this documentation accurately, completely, and in a timely manner does not constitute a cause for change order or a time extension;

B. The following shall be submitted to the Consultant during the Work:
   1. Results of personal air sampling
   2. Training and medical records for new employees to start Site work (24-hours in advance)

C. The following shall be submitted to the Consultant at the completion of the Work:
   1. Copies of all air sampling results
   2. Contractor logs
   3. Copies of manifests and receipts acknowledging disposal of all waste material from the project showing delivery date, quantity, and appropriate signature of landfill's authorized representative.

1.7 PERSONAL PROTECTION

A. Exposure Assessment

1. The Contractor shall determine if any worker will be exposed to lead at or above the action level.
2. The exposure assessment shall identify the level of exposure a worker would be subjected to without respiratory protection.
3. The exposure assessment shall be achieved by obtaining personal air monitoring samples representative of a full shift at least (8-hour TWA).
4. During the period of the exposure assessment, the Contractor shall institute the following procedures for protection of workers:
   a. Protective clothing shall be utilized
   b. Respiratory protection
   c. Change areas shall be provided
   d. Hand washing facilities and shower
   e. Biological monitoring
   f. Training of workers

B. Respiratory Protection
1. The Contractor shall furnish appropriate respirators approved by NIOSH/MSHA for use in atmospheres containing lead dust.
2. Respirators shall comply with the requirements of OSHA Title 29 CFR, Part 1926.62.
3. Workers shall be instructed in all aspects of respiratory protection.
4. The Contractor shall have an adequate supply of HEPA filter elements and spare parts on-site for all types of respirators in use.
5. The following minimum respirator protection for use during paint removal or demolition of components and surfaces with lead paint shall be the half-face air purifying respirator with a minimum of dual P100 filter cartridges for exposures (not in excess of 500 $\mu g/m^3$ or 10 x PEL).

C. Protective Clothing
1. Personal protective clothing shall be provided for all workers, supervisors, and authorized visitors entering the work area.
2. Each worker shall be provided daily with a minimum of two complete disposable coverall suits.
3. Removal workers shall not be limited to two (2) coveralls, and the Contractor shall supply additional coveralls as necessary.
4. Under no circumstances shall anyone entering the abatement area be allowed to re-use a contaminated disposable suit.
5. Disposable suits (TYVEK™ or equivalent), and other personal protective equipment (PPE) shall be donned prior to entering a lead control area. A change room shall be provided for workers to don suits and other PPE with separate areas to store street clothes and personal belongings.
6. Eye protection for personnel engaged in lead operations shall be furnished when the use of a full-face respirator is not required.
7. Goggles with side shields shall be worn when working with power tools or a material that may splash or fragment, or if protective eye wear is specified on the SDS for a particular product to be used on the project.

1.8 PERSONAL MONITORING

A. General.
1. The Contractor shall be required to perform the personal air sampling activities during lead paint disturbing work. The results of such air sampling shall be posted, provided to individual workers and submitted to the Client as described herein.

B. Air Sampling.

1. Air samples shall be collected for the duration of the work shift or for 8-hours, whichever is less. Personal air samples need not be collected every day after the first day, if working conditions remain unchanged, but must be collected each time there is a change in removal operations, either in terms of the location or in the type of work. Sampling will be used to determine 8-hour TWA. The Contractor shall be responsible for personal air sampling as outlined in OSHA Title 29 CFR, Parts 1910.1025 & 1926.62.
2. Air sampling results shall be reported to individual workers in written form no more than 48-hours after the completion of a sampling cycle. The reporting document shall list each sample's result, sampling time and date, personnel monitored and their social security numbers, flow rate, sample duration, sample yield, cassette size, and analysts' name and company, and shall include an interpretation of the results. Air sample analysis results will be reported in $\mu g/m^3$.

C. Testing Laboratory.

1. The Contractor's testing lab shall be currently participating in AIHA's Environmental Lead Laboratory Accreditation Program (ELLAP). The Contractor shall submit to the Engineer for review and acceptance, the name and address of the laboratory, certification(s) of AIHA participation, a listing of relevant experience in air lead analysis, and presentation of a documented Quality Assurance and Quality Control Program.

PART 2 PRODUCTS

2.1 GENERAL

A. Any substitution in materials, equipment, or methods to those specified shall be approved by the Owner, Owner, and Consultant prior to use. Any requests for substitution shall be provided in writing to the Owner, Owner, and Consultant. The request shall clearly state the rationale for the substitution.

B. Submit to the Owner, Owner, and Consultant product data of all materials and equipment and samples of all materials to be considered as an alternate.

C. Product data shall consist of manufacturer; catalog sheets, brochures, diagrams, schedules, performance charts, illustrations, SDS, and other standard descriptive data. Submittal data shall be clearly marked to identify pertinent materials, products or equipment and show performance characteristics and capacities.

D. Samples shall be of sufficient size and quantity to clearly illustrate the functional characteristics of the product or material with integrally related parts and attachment devices.

2.2 MATERIALS AND PRODUCTS

A. Deliver all materials in the original packages, containers, or bundles bearing the name of the manufacturer and the brand name and product technical description.

B. Damaged or deteriorating materials shall not be used and shall be removed from the premises.

C. The Contractor shall have available sufficient inventory or dated purchase orders for materials necessary for the project including protective clothing, respirators, filter cartridges, polyethylene (poly) sheeting of proper size and thickness, tape, and air filters.

D. Materials

1. Poly sheeting in a roll size to minimize the frequency of joints shall be delivered to the Site with factory label indicating 6-mil.

2. Poly disposable bags shall be 6-mil. Tie wraps for bags shall be plastic, five-inches long (minimum), pointed and looped to secure filled plastic bags.
3. Tape or spray adhesive will be capable of sealing joints in adjacent poly sheets and for attachment of poly sheeting to finished or unfinished surfaces of dissimilar materials and capable of adhering onto both dry and wet conditions, including use of amended water.
4. Impermeable containers are to be used to receive and retain any lead-containing or contaminated materials until disposal at an acceptable disposal site. The containers shall be labeled in accordance with EPA and DOT standards.
5. HEPA-filtered exhaust systems shall be used during powered dust-generating abatement operations. The use of powered equipment without HEPA exhausts on this Site shall be prohibited.

2.3 TOOLS AND EQUIPMENT

A. Provide suitable tools for all lead disturbing operations.
B. The Contractor shall have available power cables or sources such as generators (where required).
C. Vacuum units, of suitable size and capacities for the project, shall have HEPA filter(s) capable of trap-ping and retaining 99.97% of all mono-dispersed particles of 0.3 micrometers in diameter.

PART 3 EXECUTION

3.1 PRE-CONSTRUCTION MEETING

A. At least one week prior to the start of work, a Pre-Construction Meeting will be scheduled and must be attended by the Contractor and any Subcontractors. The assigned Contractor Site Supervisor must attend this meeting.
B. The Contractor shall present a detailed project schedule and project submittal package at the Pre-Construction Meeting. Variations, amendments, and corrections to the presented schedule will be discussed, and the Owner and Consultant will inform the Contractor of any scheduling adjustments for this project.
C. Following the Pre-Construction Meeting, the Contractor shall submit a revised schedule (if needed) no later than one week after the meeting.

3.2 WORKER PROTECTION/TRAINING

A. The Contractor shall provide appropriate training, respiratory and other PPE, and biological monitoring for each worker and ensure proper usage during potential lead exposure and the initial exposure assessment.
B. Workers who will perform procedures must have completed one of the following training courses:
   1. EPA Lead Abatement Supervisor (40-hours)
   2. EPA Lead Abatement Worker (32-hours)
   3. HUD/EPA course “Work Smart, Work Wet, and Work Clean to Work Lead Safe” (8-hours)
   4. HUD/NARI course “The Remodeler’s and Renovator’s Lead Based Paint Training Program” (8-hours).
   5. HUD “Lead Safe Work Practices” (8-hours)

3.3 CONTRACTOR'S RESPONSIBILITIES

A. The Contractor shall be responsible for establishing and maintaining controls referenced herein to prevent dispersal of lead contamination from the lead work area.

B. The Contractor shall also be responsible for conducting work with applicable federal, state, and local regulations as referenced herein.

3.4 WORKER HYGIENE PRACTICES (*Required during initial exposure assessment and if results of air sampling are above OSHA Action Level*)

A. Work Area Entry.
   1. Workers shall don PPE prior to entering work area, including respiratory protection, disposable coveralls, gloves, headgear, and footwear.

B. Work Area Departure.
   1. While leaving respirators on, workers shall remove all gross contamination, debris, and dust from disposable coveralls and proceed to change room, and remove coveralls and footwear and place in hazardous waste disposal container.

C. Hand washing Facilities.
   1. All workers must wash their hands and faces upon leaving the work area.

D. Equipment.
   1. All equipment used by workers inside the work area shall be wet-wiped or bagged for later decontamination before removal from the work area.

E. Prohibited Activities.
   1. Under no circumstances shall workers eat, drink, smoke, chew gum or tobacco, apply cosmetics, or remove their respirators in the work area.

F. Shock Hazards.
   1. The Contractor shall be responsible for using safe procedures to avoid electrical hazards. All temporary electrical wiring will be protected by ground fault circuit interrupters (GFCI).

3.5 LEAD WORK AREA (*Required during initial exposure assessment and if results of air sampling are above OSHA Action Level*)

A. The Contractor shall place lead warning signs at all entrances and exits from the work area. Signage shall be a minimum of 20" x 14" and shall state the following:

WARNING
LEAD WORK AREA
POISON
NO SMOKING OR EATING OR DRINKING
UNAUTHORIZED ENTRY PROHIBITED

B. The Contractor shall designate a change room as specified in this Section. The change room shall consist of two layers of 6-mil thickness poly sheeting on the floor surface adjacent to the lead work area. The change room shall have separate storage facilities for street clothes to avoid cross-contamination.

C. The Contractor shall provide potable water for hand and face washing and provide a portable shower unit.

D. The Contractor shall place 6- mil poly drop cloths on floor/ground surfaces prior to beginning removal work to facilitate clean-up.

3.6 WORK AREA CLEAN-UP

A. The Contractor shall remove all loose chips and debris from floor surfaces and place in hazardous waste disposal bags.

B. The Contractor shall clean using a HEPA-filter equipped vacuum the adjacent surfaces to remove dust and debris.

C. Poly drop cloths shall be cleaned and properly disposed of general construction and demolition waste.

3.7 WASTE DISPOSAL

A. The Contractor's contractual liability shall be the proper disposal of all non-hazardous wastes generated at the Site in accordance with all applicable federal, state, and local regulations as referenced herein.

1. Fuss & O'Neill EnviroScience collected a sample for TCLP analysis for disposal characterization of the anticipated waste stream during the inspection. The analytical results indicated that the waste stream is characterized as non-hazardous.

3.8 CONSULTANT

A. The Owner may retain a Consultant for the purpose of construction administration and project monitoring during demolition work at the Site.

B. The Consultant will represent the Owner in all tasks of the project at the discretion of the Owner.

3.9 CONSULTANT'S RESPONSIBILITIES

A. The Consultant may conduct air sampling to ascertain the integrity of controls that protect the environmental from possible lead contamination. Independently, the Contractor shall monitor air quality within the work area to ascertain the protection of employees and to comply with OSHA regulations.

B. The Consultant's project monitor may collect and analyze air samples during the following period:

1. Demolition Period. If required, the Consultant's project monitor shall collect air samples on a daily basis during the work period. A sufficient number of area air samples shall be collected outside of the work area, to evaluate the degree of cleanliness or contamination of the environment during removal. Additional air samples may be collected inside the work area and decontamination system, at the discretion of the project monitor.

C. If the project monitor determines that the building air quality has become contaminated from the project, they shall immediately inform the Contractor to cease all demolition operations and implement a work stoppage clean-up procedure. The Contractor shall conduct a thorough clean-up of the areas designated by the Consultant. No further removal work may occur until the Consultant has assessed that the air has been decontaminated.

D. Pre-abatement and abatement air samples shall be collected as required to obtain a volume of 600 liters of air. Air samples shall be analyzed by NIOSH Method 7300 sampling protocol.

3.10 CONSULTANT'S INSPECTION RESPONSIBILITIES

A. Consultant may conduct inspections throughout the progress of the demolition project. Inspections shall be conducted to document the progress of the work, as well as the procedures and practices employed by the Contractor.

B. The Consultant shall perform the following inspections during the course of abatement activities:

1. Pre-commencement Inspection. Pre-commencement inspections shall be performed at the time requested by the Contractor. The Consultant shall be informed a minimum of 12-hours prior to the time the inspection is required. If deficiencies are identified during the pre-commencement inspection, the Contractor shall perform the necessary adjustments to obtain compliance.

2. Work Area Inspections. Work area inspections shall be conducted on a daily basis at the discretion of the Consultant. During the work inspections, the

Consultant will observe the Contractor's removal methods and procedures, assess project progress, and inform the Contractor of specific remedial activities if deficiencies are noted.

END OF SECTION

SECTION 04100

MORTAR & MASONRY GROUT

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Mortar and grout for masonry.

1.02 RELATED WORK

A. Section 01400 - Quality Control: Testing laboratory services.
B. Section 04901 – Masonry Restoration and Cleaning.

1.03 REFERENCES

A. ACI 530-95 – Building Code Requirements for Masonry Structures
B. ASTM C91 - Masonry Cement.
C. ASTM C94 - Ready-Mixed Concrete.
D. ASTM C144 - Aggregate for Masonry Mortar.
E. ASTM C150 - Portland Cement.
F. ASTM C207 - Hydrated Lime for Masonry Purposes.
G. ASTM C270 - Mortar for Unit Masonry.
H. ASTM C387 - Packaged, Dry, Combined Materials, for Mortar and Concrete.
I. ASTM C404 - Aggregates for Masonry Grout.
J. ASTM C476 - Grout for Masonry.
K. ASTM C595 - Blended Hydraulic Cement.
L. ASTM C780 – Pre-construction and Construction Evaluation of Mortars for Plain and Reinforced Unit Masonry.
M. ASTM C1019 - Method of Sampling and Testing Grout.
N. IMIAC - International Masonry Industry All-Weather Council: Recommended Practices and Guide Specifications for Cold Weather Masonry Construction.

1.04 SUBMITTALS

A. Samples: Submit under provisions of Sections 01300.
B. Samples: Provide mortar sample as part of masonry sample panel mockup. Mortar color to match existing.
C. Submit test reports under provisions of Section 01400.
D. Submit test reports on mortar indicating conformance to ASTM C270 and C780.
E. Submit test reports on grout indicating conformance to ASTM C476 and C1019.
F. Submit test reports on mix and strength of existing mortar.
G. Submit test report on strength of existing bricks.
H. Submit manufacturer's certificate under provisions of Section 01400 that products meet or exceed specified requirements.
I. Submit mortar manufacturer's installation instructions under provisions of Section 01300.
J. Include design mix, indicate Proportion or Property method used, required environmental and conditions.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to site under provisions of Section 01600.

B. Store and protect products under provisions of Section 01600.
C. Maintain packaged materials clean, dry, and protected against dampness, freezing, and foreign matter.

1.06 ENVIRONMENTAL REQUIREMENTS

A. Maintain materials and surrounding air temperatures to minimum 50 degrees F (10 degrees C) prior to, during, and 48 hours after completion of masonry work. Or follow Cold Weather Requirements: IMIAC - Recommended Practices and Guide Specifications for Cold Weather Masonry Construction.

1.07 MIX TESTS

A. Test mortar and grout in accordance with Section 01400.
B. Testing of Mortar Mix: In accordance with ASTM C780.
C. Test mortar mix for compressive strength, consistency, mortar aggregate ratio, water content, air content, splitting tensile strength, and slump. Mortar used for repointing shall match characteristics of existing mortar.
D. Testing of Grout Mix: In accordance with ASTM C 1019.
E. Test grout mix for compressive strength and slump.

PART 2 PRODUCTS

2.02 MATERIALS

A. Portland Cement: ASTM C150, Type I, gray color to match existing.
B. Mortar Aggregate: ASTM C144, to match existing.
C. Hydrated Lime: ASTM C207, Type S.
D. Grout Aggregate: ASTM C404.
E. Water: Clean and potable.

2.03 MORTAR COLOR

A. Mortar Color: To match existing.

2.05 MORTAR MIXES

A. Mortar for Load Bearing & Non-load Bearing Walls and Partitions: ASTM C270, Type N using the Property Method.
B. Pointing Mortar: One part Portland cement, one part hydrated lime, and two parts graded (80 mesh) aggregate, proportioned by volume. Portland cement up to a maximum of 20 percent of total volume of the lime and cement combined. Mortar mix shall match existing in color, mix ratio, and other strength properties.

2.06 MORTAR MIXING

A. Thoroughly mix mortar ingredients in quantities needed for immediate use in accordance with ASTM C270.
B. Do not use anti-freeze compounds to lower the freezing point of mortar.
C. If water is lost by evaporation, retemper only within two hours of mixing.
D. Use mortar within two hours after mixing at temperatures of 80 degrees F (26 degrees C), or two-and-one-half hours at temperatures under 50 degrees F (10 degrees C).

2.07 GROUT MIXES

A. Lintels & Miscellaneous: 3000 psi strength at 28 days; 7-8 inches slump; premixed type

in accordance with ASTM C94.

2.08 GROUT MIXING

A. Thoroughly mix mortar ingredients in quantities needed for immediate use in accordance with ASTM C476 Course grout.
B. Do not use anti-freeze compounds to lower the freezing point of grout.

PART 3 EXECUTION

3.01 EXAMINATION

A. Request inspection of spaces to be grouted.

3.03 INSTALLATION

A. Install mortar and grout in accordance with ASTM C270.
B. Work grout into masonry cores and cavities to eliminate voids.
C. Do not displace reinforcement while placing grout.
D. Remove grout spaces of excess mortar.

END OF SECTION

SECTION 04810

UNIT MASONRY ASSEMBLIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes unit masonry assemblies consisting of the following:
   1. Face brick.
   2. Mortar and grout.
   3. Reinforcing steel.
   4. Masonry joint reinforcement.
   5. Ties and anchors.
   6. Embedded flashing.
   7. Miscellaneous masonry accessories.

1.3 DEFINITIONS

A. Reinforced Masonry: Masonry containing reinforcing steel in grouted cells.

1.4 SUBMITTALS

A. List of Materials Used in Constructing Mockups: List generic product names together with manufacturers, manufacturers' product names, model numbers, lot numbers, batch numbers, source of supply, and other information as required to identify materials used. Include mix proportions for mortar and grout and source of aggregates.
   1. Submittal is for information only. Neither receipt of list nor approval of mockup constitutes approval of deviations from the Contract Documents, unless such deviations are specifically brought to the attention of the Architect and approved in writing.

1.5 QUALITY ASSURANCE

A. Testing Agency Qualifications: An independent testing agency, acceptable to authorities having jurisdiction, qualified according to ASTM C 1093 to conduct the testing indicated, as documented according to ASTM E 548.

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, through one source from a single manufacturer for each product required.

C. Preconstruction Testing Service: Developer will engage a qualified independent testing agency to perform preconstruction testing indicated below. Payment for these services will be made by the Contractor.
   1. Clay Masonry Unit Test: For each clay masonry unit indicated, per ASTM C 67.
   2. Mortar Test: For mortar properties per ASTM C 270.
   3. Grout Test: For compressive strength per ASTM C 1019.

D. Mockups: Before installing unit masonry, build mockups to verify selections made under sample Submittals and to demonstrate aesthetic effects and qualities of materials and execution. Build mockups to comply with the following requirements, using materials indicated for the completed Work:
   1. Locate mockups in the locations as directed by Architect.

2. Build mockup of typical wall area as shown on Drawings.
3. Build mockups for the following types of masonry in sizes approximately 48 inches long by 48 inches high by full thickness, including face and backup wythes and accessories. Include a sealant-filled joint at least 16 inches long in each mockup.
   a. Each type of exposed unit masonry construction.
4. Clean exposed faces of mockups with masonry cleaner as indicated.
5. Notify Architect seven days in advance of dates and times when mockups will be constructed.
6. Protect accepted mockups from the elements with weather-resistant membrane.
7. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
8. 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.
9. Demolish and remove mockups when directed.
10. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

E. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Meetings."

1.6 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.
   1. Protect Type I concrete masonry units from moisture absorption so that, at the time of installation, the moisture content is not more than the maximum allowed at the time of delivery.

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 lifting and emptying into dispensing silo. Store preblended, dry mortar mix in delivery containers on elevated platforms, under cover, and in a dry location or in a metal dispensing silo with weatherproof cover.

E. Store masonry accessories, including metal items, to prevent corrosion and accumulation of dirt and oil.

1.7 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 and hold cover securely in place.

B. Do not apply uniform floor or roof loads for at least 12 hours and concentrated loads for at least 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 coverings spread 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 and above and will remain so until masonry has dried, but not less than 7 days after completing cleaning.

E. Hot-Weather Requirements: Protect unit masonry work when temperature and humidity conditions produce excessive evaporation of water from mortar and grout. Provide artificial shade and wind breaks and use cooled materials as required.
1. When ambient temperature exceeds, or 90 deg F° with a wind velocity greater than 8 mph, do not spread mortar beds more than 48 inches ahead of masonry. Set masonry units within one minute of spreading mortar.

PART 2 - PRODUCTS

2.1 BRICK

A. General: Provide shapes indicated and as follows for each form of brick required:
1. Provide units without cores or frogs and with exposed surfaces finished for ends of sills and caps and for similar applications that would otherwise expose unfinished brick surfaces.

B. Provide special shapes for applications requiring brick of size, form, color, and texture on exposed surfaces that cannot be produced by sawing.
1. Provide special shapes for applications where stretcher units cannot accommodate special conditions, including those at corners, movement joints, bond beams, sashes, and lintels.
2. Provide special shapes for applications where shapes produced by sawing would result in sawed surfaces being exposed to view.

C. Face Brick: ASTMC 1088-22, Grade SW, Type FBX, and as follows:
1. Initial Rate of Absorption: Less than 20 g/30 sq. in. per minute when tested per ASTM C 67.
2. Efflorescence: Provide brick that has been tested according to ASTM C 67 and is rated "not effloresced."
3. Surface Coloring: Brick with surface coloring, other than flashed or sand-finished brick, shall withstand 50 cycles of freezing and thawing per ASTM C 67 with no observable difference in the applied finish when viewed from 10 feet .
4. Size: Manufactured to the following actual dimensions: Match existing.
5. Application: Use where brick is exposed, as scheduled unless otherwise indicated.

2.2 MORTAR AND GROUT MATERIALS

A. Portland Cement: ASTM C 150, Type I , except Type III may be used for cold-weather construction. Provide natural color.

B. Hydrated Lime: ASTM C 207, Type S.

C. Portland Cement-Lime Mix: Packaged blend of portland cement complying with ASTM C 150, Type I and hydrated lime complying with ASTM C 207.

D. Mortar Cement: ASTM C 1329.

E. Aggregate for Mortar: ASTM C 144; except for joints less than 1/4 inch thick, use aggregate graded with 100 percent passing the No. 16 sieve.
F. Aggregate for Grout: ASTM C 404.
G. Water: Potable.
H. Mortar Mix Volume for brick:
   1. 1 part Portland Cement
   2. 2 parts hydrated lime
   3. 6 to 7 parts clean light colored sand
   4. water repellent agent for exterior use

2.3 EMBEDDED FLASHING MATERIALS

A. Metal Flashing: Fabricate from the following metal complying with requirements specified in Division 7 Section "Sheet Metal Flashing and Trim" and below:
   1. Stainless Steel: 0.0156 thick. (install above precast locations where required)
   2. Copper: 16-oz./sq. ft. weight.
   3. Fabricate through-wall metal flashing embedded in masonry from sheet metal indicated above and with ribs at 3-inch intervals along length of flashing to provide an integral mortar bond.
   4. Fabricate metal expansion-joint strips from sheet metal indicated above, formed to shape indicated.
   5. Fabricate metal drip edges from sheet metal indicated above. Extend at least 3 inches into wall and 1/2 inch out from wall, with a hemmed outer edge bent down 30 degrees.
   6. Fabricate metal flashing terminations from sheet metal indicated above. Extend at least 3 inches) into wall and out to exterior face of wall. At exterior face of wall, bend metal back on itself for 3/4 inch and then down into joint 3/8 inch to form a stop for retaining sealant backer rod.
B. Concealed Flashing: For flashing partly exposed to the exterior, use metal flashing specified above. For flashing not exposed to the exterior, use the following, unless otherwise indicated:
   1. Asphalt-Coated Copper Flashing: Manufacturer's standard product consisting of 5-oz./sq. ft. sheet copper coated with flexible asphalt. Use only where flashing is fully concealed in masonry.
      a. Manufacturers:
         1) AFCO, Cop-A-Lead fabric
         2) Phoenix, Type B Cop-R-Flash
         3) York, cop-R-Tex Duplex Plus Lead
C. Adhesives, Primers, and Seam Tapes for Flashings: Flashing manufacturer's standard products or products recommended by the flashing manufacturer for bonding flashing sheets to each other and to substrates.

2.4 MISCELLANEOUS MASONRY ACCESSORIES

A. Compressible Filler:
   1. Dur-O-Wall “Rapid Poly Joint” or equal
      a. Premolded filler strips complying with ASTM D 1056, Class RE41
      b. Compressible prefabricated neoprene.
      c. 3”x3/8” by full lengths
B. Bond-Breaker Strips: Asphalt-saturated, organic roofing felt complying with ASTM D 226, Type I (No. 15 asphalt felt).
C. Rectangular Plastic Weep/Vent Tubing: Clear polyethylene, 3/8 by 1-1/2 by 3-1/2 inches.
D. Cavity Drainage Material: Peastone: clean, washed, round gravel ¼” to ½” diameter free of sand.

E. Reinforcing Bar Positioners: Wire units designed to fit into mortar bed joints spanning masonry unit cells with loops for holding reinforcing bars in center of cells. Units are formed from 0.142-inch steel wire, hot-dip galvanized after fabrication.
   1. Provide units with either two loops or four loops as needed for number of bars indicated.

2.5 MASONRY CLEANERS

A. Proprietary Acidic Cleaner: Biodegradable water soluble cleaner, specifically manufactured for cleaning masonry and mortar. Concentration of material shall be adjusted for site conditions, stain removal and materials in strict accordance with the manufacturers recommendations.

2.6 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.
B. Preblended, Dry Mortar Mix: Furnish dry mortar ingredients in the 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 91, Property Specification.
   1. Limit cementitious materials in mortar to portland cement, mortar cement, and lime.
   2. For masonry below grade, in contact with earth, and where indicated, use Type S.
D. Grout for Unit Masonry: Comply with ASTM C 476.
   1. Use grout of type indicated or, if not otherwise indicated, of type that will comply with Table 5 of ACI 530.1r dimensions of grout spaces and pour height.
   2. Provide grout with a slump of 8 to 11 inches as measured according to ASTM C 143.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance.
   1. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance.
   2. Verify that foundations are within tolerances specified.
   3. Verify that reinforcing dowels are properly placed.
   4. Proceed with installation only after unsatisfactory conditions have been corrected.
B. Before installation, examine rough-in and built-in construction to verify actual locations of piping connections.

3.2 INSTALLATION, GENERAL

A. Thickness: Build cavity and composite walls and other masonry construction to the full thickness shown. Build single-wythe walls to the actual widths of masonry units, using units of widths indicated.
B. Build chases and recesses to accommodate items specified in this Section and in other Sections of the Specifications.
C. Leave openings for equipment to be installed before completing masonry. After installing equipment, complete masonry to match the construction immediately adjacent to the opening.
D. Cut masonry units with motor-driven saws to provide clean, sharp, unchipped edges. Cut units as required to provide a continuous pattern and to fit adjoining construction. Where possible, use full-size units without cutting. Allow units cut with water-cooled saws to dry before

placing, 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. Wetting of Brick: Wet brick before laying if the initial rate of absorption exceeds 30 g/30 sq. in. per minute when tested per ASTM C 67. Allow units to absorb water so they are damp but not wet at the time of laying.

3.3 CONSTRUCTION TOLERANCES

A. Comply with tolerances in ACI 530.1/ASCE 6/TMS 602 and the following:

B. For conspicuous vertical lines, such as external corners, door jambs, reveals, and expansion and control joints, do not vary from plumb by more than 1/4 inch in 20 feet nor 1/2 inch maximum.

C. For vertical alignment of exposed head joints, do not vary from plumb by more than 1/4 inch in 10 feet, nor 1/2 inch maximum.

D. For conspicuous horizontal lines, such as exposed lintels, sills, parapets, and reveals, do not vary from level by more than 1/4 inch in 20 feet , nor 1/2 inch maximum.

E. For exposed bed joints, do not vary from thickness indicated by more than plus or minus 1/8 inch, with a maximum thickness limited to 1/2 inch . Do not vary from bed-joint thickness of adjacent courses by more than 1/8 inch .

3.4 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: Lay exposed masonry in the following bond pattern; do not use units with less than nominal 4-inch horizontal face dimensions at corners or jambs.
   1. One-half running bond with vertical joint in each course centered on units in courses above and below.
   2. Stack bond.
   3. One-third running bond.
   4. As indicated on Drawings.

C. Lay concealed masonry with all units in a wythe in running bond or bonded by lapping not less than 2 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: In each course, rack back one-half-unit length for one-half running bond or one-third-unit length for one-third running bond; do not tooth. Clean exposed surfaces of set masonry, wet clay masonry units lightly if required, and remove loose masonry units and mortar before laying fresh masonry.

E. Built-in Work: As construction progresses, build in items specified under this and other Sections of the Specifications. Fill in solidly with masonry around built-in items.

F. Fill space between hollow-metal 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 in the joint below and rod mortar or grout into core.

H. Fill cores in hollow concrete masonry units 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. 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.
3. At fire-rated partitions, install firestopping in joint between top of partition and underside of structure above to comply with Division 7 Section "Firestopping."

3.5 MORTAR BEDDING AND JOINTING

A. Lay hollow masonry units as follows:
   1. With full mortar coverage on horizontal and vertical face shells.
   2. Bed webs in mortar in starting course on footings and in all courses of piers, columns, and pilasters, and where adjacent to cells or cavities to be filled with grout.
   3. For starting course on footings where cells are not grouted, spread out full mortar bed, including areas under cells.
B. Lay solid brick-size 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.
   1. At cavity walls, bevel beds away from cavity, to minimize mortar protrusions into cavity. As work progresses, trowel mortar fins protruding into cavity flat against the cavity face of the brick.
C. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than the joint thickness, unless otherwise indicated.
D. Cut joints flush for masonry walls to receive plaster or other direct-applied finishes (other than paint), unless otherwise indicated.

3.6 CAVITIES

A. Keep cavities clean of mortar droppings and other materials during construction. Strike joints facing cavities flush.
   1. Use wood strips temporarily placed in cavity to collect mortar droppings. As work progresses, remove strips, clean off mortar droppings, and replace in cavity.
   2. Provide temporary opening by omitting 1 brick every 48 inches at bottom of cavity and in first course above flashing. After wall has been built to top of cavity and mortar has set, clean out cavity and then close temporary opening.
B. Coat cavity face of backup wythe to comply with Division 7 Section "Bituminous Dampproofing."
C. Installing Cavity-Wall Insulation: Place small dabs of adhesive, spaced approximately 12 inches o.c. both ways, on inside face of insulation boards, or attach with plastic fasteners designed for this purpose. Fit courses of insulation between wall ties and other confining obstructions in cavity, with edges butted tightly both ways. Press units firmly against inside wythe of masonry or other construction as shown.
   1. Fill cracks and open gaps in insulation with crack sealer compatible with insulation and masonry.

3.7 MASONRY JOINT REINFORCEMENT

A. General: Provide continuous masonry joint reinforcement as indicated. 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 parapet walls.
   3. Provide reinforcement not more than 8 inches above and below wall openings and extending 12 inches beyond openings.
      a. Reinforcement above is in addition to continuous reinforcement.

B. Cut or interrupt joint reinforcement at control and expansion joints, unless otherwise indicated.

C. Provide continuity at corners and wall intersections by using prefabricated "L" and "T" sections. Cut and bend reinforcing units as directed by manufacturer for continuity at returns, offsets, column fireproofing, pipe enclosures, and other special conditions.

3.8 ANCHORING MASONRY TO STRUCTURAL MEMBERS

A. Anchor masonry to structural members where masonry abuts or faces structural members to comply with the following:

1. Provide an open space not less than 1 inch in width between masonry and structural member, unless otherwise indicated. Keep open space free of mortar or other rigid materials.
2. Anchor masonry to structural members with flexible 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.

3.9 ANCHORING MASONRY VENEERS

A. Anchor masonry veneers to concrete and masonry backup with seismic masonry-veneer anchors to comply with the following requirements:

1. Embed tie sections in masonry joints. Provide not less than 2 inches of air space between back of masonry veneer and face of sheathing.
2. Locate anchor sections to allow maximum vertical differential movement of ties up and down.
3. Space anchors as indicated, but not more than 18 inches o.c. vertically and 24 inches o.c. horizontally, with not less than 1 anchor for each 2 sq. ft. of wall area. Install additional anchors within 12 inches of openings and at intervals, not exceeding 8 inches, around the perimeter.

3.10 LINTELS

A. Install steel lintels at all openings not designated with structural precast lintels
Provide and install precast lintels made from concrete matching concrete masonry units in color, texture, and compressive strength and with reinforcing bars indicated or required to support loads indicated. Cure precast lintels by the same method used for concrete masonry units. Structural design is to be designed and certified from a State of CT licensed structural engineer in accordance to the designs shown on the documents.

B. Provide minimum bearing of 8 inches at each jamb.

3.11 FLASHING, WEEP HOLES, AND VENTS

A. General: Install embedded flashing and weep holes in masonry at shelf angles, lintels, ledges, other obstructions to downward flow of water in wall, and where indicated.

B. Prepare masonry surfaces so they are smooth and free from projections that could puncture flashing. Unless otherwise indicated, 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.

C. Install flashing as follows:

1. At masonry-veneer walls, extend flashing from exterior face of veneer, through veneer, up face of sheathing at least 8 inches, and behind air-infiltration barrier or building paper.
2. At lintels and shelf angles, extend flashing a minimum of 4 inches into masonry at each end. At heads and sills, extend flashing 4 inches at ends and turn flashing up not less than 2 inches to form a pan.

3. Interlock end joints of ribbed sheet metal flashing by overlapping ribs not less than 1-1/2 inches or as recommended by flashing manufacturer, and seal lap with elastomeric sealant complying with requirements in Division 7 Section "Joint Sealants" for application indicated.
4. Extend sheet metal flashing 1/2 inch beyond face of masonry at exterior and turn flashing down to form a drip.
5. Install metal drip edges beneath flashing at exterior face of wall. Stop flashing 1/2 inch back from outside face of wall and adhere flashing to top of metal drip edge.
6. Install metal flashing termination beneath flashing at exterior face of wall. Stop flashing 1/2 inch back from outside face of wall and adhere flashing to top of metal flashing termination.
7. Cut flashing off flush with face of wall after masonry wall construction is completed.

D. Install weep holes in the head joints in exterior wythes of the first course of masonry immediately above embedded flashing and as follows:
1. Use rectangular plastic tubing to form weep holes.
2. Use wicking material to form weep holes above flashing in brick sills. Turn wicking down at lip of sill to be as inconspicuous as possible.
3. Space weep holes 48 inches o.c.
4. In cavities, place pea gravel to a min. height of 6” but not less than 2 inches , immediately above top of flashing embedded in the wall, as masonry construction progresses, to splatter mortar droppings and to maintain drainage.

E. Install vents in vertical head joints at the top of each continuous cavity at spacing indicated. rectangular plastic tubing to form vents.
1. Close cavities off vertically and horizontally with blocking in manner indicated. Install through-wall flashing and weep holes above horizontal blocking.

F. Install reglets and nailers for flashing and other related construction where they are shown to be built into masonry.

3.12 FIELD QUALITY CONTROL

A. Owner will engage a qualified independent testing agency to perform field quality-control testing indicated below.
1. Payment for these services will be made by Owner.
2. Retesting of materials failing to meet specified requirements shall be done at Contractor's expense.

3.13 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, except weep 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.

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, polyethylene film, or waterproof masking tape.
4. Wet wall surfaces with water before applying cleaners; remove cleaners promptly by rinsing the 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 8-2 applicable to type of stain on exposed surfaces.

3.14 MASONRY WASTE DISPOSAL

A. Recycling: Unless otherwise indicated, excess masonry materials are Contractor's property. At completion of unit masonry work, remove from Project site.

B. Disposal as Fill Material: Dispose of clean masonry waste, including broken masonry units, waste mortar, and excess or soil-contaminated sand, by crushing and mixing with fill material as fill is placed.
1. Crush masonry waste to less than 4 inches in each dimension.
2. Mix masonry waste with at least two parts of specified fill material for each part of masonry waste. Fill material is specified in Division 2 Section "Earthwork."
3. Do not dispose of masonry waste as fill within 18 inches of finished grade.

C. 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 04810

SECTION 04901

CLAY MASONRY RESTORATION AND CLEANING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes maintenance of unit masonry consisting of brick masonry restoration and cleaning as follows:
   1. Unused anchor removal.
   2. Repairing unit masonry, including replacing units.
   3. Painting steel uncovered during the work.
   4. Repointing joints.
   5. Brownstone resurfacing
   6. Preliminary cleaning, including removing plant growth.
   7. Cleaning exposed unit masonry surfaces.

B. Related Sections:
   1. Division 4 Section "Mortar & Masonry Grout" for new mortar.
   2. Division 4 Section "Unit Masonry Assemblies" for new clay masonry construction.
   3. Division 4 Section "Stone Restoration and Cleaning."
   4. Division 7 Section "Water Repellent Penetrant" for masonry sealant.

1.3 UNIT PRICES

A. Work of this Section is affected by unit prices specified in Division 1 Section "Unit Prices."
   1. Unit prices apply to authorized work covered by quantity allowances for areas that exceed the base bid. Refer to drawings for more info.
   2. Unit prices apply to additions to and deletions from Work as authorized by Change Orders.

1.4 DEFINITIONS

A. Very Low-Pressure Spray: Under 100 psi.

B. Low-Pressure Spray: 100 to 400 psi ; 4 to 6 gpm.

C. Medium-Pressure Spray: 400 to 800 psi ; 4 to 6 gpm.

D. High-Pressure Spray: 800 to 1200 psi ; 4 to 6 gpm.

E. Saturation Coefficient: Ratio of the weight of water absorbed during immersion in cold water to weight absorbed during immersion in boiling water; used as an indication of resistance of masonry units to freezing and thawing.

1.5 SUBMITTALS

A. Product Data: For each type of product indicated. Include recommendations for application and use. Include test data substantiating that products comply with requirements.

B. Shop Drawings: For the following:
   1. Provisions for expansion joints or other sealant joints.
   2. Provisions for flashing, lighting fixtures, conduits, and weep holes as required.

3. Replacement and repair anchors. Include details of anchors within individual masonry units, with locations of anchors and dimensions of holes and recesses in units required for anchors.

C. Samples for Initial Selection: For the following:
   1. Pointing Mortar: Submit sets of mortar for pointing in the form of sample mortar strips, 6 inches long by 1/4 inch wide, set in aluminum or plastic channels.
      a. Have each set contain a close color range of at least three Samples of different mixes of colored sands and cements that produce a mortar matching the cleaned masonry when cured and dry.
      b. Submit with precise measurements on ingredients, proportions, gradations, and sources of colored sands from which each Sample was made.
   2. Patching Compound: Submit sets of patching compound Samples in the form of plugs (patches in drilled holes) in sample units of masonry representative of the range of masonry colors on the building.
      a. Have each set contain a close color range of at least three Samples of different mixes of patching compound that matches the variations in existing masonry when cured and dry.
   3. Include similar Samples of accessories involving color selection.

D. Samples for Verification: For the following:
   1. Each type of masonry unit to be used for replacing existing units. Include sets of Samples as necessary to show the full range of shape, color, and texture to be expected.
      a. For each brick type, provide straps or panels containing at least four bricks. Include multiple straps for brick with a wide range.
   2. Each type of sand used for pointing mortar; minimum 1 lb of each in plastic screw-top jars.
      a. For blended sands, provide Samples of each component and blend.
      b. Identify sources, both supplier and quarry, of each type of sand.
   3. Each type, color, and texture of pointing mortar in the form of sample mortar strips, 6 inches long by 1/4 inch wide, set in aluminum or plastic channels.
      a. Include with each Sample a list of ingredients with proportions of each. Identify sources, both supplier and quarry, of each type of sand and brand names of cementitious materials and pigments if any.
   4. Each type of masonry patching compound in the form of briquettes, at least 3 inches long by 1-1/2 inches wide. Document each Sample with manufacturer and stock number or other information necessary to order additional material.
   5. Sealant Materials: See Division 7 Section "Joint Sealants."
   6. Accessories: Each type of anchor, accessory, and miscellaneous support.

1.6 QUALITY ASSURANCE

A. Restoration Specialist Qualifications: Engage an experienced masonry restoration and cleaning firm to perform work of this Section. Firm shall have completed work similar in material, design, and extent to that indicated for this Project with a record of successful in-service performance. Experience installing standard unit masonry is not sufficient experience for masonry restoration work.
   1. At Contractor's option, work may be divided between two specialist firms: one for cleaning work and one for repair work.
   2. Field Supervision: Restoration specialist firms shall maintain experienced full-time supervisors on Project site during times that clay masonry restoration and cleaning work is in progress. Supervisors shall not be changed during Project except for causes beyond the control of restoration specialist firm.

3. Restoration Worker Qualifications: Persons who are experienced in restoration work of types they will be performing. When masonry units are being patched, assign at least one worker among those performing patching work who is trained and certified by manufacturer of patching compound to apply its products.

B. Source Limitations: Obtain each type of material for masonry restoration (face brick, cement, sand, etc.) from one source with resources to provide materials of consistent quality in appearance and physical properties.

C. Cleaning and Repair Appearance Standard: Cleaned and repaired surfaces are to have a uniform appearance as viewed from 20 feet away by Architect. Perform additional paint and stain removal, general cleaning, and spot cleaning of small areas that are noticeably different, so that surface blends smoothly into surrounding areas.

D. Mockups: Prepare mockups of restoration and cleaning to demonstrate aesthetic effects and set quality standards for materials and execution and for fabrication and installation.

1. Masonry Repair: Prepare sample areas for each type of masonry material indicated to have repair work performed. If not otherwise indicated, size each mockup not smaller than 2 adjacent whole units or approximately 48 inches in least dimension. Erect sample areas in existing walls unless otherwise indicated, to demonstrate quality of materials, workmanship, and blending with existing work. Include the following as a minimum:
   a. Patching: Three small holes at least 1 inch in diameter for each type of masonry material indicated to be patched, so as to leave no evidence of repair.
   b. Widening Joints: Widen a joint in 2 separate locations, each approximately 12 inches long.
2. Repointing: Rake out joints in 2 separate areas, each approximately 36 inches high by 48 inches wide for each type of repointing required and repoint one of the areas.
3. Cleaning: Clean an area approximately 25 sq. ft. for each type of masonry and surface condition.
   a. Test cleaners and methods on samples of adjacent materials for possible adverse reactions. Do not use cleaners and methods known to have deleterious effect.
   b. Allow a waiting period of not less than seven days after completion of sample cleaning to permit a study of sample panels for negative reactions.
4. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
5. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver masonry units to Project site strapped together in suitable packs or pallets or in heavy-duty cartons.

B. Deliver other materials to Project site in manufacturer's original and unopened containers, labeled with manufacturer's name and type of products.

C. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.

D. Store hydrated lime in manufacturer's original and unopened containers. Discard lime if containers have been damaged or have been opened for more than two days.

E. Store lime putty covered with water in sealed containers.

F. Store sand where grading and other required characteristics can be maintained and contamination avoided.

1.8 PROJECT CONDITIONS

A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit masonry restoration and cleaning work to be performed according to manufacturers' written instructions and specified requirements.

B. Repair masonry units and repoint mortar joints only when air temperature is between 40 and 90 deg F and is predicted to remain so for at least 7 days after completion of the Work unless otherwise indicated.

C. Cold-Weather Requirements: Comply with the following procedures for masonry repair and mortar-joint pointing unless otherwise indicated:
   1. When air temperature is below 40 deg F , heat mortar ingredients, masonry repair materials, and existing masonry walls to produce temperatures between 40 and 120 deg F .
   2. When mean daily air temperature is below 40 deg F , provide enclosure and heat to maintain temperatures above 32 deg F within the enclosure for 7 days after repair and pointing.

D. Hot-Weather Requirements: Protect masonry repair and mortar-joint pointing when temperature and humidity conditions produce excessive evaporation of water from mortar and repair materials. Provide artificial shade and windbreaks and use cooled materials as required to minimize evaporation. Do not apply mortar to substrates with temperatures of 90 deg F and above unless otherwise indicated.

E. For manufactured repair materials, perform work within the environmental limits set by each manufacturer.

F. Clean masonry surfaces only when air temperature is 40 deg F and above and is predicted to remain so for at least 7 days after completion of cleaning.

1.9 COORDINATION

A. Coordinate masonry restoration and cleaning with public circulation patterns at Project site. Some work is near public circulation patterns. Public circulation patterns cannot be closed off entirely, and in places can be only temporarily redirected around small areas of work. Plan and execute the Work accordingly.

1.10 SEQUENCING AND SCHEDULING

A. Order replacement materials at earliest possible date to avoid delaying completion of the Work.

B. Order sand and gray portland cement for pointing mortar immediately after approval of mockups. Take delivery of and store at Project site a sufficient quantity to complete Project.

C. Perform masonry restoration work in the following sequence:
   1. Remove plant growth.
   2. Inspect for open mortar joints and repair before cleaning to prevent the intrusion of water and other cleaning materials into the wall.
   3. Remove paint.
   4. Clean 100% of masonry surfaces.
   5. Where water repellents, specified in Division 7, are to be used on or near masonry work, delay application of these chemicals until after pointing.
   6. Rake out mortar from joints surrounding masonry to be replaced and from joints adjacent to masonry repairs along joints.
   7. Repair masonry, including replacing existing masonry with new masonry materials.
   8. Rake out mortar from joints to be repointed.
   9. Point mortar and sealant joints.
   10. After repairs and repointing have been completed and cured, perform a final cleaning to remove residues from this work.
   11. Inspect for open mortar joints and repair before cleaning to prevent the intrusion of water and other cleaning materials into the wall.

12. Remove paint.
13. Clean masonry surfaces.

D. As scaffolding is removed, patch anchor holes used to attach scaffolding.

PART 2 - PRODUCTS

2.1 MASONRY MATERIALS

A. Face Brick: Provide face brick, including specially molded, ground, cut, or sawed shapes where required to complete masonry restoration work.
   1. Provide units with colors, color variation within units, surface texture, size, and shape to match existing brickwork and with physical properties within 10 percent of those determined from preconstruction testing of selected existing units.
      a. For existing brickwork that exhibits a range of colors or color variation within units, provide brick that proportionally matches that range and variation rather than brick that matches an individual color within that range.
   2. Provide units with colors, color variation within units, surface texture, and physical properties to match Architect's sample. Match existing units in size and shape.
      a. For Architect's sample that exhibits a range of colors or color variation within units, provide brick that proportionally matches that range rather than brick that matches an individual color within that range.
   3. Tolerances as Fabricated: Comply with tolerance requirements in ASTM C 216, Type FBX.
   4. Date Identification: Emboss in the clay body on an interior surface of each unit in easily read 1/2-inch- high characters, "MADE 2007." Manufacturer's name may also be embossed.

2.2 MORTAR MATERIALS

A. Portland Cement: ASTM C 150, Type I or Type II, white or gray or both where required for color matching of exposed mortar.
   1. Provide cement containing not more than 0.60 percent total alkali when tested according to ASTM C 114.
B. Hydrated Lime: ASTM C 207, Type S.
C. Factory-Prepared Lime Putty: ASTM C 1489.
D. Quicklime: ASTM C 5, pulverized lime.
E. Mortar Sand: ASTM C 144 unless otherwise indicated.
   1. Color: Provide natural sand of color necessary to produce required mortar color.
   2. For pointing mortar, provide sand with rounded edges.
   3. Match size, texture, and gradation of existing mortar sand as closely as possible. Blend several sands if necessary to achieve suitable match.
F. Mortar Pigments: Natural and synthetic iron oxides, compounded for mortar mixes. Use only pigments with a record of satisfactory performance in masonry mortars.
G. Water: Potable.

2.3 MANUFACTURED REPAIR MATERIALS

A. Masonry Patching Compound: Factory-mixed cementitious product that is custom manufactured for patching masonry.
   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. Cathedral Stone Products, Inc.; Jahn M100 Terra Cotta and Brick Repair Mortar.
      b. Conproco Corporation; Mimic.
      c. Edison Coatings, Inc.; Custom System 45.

2. Use formulation that is vapor- and water permeable (equal to or more than the masonry unit), exhibits low shrinkage, has lower modulus of elasticity than the masonry units being repaired, and develops high bond strength to all types of masonry.
3. Use formulation having working qualities and retardation control to permit forming and sculpturing where necessary.
4. Formulate patching compound used for patching brick and terra cotta in colors and textures to match each masonry unit being patched. Provide not less than three colors to enable matching the color, texture, and variation of each unit.

2.4 PAINT REMOVERS

A. Alkaline Paste Paint Remover: Manufacturer's standard alkaline paste formulation for removing paint coatings from masonry.
   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. Diedrich Technologies Inc.; 606 Multi-Layer Paint Remover or 606X Extra Thick Multi-Layer Paint Remover.
      b. PROSOCO; Sure Klean Safety Peel 2.

B. Covered or Skin-Forming Alkaline Paint Remover: Manufacturer's standard covered or skin-forming alkaline formulation for removing paint coatings from masonry.
   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. ABR Products, Inc.; Grip 'N Strip 800 Fast Acting.
      b. Diedrich Technologies Inc.; 606 Multi-Layer Paint Remover or 606X Extra Thick Multi-Layer Paint Remover with pull-off removal system.
      c. Dumond Chemicals, Inc.; Peel Away 1 System.
      d. PROSOCO; Enviro Klean Safety Peel 1 with Enviro Klean Overcoat.

C. Solvent-Type Paint Remover: Manufacturer's standard water-rinsable, solvent-type gel formulation for removing paint coatings from masonry.
   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. ABR Products, Inc.; Super Bio Strip Gel.
      b. Diedrich Technologies Inc.; 505 Special Coatings Stripper.
      c. Dumond Chemicals, Inc.; Peel Away 2.
      d. Hydroclean, Hydrochemical Techniques, Inc.; Hydroclean HT-300 Solvent Paint Remover.
      e. Price Research, Ltd.; Price Strip-All.
      f. PROSOCO; Sure Klean Fast Acting Stripper.

D. Low-Odor, Solvent-Type Paint Remover: Manufacturer's standard low-odor, water-rinsable solvent-type gel formulation, containing no methanol or methylene chloride, for removing paint coatings from masonry.
   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. ABR Products, Inc.; Super Bio Strip Gel.
      b. Cathedral Stone Products, Inc.; S-301.
      c. Dumond Chemicals, Inc.; Peel Away 6.
      d. PROSOCO; Enviro Klean Safety Peel 1.

2.5 CLEANING MATERIALS

A. Water: Potable.
B. Hot Water: Water heated to a temperature of 140 to 160 deg F .

C. Job-Mixed Detergent Solution: Solution prepared by mixing 2 cups of tetrasodium polyphosphate, 1/2 cup of laundry detergent, and 20 quarts of hot water for every 5 gal. of solution required.

D. Nonacidic Gel Cleaner: Manufacturer's standard gel formulation, with pH between 6 and 9, that contains detergents with chelating agents and is specifically formulated for cleaning masonry surfaces.

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. Price Research, Ltd.; Price Marble Cleaner-Gel.
    b. PROSOCO; Sure Klean 942 Limestone and Marble Cleaner.

2.6 ACCESSORY MATERIALS

A. Liquid Strippable Masking Agent: Manufacturer's standard liquid, film-forming, strippable masking material for protecting glass, metal, and polished stone surfaces from damaging effects of acidic and alkaline masonry cleaners.

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. ABR Products, Inc.; Rubber Mask.
    b. Price Research, Ltd.; Price Mask.
    c. PROSOCO; Sure Klean Strippable Masking.

B. Setting Buttons: Resilient plastic buttons, nonstaining to masonry, sized to suit joint thicknesses and bed depths of masonry units without intruding into required depths of pointing materials.

C. Masking Tape: Nonstaining, nonabsorbent material, compatible with pointing mortar, joint primers, sealants, and surfaces adjacent to joints; that will easily come off entirely, including adhesive.

D. Antirust Coating: Fast-curing, lead- and chromate-free, self-curing, universal modified-alkyd primer complying with SSPC-Paint 20 or SSPC-Paint 29 zinc-rich coating.

1. Use coating requiring no better than SSPC-SP 3, "Power Tool Cleaning" surface preparation according to manufacturer's literature or certified statement.
2. Use coating with a VOC content of 420 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

E. Miscellaneous Products: Select materials and methods of use based on the following, subject to approval of a mockup:

1. Previous effectiveness in performing the work involved.
2. Little possibility of damaging exposed surfaces.
3. Consistency of each application.
4. Uniformity of the resulting overall appearance.
5. Do not use products or tools that could do the following:
    a. Remove, alter, or in any way harm the present condition or future preservation of existing surfaces, including surrounding surfaces not in contract.
    b. Leave a residue on surfaces.

2.7 MORTAR MIXES

A. Preparing Lime Putty: Slake quicklime and prepare lime putty according to appendix to ASTM C 5 and manufacturer's written instructions.

B. Measurement and Mixing: Measure cementitious materials and sand in a dry condition by volume or equivalent weight. Do not measure by shovel; use known measure. Mix materials in a clean, mechanical batch mixer.

1. Mixing Pointing Mortar: Thoroughly mix cementitious materials and sand together before adding any water. Then mix again adding only enough water to produce a damp,

unworkable mix that will retain its form when pressed into a ball. Maintain mortar in this dampened condition for 15 to 30 minutes. Add remaining water in small portions until mortar reaches desired consistency. Use mortar within one hour of final mixing; do not retemper or use partially hardened material.

C. Colored Mortar: Produce mortar of color required by using specified ingredients. Do not alter specified proportions without Architect's approval.
   1. Mortar Pigments: Where mortar pigments are indicated, do not exceed a pigment-to-cement ratio of 1:10 by weight.

D. Do not use admixtures in mortar unless otherwise indicated.

E. Mortar Proportions: Mix mortar materials in the following proportions:
   1. Pointing Mortar for Brick: 1 part portland cement, 2 parts lime, and 6 parts sand.
      a. Add mortar pigments to produce mortar colors required.
   2. Pointing Mortar for Terra Cotta: 1 part white portland cement, 1 part lime, and 6 parts sand.
      a. Add mortar pigments to produce mortar colors required.
   3. Rebuilding (Setting) Mortar: Same as pointing mortar.
   4. Rebuilding (Setting) Mortar: 1 part portland cement, 2 parts lime, and 6 parts sand.
   5. Rebuilding (Setting) Mortar: Comply with ASTM C 270, Proportion Specification, Type N unless otherwise indicated; with cementitious material limited to portland cement and lime.

2.8 ADDITIONAL MATERIALS

A. Brownstone Repair Mortar:
Conproco Corporation’s Matrix (formerly Mimic). Conproco Co. 17 Production Drive Dover, NH 03820- 800.258.35oo- wwwconproco.com. Color to match existing brownstone.

PART 3 - EXECUTION

3.1 RESTORATION SPECIALISTS

A. Restoration Specialist Firms: Subject to compliance with requirements, firms that may provide masonry restoration and cleaning include, but are not limited to, the following:
   1. To be approved by Architect.

3.2 PROTECTION

A. Protect persons, motor vehicles, surrounding surfaces of building being restored, building site, plants, and surrounding buildings from harm resulting from masonry restoration work.
   1. Erect temporary protective covers over walkways and at points of pedestrian and vehicular entrance and exit that must remain in service during course of restoration and cleaning work.

B. Prevent mortar from staining face of surrounding masonry and other surfaces.
   1. Cover sills, ledges, and projections to protect from mortar droppings.
   2. Keep wall area wet below rebuilding and pointing work to discourage mortar from adhering.
   3. Immediately remove mortar in contact with exposed masonry and other surfaces.
   4. Clean mortar splatters from scaffolding at end of each day.

3.3 UNUSED ANCHOR REMOVAL

A. Remove masonry anchors, brackets, wood nailers, and other extraneous items no longer in use unless identified as historically significant or indicated to remain.
   1. Remove items carefully to avoid spalling or cracking masonry.

2. Where directed, if an item cannot be removed without damaging surrounding masonry, do the following:
   a. Cut or grind off item approximately 3/4 inch beneath surface and core drill a recess of same depth in surrounding masonry as close around item as practical.
   b. Immediately paint exposed end of item with two coats of antirust coating, following coating manufacturer's written instructions and without exceeding manufacturer's recommended dry film thickness per coat. Keep paint off sides of recess.
3. Patch the hole where each item was removed unless directed to remove and replace the masonry unit.

3.4 BRICK REMOVAL AND REPLACEMENT

A. At locations indicated, remove bricks that are damaged, spalled, or deteriorated or are to be reused. Carefully demolish or remove entire units from joint to joint, without damaging surrounding masonry, in a manner that permits replacement with full-size units.
   1. When removing single bricks, remove material from center of brick and work toward outside edges.

B. Support and protect remaining masonry that surrounds removal area. Maintain flashing, reinforcement, lintels, and adjoining construction in an undamaged condition.

C. Notify Architect of unforeseen detrimental conditions including voids, cracks, bulges, and loose units in existing masonry backup, rotted wood, rusted metal, and other deteriorated items.

D. Remove in an undamaged condition as many whole bricks as possible.
   1. Remove mortar, loose particles, and soil from brick by cleaning with hand chisels, brushes, and water.
   2. Remove sealants by cutting close to brick with utility knife and cleaning with solvents.
   3. Store brick for reuse. Store off ground, on skids, and protected from weather.
   4. Deliver cleaned brick not required for reuse to Owner unless otherwise indicated.

E. Clean bricks surrounding removal areas by removing mortar, dust, and loose particles in preparation for replacement.

F. Replace removed damaged brick with other removed brickin good quality, where possible, or with new brick matching existing brick, including size. Do not use broken units unless they can be cut to usable size.

G. Install replacement brick into bonding and coursing pattern of existing brick. If cutting is required, use a motor-driven saw designed to cut masonry with clean, sharp, unchipped edges.
   1. Maintain joint width for replacement units to match existing joints.
   2. Use setting buttons or shims to set units accurately spaced with uniform joints.

H. Lay replacement brick with completely filled bed, head, and collar joints. Butter ends with sufficient mortar to fill head joints and shove into place. Wet both replacement and surrounding bricks that have ASTM C 67 initial rates of absorption (suction) of more than 30 g/30 sq. in. per min. . Use wetting methods that ensure that units are nearly saturated but surface is dry when laid.
   1. Tool exposed mortar joints in repaired areas to match joints of surrounding existing brickwork.
   2. Rake out mortar used for laying brick before mortar sets and point new mortar joints in repaired area to comply with requirements for repointing existing masonry, and at same time as repointing of surrounding area.
   3. When mortar is sufficiently hard to support units, remove shims and other devices interfering with pointing of joints.

3.5 MASONRY UNIT PATCHING

A. Repointing shall match the color, texture, joint width and joint profile of the existing historic masonry. Specifications and repointing samples shall be reviewed and approved by the Connecticut Commission on Culture & Tourism before proceeding with this work.
B. Patch the following masonry units unless another type of replacement or repair is indicated:
   1. Units indicated to be patched.
   2. Units with holes.
   3. Units with chipped edges or corners.
   4. Units with small areas of deep deterioration.
C. Remove and replace existing patches unless otherwise indicated or approved by Architect.
D. Patching Bricks:
   1. Remove loose material from masonry surface. Carefully remove additional material so patch will not have feathered edges but will have square or slightly undercut edges on area to be patched and will be at least 1/4 inch thick, but not less than recommended by patching compound manufacturer.
   2. Mask adjacent mortar joint or rake out for repointing if patch will extend to edge of masonry unit.
   3. Mix patching compound in individual batches to match each unit being patched. Combine one or more colors of patching compound, as needed, to produce exact match.
   4. Rinse surface to be patched and leave damp, but without standing water.
   5. Brush-coat surfaces with slurry coat of patching compound according to manufacturer's written instructions.
   6. Place patching compound in layers as recommended by patching compound manufacturer, but not less than 1/4 inch or more than 2 inches thick. Roughen surface of each layer to provide a key for next layer.
   7. Trowel, scrape, or carve surface of patch to match texture and surrounding surface plane or contour of the masonry unit. Shape and finish surface before or after curing, as determined by testing, to best match existing masonry unit.
   8. Keep each layer damp for 72 hours or until patching compound has set.

3.6 WIDENING JOINTS

A. Do not widen a joint, except where indicated or approved by Architect.
B. Location Guideline: Where an existing masonry unit abuts another or the joint is less than 1/8 inch, widen the joint for length indicated and to depth required for repointing after obtaining Architect's approval.
C. Carefully perform widening by cutting, grinding, routing, or filing procedures demonstrated in an approved mockup.
D. Widen joint to width equal to or less than predominant width of other joints on building. Make sides of widened joint uniform and parallel. Ensure that edges of units along widened joint are in alignment with joint edges at unaltered joints.

3.7 BROWNSTONE SURFACE RESTORATION

A. Patch brownstone units with missing surfaces including chipped corners or edges, cracks, spalls and loose material. Carefully sound and check all stone surfaces. Remove all deteriorated brownstone down to sound material.
B. Remove and replace all existing cement based mortar repairs and patches.
C. Carefully remove deteriorated stone and adjacent stone that have begun to deteriorate down to sound stone. Use methods so remaining adjacent and exposed surfaces are not weakened or bruised by impact mechanical methods. Saw cut and square up the perimeter walls of the area to be patched with no more than a 2 degree undercut. Remove stone within the patch area to a depth of not less than ½ inch. Repair mortar patches at a finished thickness less than ½ inch will not be accepted by the Project Manager.

D. For patches with a depth greater than two inches thick, drill substrate to receive pins or anchors set in a weak adhesive. Set anchors to required depth and spacing based on the size and depth of the patch... The repair mortar should cover the pins by at least 1 inch.

E. Before application of the patching mortar, remove all dust, soil and other debris from the area using filtered compressed air, stiff-fiber brush, (no steel brushes permitted) and a low pressure water rinse. Rinsing should be complete enough to assure that no paste or film is left that could prevent the bonding of the patch mortar.

F. Prior to the application of the repair mortar, the areas to be patched should be thoroughly saturated with clean water. Never apply mortar to surfaces with standing water. Air and substrate temperature should be above 40 degrees f. For at least 72 hours during the mortar application process.

G. Mix patching mortar in individual batches per manufacturer's specifications to match brownstone units to be patched. .

H. Apply patching mortar in layers or lifts not less than ½ inch thick but no more than 2 inches in one pass. Roughen or score the base layers to provide a key for the next application. Prevent rapid evaporation of water from the repair area during this process by misting with clean water periodically. Build patch up approximately ¼ inch above the adjacent existing brownstone. After completing each application, wipe down adjacent areas with a wet sponge or cloth to remove excess mortar.

I. When using a NHL based patching mortar like Lithomex, the basic shaping and forming of the brownstone surface details can take place after it has partially cured, (24 to 48 hours after installation). Carving and smooth finishes can be completed approximately7 days after installation depending on the weather conditions.

3.8 CLEANING MASONRY, GENERAL

A. Cleaning of masonry shall be accomplished using the gentlest means possible without damaging the surface of the masonry. Specifications and test cleaning samples shall be reviewed and approved by the Connecticut Commission on Culture and Tourism before proceeding with this work.

B. Proceed with cleaning in an orderly manner; work from top to bottom of each scaffold width and from one end of each elevation to the other. Ensure that dirty residues and rinse water will not wash over cleaned, dry surfaces.

C. Use only those cleaning methods indicated for each masonry material and location.

1. Do not use wire brushes or brushes that are not resistant to chemical cleaner being used. Do not use plastic-bristle brushes if natural-fiber brushes will resist chemical cleaner being used.
2. Use spray equipment that provides controlled application at volume and pressure indicated, measured at spray tip. Adjust pressure and volume to ensure that cleaning methods do not damage masonry.
    a. Equip units with pressure gages.
3. For chemical-cleaner spray application, use low-pressure tank or chemical pump suitable for chemical cleaner indicated, equipped with cone-shaped spray tip.
4. For water-spray application, use fan-shaped spray tip that disperses water at an angle of 25 to 50 degrees.
5. For high-pressure water-spray application, use fan-shaped spray tip that disperses water at an angle of at least 40 degrees.
6. For heated water-spray application, use equipment capable of maintaining temperature between 140 and 160 deg F at flow rates indicated.

D. Perform each cleaning method indicated in a manner that results in uniform coverage of all surfaces, including corners, moldings, and interstices, and that produces an even effect without streaking or damaging masonry surfaces.

E. Water Application Methods:
   1. Water-Spray Applications: Unless otherwise indicated, hold spray nozzle at least 6 inches from surface of masonry and apply water in horizontal back and forth sweeping motion, overlapping previous strokes to produce uniform coverage.

F. Rinse off chemical residue and soil by working upward from bottom to top of each treated area at each stage or scaffold setting. Periodically during each rinse, test pH of rinse water running off of cleaned area to determine that chemical cleaner is completely removed.
   1. Apply neutralizing agent and repeat rinse if necessary to produce tested pH of between 6.7 and 7.5.

G. After cleaning is complete, remove protection no longer required. Remove tape and adhesive marks.

3.9 PRELIMINARY CLEANING

A. Removing Plant Growth: Completely remove visible plant, moss, and shrub growth from masonry surfaces. Carefully remove plants, creepers, and vegetation by cutting at roots and allowing to dry as long as possible before removal. Remove loose soil and debris from open masonry joints to whatever depth they occur.

B. Preliminary Cleaning: Before beginning general cleaning, remove extraneous substances that are resistant to cleaning methods being used. Extraneous substances include paint, calking, asphalt, and tar.
   1. Carefully remove heavy accumulations of material from surface of masonry with a sharp chisel. Do not scratch or chip masonry surface.
   2. Remove paint and calking with alkaline paint remover.
      a. Comply with requirements in "Paint Removal" Article.
      b. Repeat application up to two times if needed.
   3. Remove asphalt and tar with solvent-type paint remover.
      a. Comply with requirements in "Paint Removal" Article.
      b. Apply paint remover only to asphalt and tar by brush without prewetting.
      c. Allow paint remover to remain on surface for 10 to 30 minutes.
      d. Repeat application if needed.

3.10 PAINT REMOVAL

A. Paint Removal with Alkaline Paste Paint Remover:
   1. Remove loose and peeling paint using high-pressure spray, scrapers, stiff brushes, or a combination of these. Let surface dry thoroughly.
   2. Apply paint remover to dry, painted masonry with brushes.
   3. Allow paint remover to remain on surface for period recommended by manufacturer.
   4. Rinse with cold water applied by high-pressure spray to remove chemicals and paint residue.
   5. Repeat process if necessary to remove all paint.
   6. Apply acidic cleaner or manufacturer's recommended afterwash to masonry, while surface is still wet, using low-pressure spray equipment or soft-fiber brush. Let cleaner or afterwash remain on surface as a neutralizing agent for period recommended by chemical cleaner or afterwash manufacturer.
   7. Rinse with cold water applied by low-pressure spray to remove chemicals and soil.

B. Paint Removal with Covered or Skin-Forming Alkaline Paint Remover:
   1. Remove loose and peeling paint using high-pressure spray, scrapers, stiff brushes, or a combination of these. Let surface dry thoroughly.
   2. Apply paint remover to dry, painted masonry with trowel, spatula, or as recommended by manufacturer.
   3. Apply cover, if required by manufacturer, per manufacturer's written instructions.

4. Allow paint remover to remain on surface for period recommended by manufacturer or as determined in test panels.
5. Scrape off paint and remover and collect for disposal.
6. Rinse with cold water applied by high-pressure spray to remove chemicals and paint residue.
7. Use alkaline paste paint remover, according to "Paint Removal with Alkaline Paste Paint Remover" Paragraph, if necessary to remove remaining paint.
8. Apply acidic cleaner or manufacturer's recommended afterwash to masonry, while surface is still wet, using low-pressure spray equipment or soft-fiber brush. Let cleaner or afterwash remain on surface as a neutralizing agent for period recommended by chemical-cleaner or afterwash manufacturer.
9. Rinse with cold water applied by low-pressure spray to remove chemicals and soil.

C. Paint Removal with Solvent-Type Paint Remover:
1. Remove loose and peeling paint using high-pressure spray, scrapers, stiff brushes, or a combination of these. Let surface dry thoroughly.
2. Apply thick coating of paint remover to painted masonry with natural-fiber cleaning brush, deep-nap roller, or large paint brush.
3. Allow paint remover to remain on surface for period recommended by manufacturer. Agitate periodically with stiff-fiber brush.
4. Rinse with cold water applied by low-pressure spray to remove chemicals and paint residue.

3.11 CLEANING BRICKWORK

A. Detergent Cleaning:
1. Wet masonry with cold water applied by low-pressure spray.
2. Scrub masonry with detergent solution using medium-soft brushes until soil is thoroughly dislodged and can be removed by rinsing. Use small brushes to remove soil from mortar joints and crevices. Dip brush in solution often to ensure that adequate fresh detergent is used and that masonry surface remains wet.
3. Rinse with cold water applied by low-pressure spray to remove detergent solution and soil.
4. Repeat cleaning procedure above where required to produce cleaning effect established by mockup.

3.12 REPOINTING MASONRY

A. Repointing shall match the color, texture, joint width and joint profile of the existing historic masonry. Specifications and repointing samples shall be reviewd and approved by the Connecticut Commission on Culture & Tourism before proceeding with this work.

B. Rake out and repoint joints to the following extent:
1. All joints in areas indicated.
2. Joints where mortar is missing or where they contain holes.
3. Cracked joints where cracks can be penetrated at least 1/4 inch by a knife blade 0.027 inch thick.
4. Cracked joints where cracks are 1/8 inch or more in width and of any depth.
5. Joints where they sound hollow when tapped by metal object.
6. Joints where they are worn back 1/4 inch or more from surface.
7. Joints where they are deteriorated to point that mortar can be easily removed by hand, without tools.
8. Joints where they have been filled with substances other than mortar.
9. Joints indicated as sealant-filled joints.

C. Do not rake out and repoint joints where not required.

D. Rake out joints as follows, according to procedures demonstrated in approved mockup:
   1. Remove mortar from joints to depth of joint width plus 1/8 inch, but not less than 1/2 inch or not less than that required to expose sound, unweathered mortar.
   2. Remove mortar from masonry surfaces within raked-out joints to provide reveals with square backs and to expose masonry for contact with pointing mortar. Brush, vacuum, or flush joints to remove dirt and loose debris.
   3. Do not spall edges of masonry units or widen joints. Replace or patch damaged masonry units as directed by Architect.
      a. Cut out mortar by hand with chisel and resilient mallet. Do not use power-operated grinders without Architect's written approval based on approved quality-control program.
      b. Cut out center of mortar bed joints using angle grinders with diamond-impregnated metal blades. Remove remaining mortar by hand with chisel and resilient mallet. Strictly adhere to approved quality-control program.

E. Notify Architect of unforeseen detrimental conditions including voids in mortar joints, cracks, loose masonry units, rotted wood, rusted metal, and other deteriorated items.

F. Pointing with Mortar:
   1. Rinse joint surfaces with water to remove dust and mortar particles. Time rinsing application so, at time of pointing, joint surfaces are damp but free of standing water. If rinse water dries, dampen joint surfaces before pointing.
   2. Apply pointing mortar first to areas where existing mortar was removed to depths greater than surrounding areas. Apply in layers not greater than 3/8 inch until a uniform depth is formed. Fully compact each layer thoroughly and allow it to become thumbprint hard before applying next layer.
   3. After low areas have been filled to same depth as remaining joints, point all joints by placing mortar in layers not greater than 3/8 inch . Fully compact each layer and allow to become thumbprint hard before applying next layer. Where existing masonry units have worn or rounded edges, slightly recess finished mortar surface below face of masonry to avoid widened joint faces. Take care not to spread mortar beyond joint edges onto exposed masonry surfaces or to featheredge the mortar.
   4. When mortar is thumbprint hard, tool joints to match original appearance of joints as demonstrated in approved mockup. Remove excess mortar from edge of joint by brushing.
   5. Cure mortar by maintaining in thoroughly damp condition for at least 72 consecutive hours including weekends and holidays.
      a. Acceptable curing methods include covering with wet burlap and plastic sheeting, periodic hand misting, and periodic mist spraying using system of pipes, mist heads, and timers.
      b. Adjust curing methods to ensure that pointing mortar is damp throughout its depth without eroding surface mortar.
   6. Hairline cracking within the mortar or mortar separation at edge of a joint is unacceptable. Completely remove such mortar and repoint.

G. Where repointing work precedes cleaning of existing masonry, allow mortar to harden at least 30 days before beginning cleaning work.

3.13 FINAL CLEANING

A. Cleaning of exterior masonry shall be accomplished using the gentlest means possible without damaging the surface of the masonry. Specifications and test cleaning samples shall be reviewed and approved by the Connecticut Commission on Culture & Tourism before proceeding with this work.

B. After mortar has fully hardened, thoroughly clean exposed masonry surfaces of excess mortar and foreign matter; use wood scrapers, stiff-nylon or -fiber brushes, and clean water, spray applied at low pressure.
   1. Do not use metal scrapers or brushes.
   2. Do not use acidic or alkaline cleaners.

C. Wash adjacent woodwork and other non-masonry surfaces. Use detergent and soft brushes or cloths.

D. Clean mortar and debris from roof; remove debris from gutters and downspouts. Rinse off roof and flush gutters and downspouts.

E. Sweep and rake adjacent pavement and grounds to remove mortar and debris. Where necessary, pressure wash pavement surfaces to remove mortar, dust, dirt, and stains.

3.14 FIELD QUALITY CONTROL

A. Inspectors: Owner will engage qualified independent inspectors to perform inspections and prepare test reports. Allow inspectors use of lift devices and scaffolding, as needed, to perform inspections.

B. Notify inspectors in advance of times when lift devices and scaffolding will be relocated. Do not relocate lift devices and scaffolding until inspectors have had reasonable opportunity to make inspections of work areas at lift device or scaffold location.

END OF SECTION 04901

SECTION 07181

WATER REPELLENT PENETRANT (ALTERNATES 5 & 6)

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Water repellent coating applied to exterior masonry surfaces.

1.2 RELATED SECTIONS

A. Section 04810- Unit Masonry Assemblies.

1.3 REFERENCES

A. FS SS-W-110 - Water Repellent, Colorless Silicone, Resin Base.

1.4 SYSTEM DESCRIPTION

A. Applied Penetrant: To exhibit an ability to permit 8 percent maximum moisture absorption in material being treated.

1.5 SUBMITTALS FOR REVIEW

A. Section 01300 - Submittals: Procedures for submittals.
B. Product Data: Provide details of product description, tests performed, limitations to coating, and chemical properties including percentage of solids.

1.6 SUBMITTALS FOR INFORMATION

A. Section 01300 - Submittals: Procedures for submittals.
B. Manufacturer's Installation Instructions: Indicate special procedures and conditions requiring special attention; cautionary procedures required during application.
C. Manufacturer's Certificate: Certify that Products meet or exceed specified requirements.

1.7 MOCKUP

A. Provide mockup of sealed area of brick under provisions of Section 01400.
B. Seal a 3 x 3 foot wall panel using materials and methods specified.
C. Repeat, using specified cleaning methods until acceptable.
D. Acceptable panel and method of procedure will become the standard for Work of this Section.

1.8 QUALITY ASSURANCE

A. Manufacturer: Company specializing in manufacturing the Products specified in this section with minimum three years experience.
B. Applicator: Company specializing in performing the work of this section with minimum 3 years experience.

1.9 DELIVERY, STORAGE, AND PROTECTION

A. Section 01600 - Material and Equipment: Transport, handle, store, and protect products.
B. Protect coating liquid from freezing.

1.10 ENVIRONMENTAL REQUIREMENTS

A. Section 01600 - Material and Equipment: Environmental conditions affecting products

on site.

B. Do not apply coating when ambient temperature is lower than 50 degrees F or higher than 100 degrees F.

C. Do not apply coating when wind velocity is higher than 20 mph.

1.11 WARRANTY

A. Section 01700 - Contract Closeout.

B. Correct defective Work within a five year period after Date of Substantial Completion.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Professional Products of Kansas, Inc.; Product: Professional Water Sealant

B. Section 01600 - Material and Equipment: Product options and substitutions. Substitutions: Permitted.

PART 3 EXECUTION

3.1 EXAMINATION

A. Section 01039 - Coordination and Meetings: Verification of existing conditions before starting work.

B. Verify joint sealants are installed and cured.

C. Verify surfaces to be coated are dry, clean, and free of efflorescence, oil, or other matter detrimental to application of coating.

3.2 PREPARATION

A. Delay work until masonry mortar substrate is cured a minimum of 60 days.

B. Remove loose particles and foreign matter.

C. Remove oil or foreign substance with a chemical solvent which will not affect coating.

D. Scrub and rinse surfaces with water and let dry.

3.3 APPLICATION

A. Apply coating in accordance with manufacturer's instructions.

B. Apply in two continuous, uniform coats.

3.4 PROTECTION TO FINISHED AND ADJACENT WORK

A. Section 01700 - Contract Closeout: Protecting installed work.

B. Protect adjacent surfaces not scheduled to receive coating.

C. Protect landscaping, property & vehicles.

D. If applied to unscheduled surfaces, remove immediately by a method instructed by coating manufacturer.

END OF SECTION

Exhibit A

Prevailing Wage Rates

Exhibit B

Preservation Brief 2

Repointing Mortar Joints in Historic Buildings

2 Preservation Briefs
Technical Preservation Services
National Park Service
U.S. Department of the Interior

Repointing Mortar Joints in Historic Masonry Buildings

Robert C. Mack, FAIA, and John P. Speweik

A NOTE TO OUR USERS: The web versions of the **Preservation Briefs** differ somewhat from the printed versions. Many illustrations are new, captions are simplified, illustrations are typically in color rather than black and white, and some complex charts have been omitted.

Masonry--brick, stone, terra-cotta, and concrete block--is found on nearly every historic building. Structures with all-masonry exteriors come to mind immediately, but most other buildings at least have masonry foundations or chimneys. Although generally considered "permanent," masonry is subject to deterioration, especially at the mortar joints. Repointing, also known simply as "pointing"or--somewhat inaccurately--"tuck pointing"*, is the process of removing deteriorated mortar from the joints of a masonry wall and replacing it with new mortar. Properly done, repointing restores the visual and physical integrity of the masonry. Improperly done, repointing not only detracts from the appearance of the building, but may also cause physical damage to the masonry units themselves.

The purpose of this Brief is to provide general guidance on appropriate materials and methods for repointing historic masonry buildings and it is intended to benefit building owners, architects, and contractors. The Brief should serve as a guide to prepare specifications for repointing historic masonry buildings. It should also help develop sensitivity to the particular needs of historic masonry, and to assist historic building owners in working cooperatively with architects, architectural conservators and historic preservation consultants, and contractors. Although specifically intended for historic buildings, the guidance is appropriate for other masonry buildings as well. This

publication updates *Preservation Briefs 2: Repointing Mortar Joints in Historic Brick Buildings* to include all types of historic unit masonry. The scope of the earlier Brief has also been expanded to acknowledge that the many buildings constructed in the first half of the 20th century are now historic and eligible for listing in the National Register of Historic Places, and that they may have been originally constructed with portland cement mortar.

**Tuckpointing technically describes a primarily decorative application of a raised mortar joint or lime putty joint on top of flush mortar joints.*

Historical Background

Mortar consisting primarily of lime and sand has been used as an integral part of masonry structures for thousands of years. Up until about the mid-19th century, lime or quicklime (sometimes called lump lime) was delivered to construction sites, where it had to be slaked, or combined with water. Mixing with water caused it to boil and resulted in a wet lime putty that was left to mature in a pit or wooden box for several weeks, up to a year. Traditional mortar was made from lime putty, or slaked lime, combined with local sand, generally in a ratio of 1 part lime putty to 3 parts sand by volume. Often other ingredients, such as crushed marine shells (another source of lime), brick dust, clay, natural cements, pigments, and even animal hair were also added to mortar, but the basic formulation for lime putty and sand mortar remained unchanged for centuries until the advent of portland cement or its forerunner, Roman cement, a natural, hydraulic cement.

Portland cement was patented in Great Britain in 1824. It was named after the stone from Portland in Dorset which it resembled when hard. This is a fast-curing, hydraulic cement which hardens under water. Portland cement was first manufactured in the United States in 1872, although it was imported before this date. But it was not in common use throughout the country until the early 20th century. Up until the turn of the century portland cement was considered primarily an additive, or "minor ingredient" to help accelerate mortar set time. By the 1930s, however, most masons used a mix of equal parts portland cement and lime putty. Thus, the mortar found in masonry structures built between 1873 and 1930 can range from pure lime and sand mixes to a wide variety of lime, portland cement, and sand combinations.

In the 1930s more new mortar products intended to hasten and simplify masons' work were introduced in the U.S. These included **masonry cement**, a premixed, bagged mortar which is a combination of portland cement and ground limestone, and **hydrated lime**, machine-slaked lime that eliminated the necessity of slaking quicklime into putty at the site.

Identifying the Problem Before Repointing

The decision to repoint is most often related to some obvious sign of deterioration, such as disintegrating mortar, cracks in mortar joints, loose bricks or stones, damp walls, or damaged plasterwork. It is, however, erroneous to assume that repointing alone will solve deficiencies that result from other problems. The root cause of the deterioration--leaking roofs or gutters, differential settlement of the building, capillary action causing

rising damp, or extreme weather exposure--should always be dealt with prior to beginning work.

Without appropriate repairs to eliminate the source of the problem, mortar deterioration will continue and any repointing will have been a waste of time and money.

Masons practice using lime putty mortar to repair historic marble. Photo: NPS files.

Use of Consultants. Because there are so many possible causes for deterioration in historic buildings, it may be desirable to retain a consultant, such as a historic architect or architectural conservator, to analyze the building. In addition to determining the most appropriate solutions to the problems, a consultant can prepare specifications which reflect the particular requirements of each job and can provide oversight of the work in progress. Referrals to preservation consultants frequently can be obtained from State Historic Preservation Offices, the American Institute for Conservation of Historic and Artistic Works (AIC), the Association for Preservation Technology (APT), and local chapters of the American Institute of Architects (AIA).

Finding an Appropriate Mortar Match

Preliminary research is necessary to ensure that the proposed repointing work is both physically and visually appropriate to the building. Analysis of unweathered portions of the historic mortar to which the new mortar will be matched can suggest appropriate mixes for the repointing mortar so that it will not damage the building because it is excessively strong or vapor impermeable.

This late 19th century granite has recently been repointed with the joint profile and mortar color carefully matched to the original. Photo: NPS files.

Examination and analysis of the masonry units--brick, stone or terra cotta--and the techniques used in the original construction will assist in maintaining the building's historic appearance. A simple, non-technical, evaluation of the masonry units and mortar can provide information concerning the relative strength and permeability of each--critical factors in selecting the repointing mortar--while a visual analysis of the historic mortar can provide the information necessary for developing the new mortar mix and application techniques.

Although not crucial to a successful repointing project, for projects involving properties of special historic significance, a mortar analysis by a qualified laboratory can be useful by providing information on the original ingredients. However, there are limitations with such an analysis, and replacement mortar specifications should not be based solely on laboratory analysis. Analysis requires interpretation, and there are important factors which affect the condition and performance of the mortar that cannot be established through laboratory analysis. These may include: the original water content, rate of curing, weather

conditions during original construction, the method of mixing and placing the mortar, and the cleanliness and condition of the sand. *The most useful information that can come out of laboratory analysis is the identification of sand by gradation and color.* This allows the color and the texture of the mortar to be matched with some accuracy because sand is the largest ingredient by volume.

In creating a repointing mortar that is compatible with the masonry units, the objective is to achieve one that matches the historic mortar as closely as possible, so that the new material can coexist with the old in a sympathetic, supportive and, if necessary, sacrificial capacity. The exact physical and chemical properties of the historic mortar are not of major significance as long as the new mortar conforms to the following criteria:

- The new mortar must match the historic mortar in **color, texture and tooling.** (If a laboratory analysis is undertaken, it may be possible to match the binder components and their proportions with the historic mortar, if those materials are available.)

- The **sand must match the sand** in the historic mortar. (The color and texture of the new mortar will usually fall into place if the sand is matched successfully.)

- The new mortar must have **greater vapor permeability** and be **softer** (measured in compressive strength) than the masonry units.

- The new mortar must be **as vapor permeable** and **as soft or softer** (measured in compressive strength) than the historic mortar. (Softness or hardness is not necessarily an indication of permeability; old, hard lime mortars can still retain high permeability.)

This mortar is the proper consistency for repointing historic brick. Photo: John P. Speweik.

Mortar Analysis

Methods for analyzing mortars can be divided into two broad categories: **wet chemical** and **instrumental.** Many laboratories that analyze historic mortars use a simple **wet-chemical** method called acid digestion, whereby a sample of the mortar is crushed and then mixed with a dilute acid. The acid dissolves all the carbonate-containing minerals not only in the binder, but also in the aggregate (such as oyster shells, coral sands, or other carbonate-based materials), as well as any other acid-soluble materials. The sand and fine-grained acid-insoluble material is left behind. There are several variations on the simple acid digestion test. One involves collecting the carbon dioxide gas given off as the carbonate is digested by the acid; based on the gas volume the carbnate content of the mortar can be accurately determined (Jedrzejewska, 1960). Simple acid digestion methods are rapid, inexpensive, and easy to perform, but the information they provide about the original composition of a mortar is limited to the color and texture of the sand. The gas collection method provides more information about the binder than a simple acid digestion test.

Instrumental analysis methods that have been used to evaluate mortars include

polarized light or thin-section microscopy, scanning electron microscopy, atomic absorption spectroscopy, X-ray diffraction, and differential thermal analysis. All instrumental methods require not only expensive, specialized equipment, but also highly-trained experienced analysts. However, instrumental methods can provide much more information about a mortar. Thin-section microscopy is probably the most commonly used instrumental method. Examination of thin slices of a mortar in transmitted light is often used to supplement acid digestion methods, particularly to look for carbonate-based aggregate. For example, the new ASTM test method, ASTM C 1324-96 "Test Method for Examination and Analysis of Hardened Mortars" which was designed specifically for the analysis of modern lime-cement and masonry cement mortars, combines a complex series of wet chemical analyses with thin-section microscopy.

The drawback of most mortar analysis methods is that mortar samples of known composition have not been analyzed in order to evaluate the method. Historic mortars were not prepared to narrowly defined specifications from materials of uniform quality; they contain a wide array of locally derived materials combined at the discretion of the mason. While a particular method might be able to accurately determine the original proportions of a lime-cement-sand mortar prepared from modern materials, the usefulness of that method for evaluating historic mortars is questionable unless it has been tested against mortars prepared from materials more commonly used in the past. **Lorraine Schnabel.**

Properties of Mortar

Mortars for repointing should be softer or more permeable than the masonry units and no harder or more impermeable than the historic mortar to prevent damage to the masonry units. It is a common error to assume that hardness or high strength is a measure of appropriateness, particularly for lime-based historic mortars. Stresses within a wall caused by expansion, contraction, moisture migration, or settlement must be accommodated in some manner; in a masonry wall, these stresses should be relieved by the mortar rather than by the masonry units. A mortar that is stronger in compressive strength than the masonry units will not "give," thus causing stresses to be relieved through the masonry units--resulting in permanent damage to the masonry, such as cracking and spalling, that cannot be repaired easily.

While stresses can also break the bond between the mortar and the masonry units, permitting water to penetrate the resulting hairline cracks, this is easier to correct in the joint through repointing than if the break occurs in the masonry units.

This early 19th century building is being repointed

Permeability, or rate of vapor transmission, is also critical. High lime mortars are more permeable than denser cement mortars. Historically, mortar acted as a bedding material--not unlike an expansion joint--rather than a "glue" for the masonry units, and moisture was able to migrate through the mortar joints rather than the masonry units. When moisture evaporates from the masonry it deposits any soluble salts either on the surface as *efflorescence* or below the surface as *subflorescence.* While salts deposited on the surface of masonry units are usually relatively harmless, salt crystallization within a masonry unit creates pressure that

can cause parts ofthe outer surface to spall off or delaminate. If the mortar does not permitmoisture or moisture vapor to migrate out of the wall and evaporate, theresult will be damage to the masonry units.

with lime mortar. Photo: Travis McDonald.

Components of Mortar

Sand. Sand is the largest component of mortar and the material that gives mortar its distinctive color, texture and cohesiveness. Sand must be free of impurities, such as salts or clay. The three key characteristics of sand are: particle shape, gradation and void ratios.

When viewed under a magnifying glass or low-power microscope, particles of sand generally have either rounded edges, such as found in beach and river sand, or sharp, angular edges, found in crushed or manufactured sand. For repointing mortar, rounded or natural sand is preferred for two reasons. It is usually similar to the sand in the historic mortar and provides a better visual match. It also has better working qualities or plasticity and can thus be forced into the joint more easily, forming a good contact with the remaining historic mortar and the surface of the adjacent masonry units. Although manufactured sand is frequently more readily available, it is usually possible to locate a supply of rounded sand.

The gradation of the sand (particle size distribution) plays a very important role in the durability and cohesive properties of a mortar. Mortar must have a certain percentage of large to small particle sizes in order to deliver the optimum performance. Acceptable guidelines on particle size distribution may be found in ASTM C 144 (American Society for Testing and Materials). However, in actuality, since neither historic nor modern sands are always in compliance with ASTM C 144, matching the same particle appearance and gradation usually requires sieving the sand.

A scoop of sand contains many small voids between the individual grains. A mortar that performs well fills all these small voids with binder (cement/lime combination or mix) in a balanced manner. Well-graded sand generally has a 30 per cent void ratio by volume. Thus, 30 per cent binder by volume generally should be used, unless the historic mortar had a different binder: aggregate ratio. This represents the 1:3 binder to sand ratios often seen in mortar specifications.

For repointing, sand generally should conform to ASTM C 144 to assure proper gradation and freedom from impurities; some variation may be necessary to match the original size and gradation. Sand color and texture also should match the original as closely as possible to provide the proper color match without other additives.

Lime. Mortar formulations prior to the late-19th century used lime as the primary binding material. Lime is derived from heating limestone at high temperatures which burns off the carbon dioxide, and turns the limestone into quicklime. There are three types of limestone--calcium, magnesium, and dolomitic--differentiated by the different levels of magnesium carbonate they contain which impart specific qualities to mortar. Historically, calcium lime was used for mortar rather than the dolomitic lime (calcium magnesium carbonate) most often used today. But it is also important to keep in mind the fact that the historic limes, and other components of mortar, varied a great deal because they were natural, as opposed to modern lime which is manufactured and, therefore, standardized. Because some of the kinds of lime, as well as other components

of mortar, that were used historically are no longer readily available, even when a conscious effort is made to replicate a "historic" mix, this may not be achievable due to the differences between modern and historic materials.

Caulking was inappropriately used here in place of mortar on the top of the wall. As a result, it has not been durable. Photo: NPS files.

Lime, itself, when mixed with water into a paste is very plastic and creamy. It will remain workable and soft indefinitely, if stored in a sealed container. Lime (calcium hydroxide) hardens by carbonation absorbing carbon dioxide primarily from the air, converting itself to calcium carbonate. Once a lime and sand mortar is mixed and placed in a wall, it begins the process of carbonation. If lime mortar is left to dry too rapidly, carbonation of the mortar will be reduced, resulting in poor adhesion and poor durability. In addition, lime mortar is slightly water soluble and thus is able to re-seal any hairline cracks that may develop during the life of the mortar. Lime mortar is soft, porous, and changes little in volume during temperature fluctuations thus making it a good choice for historic buildings. *Because of these qualities, high calcium lime mortar may be considered for many repointing projects, not just those involving historic buildings.*

For repointing, lime should conform to ASTM C 207, Type S, or Type SA, Hydrated Lime for Masonry Purposes. This machine-slaked lime is designed to assure high plasticity and water retention. The use of quicklime which must be slaked and soaked by hand may have advantages over hydrated lime in some restoration projects if time and money allow.

Lime putty. Lime putty is slaked lime that has a putty or paste-like consistency. It should conform to ASTM C 5. Mortar can be mixed using lime putty according to ASTM C 270 property or proportion specification.

Portland cement. More recent, 20th-century mortar has used portland cement as a primary binding material. A straight portland cement and sand mortar is extremely hard, resists the movement of water, shrinks upon setting, and undergoes relatively large thermal movements. When mixed with water, portland cement forms a harsh, stiff paste that is quite unworkable, becoming hard very quickly. (Unlike lime, portland cement will harden regardless of weather conditions and does not require wetting and drying cycles.) Some portland cement assists the workability and plasticity of the mortar without adversely affecting the finished project; it also provides early strength to the mortar and speeds setting. Thus, it may be appropriate to add some portland cement to an essentially lime-based mortar even when repointing relatively soft 18th or 19th century brick under some circumstances when a slightly harder mortar is required. The more portland cement that is added to a mortar formulation the harder it becomes--and the faster the initial set.

For repointing, portland cement should conform to ASTM C 150. White, non- staining portland cement may provide a better color match for some historic mortars than the more commonly available grey portland cement. But, it should not be assumed, however, that white portland cement is always appropriate for all historic buildings, since the original mortar may have been mixed with grey cement. The cement should not have more than 0.60 per cent alkali to help avoid efflorescence.

Masonry cement. Masonry cement is a preblended mortar mix commonly found at hardware and home repair stores. It is designed to produce mortars with a compressive strength of 750 psi or higher when mixed with sand and water at the job site. It may contain hydrated lime, but it always contains a large amount of portland cement, as well as ground limestone and other workability agents, including air-entraining agents. Because masonry cements are not required to contain hydrated lime, and generally do not contain lime, they produce high strength mortars that can damage historic masonry. *For this reason, they generally are not recommended for use on historic masonry buildings.*

Lime mortar (pre-blended). Hydrated lime mortars, and pre-blended lime putty mortars with or without a matched sand are commercially available. Custom mortars are also available with color. In most instances, pre-blended lime mortars containing sand may not provide an exact match; however, if the project calls for total repointing, a pre-blended lime mortar may be worth considering as long as the mortar is compatible in strength with the masonry. If the project involves only selected, "spot" repointing, then it may be better to carry out a mortar analysis which can provide a custom pre-blended lime mortar with a matching sand. In either case, if a preblended lime mortar is to be used, it should contain Type S or SA hydrated lime conforming to ASTM C 207.

Water. Water should be potable--clean and free from acids, alkalis, or other dissolved organic materials.

Other Components

Historic components. In addition to the color of the sand, the texture of the mortar is of critical importance in duplicating historic mortar. Most mortars dating from the mid-19th century on--with some exceptions--have a fairly homogeneous texture and color. Some earlier mortars are not as uniformly textured and may contain lumps of partially burned lime or "dirty lime", shell (which often provided a source of lime, particularly in coastal areas), natural cements, pieces of clay, lampblack or other pigments, or even animal hair. The visual characteristics of these mortars can be duplicated through the use of similar materials in the repointing mortar.

Replicating such unique or individual mortars will require writing new specifications for each project. If possible, suggested sources for special materials should be included. For example, crushed oyster shells can be obtained in a variety of sizes from poultry supply dealers.

Pigments. Some historic mortars, particularly in the late 19th century, were tinted to match or contrast with the brick or stone. Red pigments, sometimes in the form of brick dust, as well as brown, and black pigments were commonly used. Modern pigments are available which can be added to the mortar at the job site, but they should not exceed 10 per cent by weight of the portland cement in the mix, and carbon black should be limited to 2 per cent. Only synthetic mineral oxides, which are alkali-proof and sun-fast, should be used to prevent bleaching and fading.

Modern components. Admixtures are used to create specific characteristics in mortar, and whether they should be used will depend upon the individual project. *Air entraining agents*, for example, help the mortar to resist freeze-thaw damage in northern climates. *Accelerators* are used to reduce mortar freezing prior to setting while *retarders* help to extend the mortar life in hot climates. Selection of admixtures should be made by the architect or architectural conservator as part of the specifications, not something routinely added by the masons.

Generally, modern chemical additives are unnecessary and may, in fact, have detrimental effects in historic masonry projects. The use of antifreeze compounds is not recommended. They are not very effective with high lime mortars and may introduce salts, which may cause efflorescence later. A better practice is to warm the sand and water, and to protect the completed work from freezing. No definitive study has determined whether air-entraining additives should be used to resist frost action and enhance plasticity, but in areas of extreme exposure requiring high-strength mortars with lower permeability, air-entrainment of 10-16 percent may be desirable (see formula for "severe weather exposure" in **Mortar Type and Mix**). Bonding agents are not a substitute for proper joint preparation, and they should generally be avoided. If the joint is properly prepared, there will be a good bond between the new mortar and the adjacent surfaces. In addition, a bonding agent is difficult to remove if smeared on a masonry surface.

Mortar Type and Mix

Mortars for repointing projects, especially those involving historic buildings, typically are custom mixed in order to ensure the proper physical and visual qualities. These materials can be combined in varying proportions to create a mortar with the desired performance and durability. The actual specification of a particular mortar type should take into consideration all of the factors affecting the life of the building including: current site conditions, present condition of the masonry, function of the new mortar, degree of weather exposure, and skill of the mason.

Here, a hammer and chisel are being correctly used to prepare a joint for repointing. Photo: John P. Speweik.

Thus, no two repointing projects are exactly the same. Modern materials specified for use in repointing mortar should conform to specifications of the American Society for Testing and Materials (ASTM) or comparable federal specifications, and the resulting mortar should conform to ASTM C 270, Mortar for Unit Masonry.

Specifying the proportions for the repointing mortar for a specific job is not as difficult as it might seem. Five mortar types, each with a corresponding recommended mix, have been established by ASTM to distinguish high strength mortar from soft flexible mortars. The ASTM designated them in decreasing order of approximate general strength as Type M (2,500 psi), Type S (1,800 psi), Type N (750 psi), Type O (350 psi) and Type K (75 psi). (The letters identifying the types are from the words MASON WORK using every other letter.) Type K has the highest lime content of the mixes that contain portland cement, although it is seldom used today, except for some historic preservation projects. The designation "L" in the accompanying chart identifies a straight lime and sand mix. Specifying the appropriate ASTM mortar by proportion of ingredients, will ensure the desired physical properties. Unless specified otherwise, measurements or proportions for mortar mixes are always given in the following order: cement-lime-sand. Thus, a Type K mix, for example, would be referred to as 1-3-10, or 1 part cement to 3 parts lime to 10 parts sand. Other requirements to create the desired visual qualities should be included in the specifications.

The strength of a mortar can vary. If mixed with higher amounts of portland cement, a harder mortar is obtained. The more lime that is added, the softer and more plastic the mortar becomes, increasing its workability. A mortar strong in compressive strength might be desirable for a hard stone (such as granite) pier holding up a bridge deck,

whereas a softer, more permeable lime mortar would be preferable for a historic wall of soft brick. Masonry deterioration caused by salt deposition results when the mortar is less permeable than the masonry unit. A strong mortar is still more permeable than hard, dense stone. However, in a wall constructed of soft bricks where the masonry unit itself has a relatively high permeability or vapor transmission rate, a soft, high lime mortar is necessary to retain sufficient permeability.

Budgeting and Scheduling

Repointing is both expensive and time consuming due to the extent of handwork and special materials required. It is preferable to repoint only those areas that require work rather than an entire wall, as is often specified. But, if 25 to 50 per cent or more of a wall needs to be repointed, repointing the entire wall may be more cost effective than spot repointing.

Total repointing may also be more sensible when access is difficult, requiring the erection of expensive scaffolding (unless the majority of the mortar is sound and unlikely to require replacement in the foreseeable future). Each project requires judgement based on a variety of factors. Recognizing this at the outset will help to prevent many jobs from becoming prohibitively expensive.

When repairing this stone wall, the mason matched the raised profile of the original tuckpointing. Photo: NPS files.

In scheduling, seasonal aspects need to be considered first. Generally speaking, wall temperatures between 40 and 95 degrees F (8 and 38 degrees C) will prevent freezing or excessive evaporation of the water in the mortar. Ideally, repointing should be done in shade, away from strong sunlight in order to slow the drying process, especially during hot weather. If necessary, shade can be provided for large-scale projects with appropriate modifications to scaffolding.

The relationship of repointing to other work proposed on the building must also be recognized. For example, if paint removal or cleaning is anticipated, and if the mortar joints are basically sound and need only selective repointing, it is generally better to postpone repointing until after completion of these activities. However, if the mortar has eroded badly, allowing moisture to penetrate deeply into the wall, repointing should be accomplished before cleaning. Related work, such as structural or roof repairs, should be scheduled so that they do not interfere with repointing and so that all work can take maximum advantage of erected scaffolding.

Building managers also must recognize the difficulties that a repointing project can create.

> The process is time consuming, and scaffolding may need to remain in place for an extended period of time. The joint preparation process can be quite noisy and can generate large quantities of dust which must be controlled, especially at air intakes to protect human health, and also where it might damage operating machinery. Entrances may be blocked from time to

A mechanical grinder improperly used to cut out the horizontal joint and incompatible repointing have seriously damaged the 19th century brick. Photo: NPS files.

time making access difficult for both building tenants and visitors. Clearly, building managers will need to coordinate the repointing work with other events at the site.

Contractor Selection

The ideal way to select a contractor is to ask knowledgeable owners of recently repointed historic buildings for recommendations. Qualified contractors then can provide lists of other repointing projects for inspection. More commonly, however, the contractor for a repointing project is selected through a competitive bidding process over which the client or consultant has only limited control. In this situation it is important to ensure that the specifications stipulate that masons must have a minimum of five years' experience with repointing historic masonry buildings to be eligible to bid on the project. Contracts are awarded to the lowest responsible bidder, and bidders who have performed poorly on other projects usually can be eliminated from consideration on this basis, even if they have the lowest prices.

The contract documents should call for unit prices as well as a base bid. Unit pricing forces the contractor to determine in advance what the cost addition or reduction will be for work which varies from the scope of the base bid. If, for example, the contractor has fifty linear feet less of stone repointing than indicated on the contract documents but thirty linear feet more of brick repointing, it will be easy to determine the final price for the work. Note that each type of work--brick repointing, stone repointing, or similar items--will have its own unit price. The unit price also should reflect quantities; one linear foot of pointing in five different spots will be more expensive than five contiguous linear feet.

Execution of the Work

Test Panels. These panels are prepared by the contractor using the same techniques that will be used on the remainder of the project. Several panel locations--preferably not on the front or other highly visible location of the building--may be necessary to include all types of masonry, joint styles, mortar colors, and other problems likely to be encountered on the job.

If cleaning tests, for example, are also to be undertaken, they should be carried out in the same location. Usually a 3 foot by 3 foot area is sufficient for brickwork, while a somewhat larger area may be required for stonework. These panels establish an acceptable standard of work and serve as a benchmark for evaluating and accepting subsequent work on the building.

Unskilled repointing has

Joint Preparation. Old mortar should be removed to a minimum depth of 2 to 2-1/2 times the width of the joint to ensure an adequate bond and to prevent mortar "popouts." For most brick joints, this will require removal of the mortar to a depth of approximately ½ to 1 inch; for stone masonry with wide joints, mortar may need to be removed to a depth of several inches. Any loose or disintegrated mortar

beyond this minimum depth also should be removed.

negatively impacted the character of this late-19th century building. Photo: NPS files.

Although some damage may be inevitable, careful joint preparation can help limit damage to masonry units. The traditional manner of removing old mortar is through the use of hand chisels and mash hammers. Though labor-intensive, in most instances this method poses the least threat for damage to historic masonry units and produces the best final product.

The most common method of removing mortar, however, is through the use of power saws or grinders. The use of power tools by unskilled masons can be disastrous for historic masonry, particularly soft brick. Using power saws on walls with thin joints, such as most brick walls, almost always will result in damage to the masonry units by breaking the edges and by overcutting on the head, or vertical joints.

However, small pneumatically-powered chisels generally can be used safely and effectively to remove mortar on historic buildings as long as the masons maintain appropriate control over the equipment. Under certain circumstances, thin diamond-bladed grinders may be used to cut out *horizontal* joints only on hard portland cement mortar common to most early-20th century masonry buildings. Usually, automatic tools most successfully remove old mortar without damaging the masonry units when they are used in combination with hand tools in preparation for repointing. Where horizontal joints are uniform and fairly wide, it may be possible to use a power masonry saw to assist the removal of mortar, such as by cutting along the middle of the joint; final mortar removal from the sides of the joints still should be done with a hand chisel and hammer. Caulking cutters with diamond blades can sometimes be used successfully to cut out joints without damaging the masonry. Caulking cutters are slow; they do not rotate, but vibrate at very high speeds, thus minimizing the possibility of damage to masonry units. Although mechanical tools may be safely used in limited circumstances to cut out horizontal joints in preparation for repointing, they should never be used on vertical joints because of the danger of slipping and cutting into the brick above or below the vertical joint. Using power tools to remove mortar without damaging the surrounding masonry units also necessitates highly skilled masons experienced in working on historic masonry buildings. Contractors should demonstrate proficiency with power tools before their use is approved.

Using any of these power tools may also be more acceptable on hard stone, such as quartzite or granite, than on terra cotta with its glass-like glaze, or on soft brick or stone. The test panel should determine the acceptability of power tools. If power tools are to be permitted, the contractor should establish a quality control program to account for worker fatigue and similar variables.

Mortar should be removed cleanly from the masonry units, leaving square corners at the back of the cut. Before filling, the joints should be rinsed with a jet of water to remove all loose particles and dust. At the time of filling, the joints should be damp, but with no standing water present. For masonry walls--limestone, sandstone and common brick--that are extremely absorbent, it is recommended that a continual mist of water be applied for a few hours before repointing begins.

Mortar Preparation. Mortar components should be measured and mixed carefully to assure the uniformity of visual and physical characteristics. Dry ingredients are measured by volume and thoroughly mixed before the addition of any water. Sand must be added in a damp, loose condition to avoid over sanding. Repointing mortar is typically pre-hydrated by adding water so it will just hold together, thus allowing it to stand for a period of time before the final water is added. Half the water should be added, followed

by mixing for approximately 5 minutes. The remaining water should then be added in small portions until a mortar of the desired consistency is reached. The total volume of water necessary may vary from batch to batch, depending on weather conditions. It is important to keep the water to a minimum for two reasons: first, a drier mortar is cleaner to work with, and it can be compacted tightly into the joints; second, with no excess water to evaporate, the mortar cures without shrinkage cracks. Mortar should be used within approximately 30 minutes of final mixing, and "retempering," or adding more water, should not be permitted.

Using Lime Putty to Make Mortar. Mortar made with lime putty and sand, sometimes referred to as roughage or course stuff, should be measured by volume, and may require slightly different proportions from those used with hydrated lime. No additional water is usually needed to achieve a workable consistency because enough water is already contained in the putty. Sand is proportioned first, followed by the lime putty, then mixed for five minutes or until all the sand is thoroughly coated with the lime putty. But mixing, in the familiar sense of turning over with a hoe, sometimes may not be sufficient if the best possible performance is to be obtained from a lime putty mortar. Although the old practice of chopping, beating and ramming the mortar has largely been forgotten, recent field work has confirmed that lime putty and sand rammed and beaten with a wooden mallet or ax handle, interspersed by chopping with a hoe, can significantly improve workability and performance. The intensity of this action increases the overall lime/sand contact and removes any surplus water by compacting the other ingredients. It may also be advantageous for larger projects to use a mortar pan mill for mixing. Mortar pan mills which have a long tradition in Europe produce a superior lime putty mortar not attainable with today's modern paddle and drum type mixers.

For larger repointing projects the lime putty and sand can be mixed together ahead of time and stored indefinitely, on or off site, which eliminates the need for piles of sand on the job site. This mixture, which resembles damp brown sugar, must be protected from the air in sealed containers with a wet piece of burlap over the top or sealed in a large plastic bag to prevent evaporation and premature carbonation. The lime putty and sand mixture can be recombined into a workable plastic state months later with no additional water.

If portland cement is specified in a lime putty and sand mortar--Type O (1:2:9) or Type K (1:3:11)--the portland cement should first be mixed into a slurry paste before adding it to the lime putty and sand. Not only will this ensure that the portland cement is evenly distributed throughout the mixture, but if dry portland cement is added to wet ingredients it tends to "ball up," jeopardizing dispersion. (Usually water must be added to the lime putty and sand anyway once the portland cement is introduced.) Any color pigments should be added at this stage and mixed for a full five minutes. The mortar should be used within 30 minutes to 1½ hours and it should not be retempered. Once portland cement has been added the mortar can no longer be stored.

Filling the Joint. Where existing mortar has been removed to a depth of greater than 1 inch, these deeper areas should be filled first, compacting the new mortar in several layers. The back of the entire joint should be filled successively by applying approximately 1/4 inch of mortar, packing it well into the back corners. This application may extend along the wall for several feet. As soon as the mortar has reached thumb-print hardness, another 1/4 inch layer of mortar--approximately the same thickness--may be applied. Several layers will be needed to fill the joint flush with the outer surface of the masonry. It is important to allow each layer time to harden before the next layer is applied; most of the mortar shrinkage occurs during the hardening process and layering thus minimizes overall shrinkage.

When the final layer of mortar is thumb-print hard, the joint should be tooled to match the historic joint. Proper timing of the tooling is important for uniform color and appearance. If tooled when too soft, the color will be lighter than expected, and hairline cracks may occur; if tooled when too hard, there may be dark streaks called "tool burning," and good closure of the mortar against the masonry units will not be achieved.

If the old bricks or stones have worn, rounded edges, it is best to recess the final mortar slightly from the face of the masonry. This treatment will help avoid a joint which is visually wider than the actual joint; it also will avoid creation of a large, thin featheredge which is easily damaged, thus admitting water. After tooling, excess mortar can be removed from the edge of the joint by brushing with a natural bristle or nylon brush. Metal bristle brushes should never be used on historic masonry.

Curing Conditions. The preliminary hardening of high-lime content mortars--those mortars that contain more lime by volume than portland cement, i.e., Type O (1:2:9), Type K (1:3:11), and straight lime/sand, Type "L" (0:1:3)--takes place fairly rapidly as water in the mix is lost to the porous surface of the masonry and through evaporation. A high lime mortar (especially Type "L") left to dry out too rapidly can result in chalking, poor adhesion, and poor durability. Periodic wetting of the repointed area after the mortar joints are thumb-print hard and have been finish tooled may significantly accelerate the carbonation process. When feasible, misting using a hand sprayer with a fine nozzle can be simple to do for a day or two after repointing. Local conditions will dictate the frequency of wetting, but initially it may be as often as every hour and gradually reduced to every three or four hours. Walls should be covered with burlap for the first three days after repointing. (Plastic may be used, but it should be tented out and not placed directly against the wall.) This helps keep the walls damp and protects them from direct sunlight. Once carbonation of the lime has begun, it will continue for many years and the lime will gain strength as it reverts back to calcium carbonate within the wall.

***Aging* the Mortar.** Even with the best efforts at matching the existing mortar color, texture, and materials, there will usually be a visible difference between the old and new work, partly because the new mortar has been matched to the unweathered portions of the historic mortar. Another reason for a slight mismatch may be that the sand is more exposed in old mortar due to the slight erosion of the lime or cement. Although spot repointing is generally preferable and some color difference should be acceptable, if the difference between old and new mortar is too extreme, it may be advisable in some instances to repoint an entire area of a wall, or an entire feature such as a bay, to minimize the difference between the old and the new mortar. If the mortars have been properly matched, usually the best way to deal with surface color differences is to let the mortars age naturally. Other treatments to overcome these differences, including cleaning the non-repointed areas or staining the new mortar, should be carefully tested prior to implementation.

This 18th century pediment and surrounding wall exhibit distinctively different mortar joints. Photo: NPS files.

Staining the new mortar to achieve a better color match is generally not recommended, but it may be appropriate in some instances. Although staining may provide an initial match, the old and new mortars may weather at different rates, leading to visual differences after a few seasons. In addition, the mixtures used to stain the mortar may be harmful to the masonry; for example, they may introduce salts into the masonry

which can lead to efflorescence.

Cleaning the Repointed Masonry. If repointing work is carefully executed, there will be little need for cleaning other than to remove the small amount of mortar from the edge of the joint following tooling. This can be done with a stiff natural bristle or nylon brush after the mortar has dried, but before it is initially set (1-2 hours). Mortar that has hardened can usually be removed with a wooden paddle or, if necessary, a chisel.

Further cleaning is best accomplished with plain water and natural bristle or nylon brushes. If chemicals must be used, they should be selected with extreme caution. Improper cleaning can lead to deterioration of the masonry units, deterioration of the mortar, mortar smear, and efflorescence. New mortar joints are especially susceptible to damage because they do not become fully cured for several months. Chemical cleaners, particularly acids, should never be used on dry masonry. The masonry should always be completely soaked once with water before chemicals are applied. After cleaning, the walls should be flushed again with plain water to remove all traces of the chemicals.

Several precautions should be taken if a freshly repointed masonry wall is to be cleaned. First, the mortar should be fully hardened before cleaning. Thirty days is usually sufficient, depending on weather and exposure; as mentioned previously, the mortar will continue to cure even after it has hardened. Test panels should be prepared to evaluate the effects of different cleaning methods. Generally, on newly repointed masonry walls, only very low pressure (100 psi) water washing supplemented by stiff natural bristle or nylon brushes should be used, except on glazed or polished surfaces, where only soft cloths should be used.**

New construction "bloom" or efflorescence occasionally appears within the first few months of repointing and usually disappears through the normal process of weathering. If the efflorescence is not removed by natural processes, the safest way to remove it is by dry brushing with stiff natural or nylon bristle brushes followed by wet brushing. Hydrochloric (muriatic) acid, is generally ineffective, and it should not be used to remove efflorescence. It may liberate additional salts, which, in turn, can lead to more efflorescence.

Surface Grouting is sometimes suggested as an alternative to repointing brick buildings, in particular. This process involves the application of a thin coat of cement-based grout to the mortar joints and the mortar/brick interface. To be effective, the grout must extend slightly onto the face of the masonry units, thus widening the joint visually. The change in the joint appearance can alter the historic character of the structure to an unacceptable degree. In addition, although masking of the bricks is intended to keep the grout off the remainder of the face of the bricks, some level of residue, called "veiling," will inevitably remain. Surface grouting cannot substitute for the more extensive work of repointing, and it is not a recommended treatment for historic masonry.

***Additional information on masonry cleaning is presented in Preservation Briefs 1: Assessing Cleaning and Water-Repellent Treatments for Historic Masonry Buildings, Robert C. Mack, FAIA, and Anne Grimmer, Washington, D.C.: Technical Preservation Services, National Park Service, U.S. Department of the Interior, 2000; and Keeping it Clean: Removing Exterior Dirt, Paint, Stains & Graffiti from Historic Masonry Buildings, Anne E. Grimmer, Washington, D.C.: Technical Preservation Services, National Park Service, U.S. Department of the Interior, 1988.*

Visually Examining the Mortar and the Masonry Units

A simple *in situ* comparison will help determine the hardness and condition of the mortar and the masonry units. Begin by scraping the mortar with a screwdriver, and gradually tapping harder with a cold chisel and mason's hammer. Masonry units can be tested in the same way beginning, even more gently, by scraping with a fingernail. This relative analysis which is derived from the 10-point hardness scale used to describe minerals, provides a good starting point for selection of an appropriate mortar. It is described more fully in "The Russack System for Brick & Mortar Description" referenced in **Selected Reading** at the end of this Brief.

Mortar samples should be chosen carefully, and picked from a variety of locations on the building to find unweathered mortar, if possible. Portions of the building may have been repointed in the past while other areas may be subject to conditions causing unusual deterioration. There may be several colors of mortar dating from different construction periods or sand used from different sources during the initial construction. Any of these situations can give false readings to the visual or physical characteristics required for the new mortar. Variations should be noted which may require developing more than one mix.

1) Remove with a chisel and hammer three or four unweathered samples of the mortar to be matched from several locations on the building. (Set the largest sample aside--this will be used later for comparison with the repointing mortar). Removing a full representation of samples will allow selection of a "mean" or average mortar sample.

2) Mash the remaining samples with a wooden mallet, or hammer if necessary, until they are separated into their constituent parts. There should be a good handful of the material.

3) Examine the powdered portion--the lime and/or cement matrix of the mortar. Most particularly, note the color. There is a tendency to think of historic mortars as having white binders, but grey portland cement was available by the last quarter of the 19th century, and traditional limes were also sometimes grey. Thus, in some instances, the natural color of the historic binder may be grey, rather than white. The mortar may also have been tinted to create a colored mortar, and this color should be identified at this point.

4) Carefully blow away the powdery material (the lime and/or cement matrix which bound the mortar together).

5) With a low power (10 power) magnifying glass, examine the remaining sand and other materials such as lumps of lime or shell.

6) Note and record the wide range of color as well as the varying sizes of the individual grains of sand, impurities, or other materials.

Other Factors to Consider

Color. Regardless of the color of the binder or colored additives, the sand is the primary material that gives mortar its color. A surprising variety of colors of sand may be found in a single sample of historic mortar, and the different sizes of the grains of sand or other materials, such as incompletely ground lime or cement, play an important role in the texture of the repointing mortar. Therefore, when specifying sand for repointing

mortar, it may be necessary to obtain sand from several sources and to combine or screen them in order to approximate the range of sand colors and grain sizes in the historic mortar sample.

Pointing Style. Close examination of the historic masonry wall and the techniques used in the original construction will assist in maintaining the visual qualities of the building. Pointing styles and the methods of producing them should be examined. It is important to look at both the horizontal and the vertical joints to determine the order in which they were tooled and whether they were the same style. Some late-19th and early-20th century buildings, for example, have horizontal joints that were raked back while the vertical joints were finished flush and stained to match the bricks, thus creating the illusion of horizontal bands. Pointing styles may also differ from one facade to another; front walls often received greater attention to mortar detailing than side and rear walls. **Tuckpointing** is not true repointing but the application of a raised joint or lime putty joint on top of flush mortar joints. **Penciling** is a purely decorative, painted surface treatment over a mortar joint, often in a contrasting color.

Masonry Units. The masonry units should also be examined so that any replacement units will match the historic masonry. Within a wall there may be a wide range of colors, textures, and sizes, particularly with hand-made brick or rough-cut, locally-quarried stone. Replacement units should blend in with the full range of masonry units rather than a single brick or stone.

Matching Color and Texture of the Repointing Mortar

New mortar should match the unweathered interior portions of the historic mortar. The simplest way to check the match is to make a small sample of the proposed mix and allow it to cure at a temperature of approximately 70 degrees F for about a week, or it can be baked in an oven to speed up the curing; this sample is then broken open and the surface is compared with the surface of the largest "saved" sample of historic mortar.

If a proper color match cannot be achieved through the use of natural sand or colored aggregates like crushed marble or brick dust, it may be necessary to use a modern mortar pigment.

During the early stages of the project, it should be determined how closely the new mortar should match the historic mortar. Will "quite close" be sufficient, or is "exactly" expected? The specifications should state this clearly so that the contractor has a reasonable idea how much time and expense will be required to develop an acceptable match.

The same judgment will be necessary in matching replacement terra cotta, stone or brick. If there is a known source for replacements, this should be included in the specifications. If a source cannot be determined prior to the bidding process, the specifications should include an estimated price for the replacement materials with the final price based on the actual cost to the contractor.

Mortar Types (Measured by volume)			
Designation	Cement	Hydrated Lime or Lime Putty	Sand
M	1	1/4	3 - 3 3/4

S	1	1/2	4 - 4 1/2
N	1	1	5 - 6
O	1	2	8 - 9
K	1	3	10 - 12
"L"	0	1	2 1/4 - 3

Suggested Mortar Types for Different Exposures			
	Exposure		
Masonry Material	Sheltered	Moderate	Severe
Very durable: granite, hard-cored brick, etc.	O	N	S
Moderately durable: limestone, durable stone, molded brick	K	O	N
Minimally durable: soft hand-made brick	"L"	K	O

Summary

For the Owner/Administrator. The owner or administrator of a historic building should remember that repointing is likely to be a lengthy and expensive process. First, there must be adequate time for evaluation of the building and investigation into the cause of problems. Then, there will be time needed for preparation of the contract documents. The work itself is precise, time-consuming and noisy, and scaffolding may cover the face of the building for some time. Therefore, the owner must carefully plan the work to avoid problems. Schedules for both repointing and other activities will thus require careful coordination to avoid unanticipated conflicts. The owner must avoid the tendency to rush the work or cut corners if the historic building is to retain its visual integrity and the job is to be durable.

For the Architect/Consultant. Because the primary role of the consultant is to ensure the life of the building, a knowledge of historic construction techniques and the special problems found in older buildings is essential. The consultant must assist the owner in planning for logistical problems relating to research and construction. It is the consultant's responsibility to determine the cause of the mortar deterioration and ensure that it is corrected before the masonry is repointed. The consultant must also be prepared to spend more time in project inspections than is customary in modern construction.

For the Masons. Successful repointing depends on the masons themselves. Experienced masons understand the special requirements for work on historic buildings and the added time and expense they require. The entire masonry crew must be willing and able to perform the work in conformance with the specifications, even when the specifications may not be in conformance with standard practice. At the same time, the masons should not hesitate to question the specifications if it appears that the work specified would damage the building.

Conclusion

A good repointing job is meant to last, at least 30 years, and preferably 50- 100 years. Shortcuts and poor craftsmanship result not only in diminishing the historic character of a building, but also in a job that looks bad, and will require future repointing sooner than if the work had been done correctly. The mortar joint in a historic masonry building has often been called a wall's "first line of defense." Good repointing practices guarantee the long life of the mortar joint, the wall, and the historic structure. Although careful maintenance will help preserve the freshly repointed mortar joints, it is important to remember that mortar joints are intended to be sacrificial and will probably require repointing some time in the future. Nevertheless, if the historic mortar joints proved durable for many years, then careful repointing should have an equally long life, ultimately contributing to the preservation of the entire building.

Selected Reading

Ashurst, John & Nicola. *Practical Building Conservation. Vol. 3: Mortars, Plasters and Renders.* New York: Halsted Press, a Division of John Wiley & Sons, Inc., 1988.

Cliver, E. Blaine. "Tests for the Analysis of Mortar Samples." *Bulletin of the Association for Preservation Technology.* Vol. 6, No. 1 (1974), pp. 68-73.

Coney, William B., AIA. *Masonry Repointing of Twentieth-Century Buildings.* Illinois Preservation Series. Number 10. Springfield, IL: Division of Preservation Services, Illinois Historic Preservation Agency, 1989.

Davidson, J.I. "Masonry Mortar." *Canadian Building Digest.* CBD 163. Ottawa, ONT: Division of Building Research, National Research Council of Canada, 1974.

Ferro, Maximillian L., AIA, RIBA. "The Russack System for Brick and Mortar Description: A Field Method for Assessing Masonry Hardness." *Technology and Conservation.* Vol. 5, No. 2 (Summer 1980), pp. 32-35.

Hooker, Kenneth A. "Field Notes on Repointing." *Aberdeen's Magazine of Masonry Construction.* Vol. 4, No. 8 (August 1991), pp. 326-328.

Jedrzejewska, H. "Old Mortars in Poland: A New Method of Investigation." Studies in Conservation. Vol. 5, No. 4 (1960), pp. 132-138.

"Lime's Role in Mortar." Aberdeen's Magazine of Masonry Construction. Vol. 9, No. 8 (August 1996), pp. 364-368.

Phillips, Morgan W. "Brief Notes on the Subjects of Analyzing Paints and Mortars and the Recording of Moulding Profiles: The Trouble with Paint and Mortar Analysis." *Bulletin of the Association for Preservation Technology.* Vol. 10, No. 2 (1978), pp. 77-89.

Preparation and Use of Lime Mortars: An Introduction to the Principles of Using Lime Mortars. Scottish Lime Centre for Historic Scotland. Edinburgh: Historic Scotland, 1995.

Schierhorn, Carolyn. "Ensuring Mortar Color Consistency." *Aberdeen's Magazine of Masonry Construction.* Vol. 9, No. 1 (January 1996), pp. 33-35.

"Should Air-Entrained Mortars Be Used?" *Aberdeen's Magazine of Masonry Construction.* Vol. 7, No. 9 (September 1994), pp. 419-422.

Sickels-Taves, Lauren B. "Creep, Shrinkage, and Mortars in Historic Preservation." *Journal of Testing and Evaluation, JTEVA.* Vol. 23, No. 6 (November 1995), pp. 447-452.

Speweik, John P. *The History of Masonry Mortar in America*, 1720-1995. Arlington, VA: National Lime Association, 1995.

Speweik, John P. "Repointing Right: Why Using Modern Mortar Can Damage a Historic House." *Old-House Journal.* Vol. XXV, No. 4 (July-August 1997), pp. 46-51.

Technical Notes on Brick Construction. Brick Institute of America, Reston, VA.

"Moisture Resistance of Brick Masonry: Maintenance." 7F. February 1986.

"Mortars for Brick Masonry." 8 Revised II. November 1989.

"Standard Specification for Portland Cement-Lime Mortar for Brick Masonry." 8A Revised. September 1988.

"Mortar for Brick Masonry-Selection and Controls." 8B Reissued. September 1988. (July/August 1976).

"Guide Specifications for Brick Masonry, Part V Mortar and Grout." 11E Revised. September 1991.

"Bonds and Patterns in Brickwork." 30 Reissued. September 1988.

Useful Addresses

Brick Institute of America
11490 Commerce Park Drive
Reston, VA 22091

National Lime Association
200 N. Glebe Road, Suite 800
Arlington, VA 22203

Portland Cement Association
5420 Old Orchard Road
Skokie, IL 60077

Acknowledgments

Robert C. Mack, FAIA, is a principal in the firm of MacDonald & Mack, Architects, Ltd., an architectural firm that specializes in historic buildings in Minneapolis, Minnesota. **John P. Speweik, CSI,** Toledo, Ohio, is a 5th-generation stonemason, and principal in U.S. Heritage Group, Inc., Chicago, Illinois, which does custom historic mortar matching. **Anne Grimmer,** Senior Architectural Historian, Heritage Preservation Services Program, National Park Service, was responsible for developing and coordinating the revision of this Preservation Brief, incorporating

professional comments, and the technical editing.

The authors and the editor wish to thank the following for the professional and technical review they provided: Mark Macpherson and Ron Peterson, Masonry Restoration Contractors, Macpherson-Towne Company, Minneapolis, MN; Lorraine Schnabel, Architectural Conservator, John Milner Associates, Inc., Philadelphia, PA; Lauren B. Sickels-Taves, Ph.D., Architectural Conservator, Biohistory International, Huntington Woods, MI; and the following National Park Service professional staff, including: E. Blaine Cliver, Chief, Historic American Buildings Survey/Historic American Engineering Record; Douglas C. Hicks, Deputy Superintendent, Historic Preservation Training Center, Frederick, MD; Chris McGuigan, Supervisory Exhibits Specialist, Historic Preservation Training Center, Frederick, MD; Charles E. Fisher, Sharon C. Park, FAIA, John Sandor, Technical Preservation Services Branch, Heritage Preservation Services, and Kay D. Weeks, Heritage Preservation Services.

The original version of this brief, *Repointing Mortar Joints in Historic Brick Buildings*, was written by Robert C. Mack in 1976, and was revised and updated in 1980 by Robert C. Mack, de Teel Patterson Tiller, and James S. Askins.

Washington, D.C. October, 1998

Home page logo: Soft mortar for repointing. Photo: John P. Speweik.

This publication has been prepared pursuant to the National Historic Preservation Act of 1966, as amended, which directs the Secretary of the Interior to develop and make available information concerning historic properties. Technical Preservation Services (TPS), Heritage Preservation Services Division, National Park Service prepares standards, guidelines, and other educational materials on responsible historic preservation treatments for a broad public.

Questions

Exhibit C

Preservation Brief 37

Lead Paint Hazards in Historic Housing

37 PRESERVATION BRIEFS

Appropriate Methods for Reducing Lead-Paint Hazards in Historic Housing

Sharon C. Park, FAIA, and Douglas C. Hicks

National Park Service
U.S. Department of the Interior
Heritage Preservation Services

Lead-based paint, a toxic material, was widely used in North America on both the exteriors and interiors of buildings until well into the second half of the twentieth century. If a "historic" place is broadly defined in terms of time as having attained an age of fifty years, this means that almost every historic house contains some lead-based paint. In its deteriorated form, it produces paint chips and lead-laden dust particles that are a known health hazard to both children and adults. Children are particularly at risk when they ingest lead paint dust through direct hand-to-mouth contact and from toys or pacifiers. They are also at risk when they chew lead-painted surfaces in accessible locations. In addition to its presence in houses, leaded paint chips, lead dust, or lead-contaminated soil in play areas can elevate a child's blood lead level to a degree that measures to reduce and control the hazard should be undertaken (see Action Level Chart, page 6)

The premise of this Preservation Brief is that historic housing can be made lead-safe for children without removing significant decorative features and finishes, or architectural trimwork that may contribute to the building's historic character (see fig. 1). *Historic housing* — encompassing private dwellings and all types of rental units—is necessarily the focus of this Brief because federal and state laws primarily address the hazards of lead and

Before

After

Figure 1. A large-scale historic rehabilitation project incorporated sensitive lead-hazard reduction measures. Interior walls and woodwork were cleaned, repaired, and repainted and compatible new floor coverings added. The total project was economically sound and undertaken in a careful manner that preserved the building's historic character. Photos: Landmarks Design Associates.

lead-based paint in housing and day-care centers to protect the health of children under six years of age. Rarely are there mandated requirements for the removal of lead-based paint from non-residential buildings.

Ideally, most owners and managers should understand the health hazards created by lead-based paint and voluntarily control these hazards to protect young children. A stricter approach has been taken by some state and federal funding programs which have compliance requirements for identifying the problem, notifying tenants, and, in some cases, remedying lead hazards in housing (see Legislation Sidebar, pg.15). With new rules being written, and new products and approaches being developed, it is often difficult to find systematic and balanced methodologies for dealing with lead-based paint in historic properties.

This Preservation Brief is intended to serve as an introduction to the complex issue of historic lead-based paint and its management. It explains how to plan and implement lead-hazard control measures to strike a balance between preserving a historic building's significant materials and features and protecting human health and safety, as well as the environment. It is not meant to be a "how-to guide" for undertaking the work. Such a short-cut approach could easily result in creating a greater health risk, if proper precautions were not taken. Home renovators and construction workers should be aware that serious health problems can be caused by coming into contact with lead. For this reason, there are also laws to protect workers on the job site (see Worker Safety Sidebar, pg. 4). Controlling the amount of waste containing lead-based paint residue will also reduce the impact on the environment. All of these considerations must be weighed against the goal of providing housing that is safe for children.

Lead in Historic Paints

Lead compounds were an important component of many historic paints. Lead, in the forms of lead carbonate and lead oxides, had excellent adhesion, drying, and covering abilities. White lead, linseed oil, and inorganic pigments were the basic components for paint in the 18th, 19th, and early 20th centuries. Lead-based paint was used extensively on wooden exteriors and interior trimwork, window sash, window frames, baseboards, wainscoting, doors, frames, and high gloss wall surfaces such as those found in kitchens and bathrooms. Almost all painted metals were primed with red lead or painted with lead-based paints. Even milk (casein) and water-based paints (distemper and calcimines) could contain some lead, usually in the form of hiding agents or pigments. Varnishes sometimes contained lead. Lead compounds were also used as driers in paint and window glazing putty.

In 1978, the use of lead-based paint in residential housing was banned by the federal government. Because the hazards have been known for some time, many lead components of paint were replaced by titanium and other less toxic elements earlier in the 20th century. Since houses are periodically repainted, the most recent layer of paint will most likely *not* contain lead, but the older layers underneath probably will. Therefore, the only way to accurately determine the amount of lead present in older paint is to have it analyzed.

It is important that owners of historic properties be aware that layers of older paint can reveal a great deal about the history of a building and that paint chronology is often used to date alterations or to document decorative period colors (see figs. 2, 3). Highly significant decorative finishes, such as graining, marbleizing, stenciling, polychrome decoration, and murals should be evaluated by a painting conservator to develop the appropriate preservation treatment that will stabilize the paint and eliminate the need to remove it. If such finishes must be removed in the process of controlling lead hazards, then research, paint analysis, and documentation are advisable as a record for future research and treatment.

Figure 2. The paint chronology of this mantel, seen in the exposed paint layers in the left corner, proved it had been relocated from another room of the house. To remove a significant feature's paint history and the evidence of its original sequence of color by stripping off all the paint is inappropriate — and unnecessary — as part of a lead hazard reduction project. Careful surface preparation and repainting with lead-free top coats is recommended. Photo: NPS Files.

Figure 3. Significant architectural features and their finishes should not be removed during a project incorporating lead hazard controls. If the decorative stencilling above, or hand grained doors below, or painted murals need repair, then a paint conservator should be consulted. Once loose paint is consolidated or otherwise stabilized, a clear finish or other reversible clear protective surface or coating can be added to areas subject to impact or abrasion. Photos: NPS Files.

Planning for Lead Hazard Reduction in Historic Housing

Typical health department guidelines call for removing as much of the surfaces that contain lead-based paint as possible. *This results in extensive loss or modification of architectural features and finishes and is not appropriate for most historic properties* (see fig. 4). A great number of federally-assisted housing programs are moving away from this approach as too expensive and too dangerous to the immediate work environment. A preferred approach, consistent with *The Secretary of the Interior's Standards for the Treatment of Historic Properties*, calls for removing, controlling, or managing the hazards rather than wholesale—or even partial—removal of the historic features and finishes (fig. 5). This is generally achieved through careful cleaning and treatment of deteriorating paint, friction surfaces, surfaces accessible to young children, and lead in soil (see figs. 6, 7). Lead-based paint that it not causing a hazard is thus permitted to remain, and, in consequence, the amount of historic finishes, features and trimwork removed from a property is minimized.

Because the hazard of lead poisoning is tied to the risk of ingesting lead, careful planning can help to determine how much risk is present and how best to allocate available financial resources. An owner, with professional assistance, can protect a historic resource and make it lead-safe using this three-step planning process:

I. Identify the historical significance of the building and architectural character of its features and finishes;

II. Undertake a risk assessment of interior and exterior surfaces to determine the hazards from lead and lead-based paint; and,

III. Evaluate the options for lead hazard control in the context of historic preservation standards.

I. Identify the historical significance of the building and architectural character of its features and finishes

The historical significance, integrity, and architectural character of the building always need to be assessed before work is undertaken that might adversely affect them. An owner may need to enlist the help of a preservation architect, building conservator or historian. The State Historic Preservation Office (SHPO) may be able to provide a list of knowledgeable preservation professionals who could assist with this evaluation.

Before

After

Figure 4. The typical method for abating lead-based paint through substrate removal is not consistent with the Standards for Rehabilitation. In this project, all the historic trim, base panels, and the transom were removed. While the unit is lead-safe, its character has been severly altered. Figure 5 shows a similar, but successful, balance of historic preservation and lead hazard control work. Photo: NPS Files.

Before

After

Figure 5. When historic interiors are rehabilitated, it is possible to remove the offending substance, such as deteriorated paint, without removing the features. In this case, the walls were repaired, and the trim and base panels were stripped of paint to a sound substrate, then repainted. Photos: Landmarks Design Associates.

Worker Safety

Low-level heat guns can be used to remove lead-based paint from significant historic windows and trimwork, but a worker exposed to lead dust over an extended period of time must be protected from the hazards created during the process of paint removal. Photo: Williamsport Preservation Training Center.

Current worker safety standards were established by OSHA's 29 CFR Part 1926, Lead Exposure in Construction; Interim Final Rule, which became effective June 3, 1993. These standards base levels of worker protection on exposure to airborne lead dust. They are primarily targeted to persons working within the construction industry, but apply to any workers who are exposed to lead dust for longer than a specific amount of time and duration. The Interim Final Rule establishes an action level of 30 micrograms of lead dust per cubic meter of air (30 ug/m^3) based on an eight hour, time-weighted average, as the level at which employers must initiate compliance activities; and it also establishes 50 ug/m^3 of lead dust as the permitted exposure level (PEL) for workers.

The standard identifies responsibilities before, during, and after the actual abatement activity necessary to protect the worker. Before the project begins, it requires an exposure assessment, a written compliance plan, initial medical surveillance, and training. The exposure assessment determines whether a worker may be exposed to lead. OSHA has identified a number of work tasks expected to produce dust levels between 50 and 500 ug/m^3 of air, including manual demolition, manual scraping, manual sanding, heat gun applications, general cleanup, and power tool use when the power tool is equipped with a dust collection system. It is an OSHA requirement that, at a minimum, a HEPA filtered half-face respirator with a protection factor of 10 be used for these operations. Initial blood lead level (BLL) base lines are established for each worker. Actual dust levels are monitored by air sampling of representative work activities, generally by an industrial hygienist or an environmental monitoring firm. Protective equipment is determined by the dust level. For all workers exposed at, or above, the action level for over 30 days in a 12-month period, BLLs are tested on a regular basis of every 2 months for the first 6 months and every 6 months thereafter. After completing a project, maintenance, medical surveillance, and recordkeeping responsibilities continue.

HEPA vacuums, HEPA respirators, and HEPA filters, which substantially reduce exposure to lead dust, are available through laboratory safety and supply catalogs and vendors.

Copies of 29 CFR Part 1926, Lead Exposure in Construction: Interim Final Rule, are available from the Department of Labor, Occupational Safety and Health Administration, or may be found in any library with a current edtion of the Code of Federal Regulation (CFR).

Features and finishes of a historic building that exhibit distinctive characteristics of an architectural style; represent work by specialized craftsmen; or possess high artistic value should be identified so they can be protected and preserved during treatment. When it is absolutely necessary to remove a significant architectural feature or finish—as noted in the first two priorities listed below—it should be replaced with a new feature and finish that matches in design, detail, color, texture, and, in most cases, material.

Figure 6. Deteriorating operable windows often contribute to lead dust in a house. Peeling paint and small particles from abraded surfaces collect in window troughs or sills and are then carried inside by air currents, settling on floors. When the lead dust mixes with regular house dust, it can easily be ingested by a child through hand to mouth contact. In homes with small children, floors and other surfaces should be kept as clean as possible to avoid lead contamination.

Figure 7. Chalking exterior paint can cause dangerous lead levels in soil around a house. Lead levels are usually highest in the one foot wide area adjacent to the building foundation. In these cases, the existing soil should be replaced with new soil or sod. This is particularly important if children and small pets play in contaminated areas, then inadvertently track the dirt inside.

Finally, features and finishes that characterize simple, vernacular buildings should be retained and preserved; in the process of removing hazards, there are usually reasonable options for their protection. Wholesale removal of historic trim, and other seemingly less important historic material, undermines a building's overall character and integrity and, thus, is never recommended.

For each historic property, features will vary in significance. As part of a survey of each historic property (see figure 8), a list of priorities should be made, in this order:

- *Highly significant features and finishes that should always be protected and preserved;*
- *Significant features and finishes that should be carefully repaired or, if necessary, replaced in-kind or to match all visual qualities; and*
- *Non-significant or altered areas where removal, rigid enclosure, or replacement could occur.*

This hierarchy gives an owner a working guide for making decisions about appropriate methods of removing lead paint.

Before

After

Figure 8. A survey of the property will help establish priorities for treatment based on its historical significance and physical condition. In this 1878 plank house, the original interlocking planks, corner details, projecting rafter tails, and original windows were considered highly significant features and were carefully stripped of failing paint using chemical poultices and HEPA sanding, then repainted. The less significant, but character-defining, painted porch flooring was replaced in new, but matching material. The non-historic porch screening was removed entirely. Photo before: Bryan Blundell; Photo after: Deborah Birch.

II. Undertake a risk assessment of interior and exterior surfaces to determine hazards from lead and lead-based paint.

While it can be assumed that most historic housing contains lead-based paint, it cannot be assumed that it is causing a health risk and should be removed. The purpose of a risk assessment is to determine, through testing and evaluation, where hazards from lead warrant remedial action (see fig. 9). Testing by a specialist can be done on paint, soil, or lead dust either on-site or in a laboratory using methods such as x-ray fluorescence (XRF) analyzers, chemicals, dust wipe tests, and atomic absorption spectroscopy. Risk assessments can be fairly low cost investigations of the location, condition, and severity of lead hazards found in house dust, soil, water, and deteriorating paint. Risk assessments will also address other sources of lead from hobbies, crockery, water, and the parents' work environment. A public health office should be able to provide names of certified risk assessors, paint inspectors, and testing laboratories. These services are critical when owners are seeking to implement measures to reduce suspected lead hazards in housing, day-care centers, or when extensive rehabilitations are planned.

The risk assessment should record:

- *the paint's location*
- *the paint's condition*
- *lead content of paint and soil*
- *the type of surface (friction; accessible to children for chewing; impact)*
- *how much lead dust is actively present*
- *how the family uses and cares for the house*
- *the age of the occupants who might come into contact with lead paint.*

a

b

c

Figure 9. A variety of testing methods are used to establish how much lead is in paint and where this paint is located: a home test kit *(a) is a good screening device to determine if lead is present, but it should not be relied upon exclusively; an* X-ray Fluorescence *machine or scanner (b), used by a licensed professional, determines, without disturbing the surface, if lead is present in underlying layers of paint; and a* dust wipe test *(c), sent to a laboratory for processing, can be used as either a clearance test, once work is completed, or as a monitoring device to determine if lead dust is present on surfaces. Paint chips can also be sent to a laboratory for analysis to determine the exact amount of lead by weight in a sample.*

ACTION LEVELS

Check with a Regional Environmental Protection Agency (EPA) office or appropriate state authorities if you have questions about applicable action levels that may change over time.

Blood Lead Levels are generally established from drawn blood and not from a finger stick test that may be unreliable. Units are measured in micrograms per deciliter (µg/dL) and reflect the Centers for Disease Control (CDC) Standards in effect in 2006.

Children:
- <10 µg/dL normal; no action needed
- 10-14 µg/dL; slight concern; look for lead source
- 15-19 µg/dL; mild concern; counseling; medical monitoring
- 20-44 µg/dL; moderate-high concern; must find/reduce lead source
- >45 µg/dL; very serious; hospitalization and removal of lead source

Adults:
- 25 µg/dL; level of concern; find source of lead
- >50 µg/dL; Occupational Safety and Health Administration (OSHA) Standard for medical removal from the worksite.

Lead in paint: Paint with lead levels greater than or equal to 1.0 milligrams per square centimeter, or more that 0.5% by weight is considered lead-based paint.

Lead dust wipes should be below the following:
- Floors; 40 µg/ft2
- Window sills; 250 µg/ft2
- Window troughs; 400 µg/ft2

Lead in soil: measured in parts per million (ppm)
Hazardous conditions:
- Play area residential soil; 400 ppm
- Soil in remaining yard areas; 1200 ppm

It is important from a health standpoint that future tenants, painters, and construction workers know that lead-based paint is present, even under treated surfaces, in order to take precautions when work is undertaken in areas that will generate lead dust. Whenever mitigation work is completed, it is important to have a clearance test using the *dust wipe method* to ensure that lead-laden dust generated during the work does not remain at levels above those established by the Environmental Protection Agency (EPA) and the Department of Housing and Urban Development (HUD) (see Action Levels Chart, above). A building file should be maintained and updated whenever any additional lead hazard control work is completed.

Hazards should be removed, mitigated, or managed in the order of their health threat, as identified in a risk assessment (with 1. the greatest risk and 8. the least dangerous):

1. Peeling, chipping, flaking, and chewed interior lead-based paint and surfaces
2. Lead dust on interior surfaces
3. High lead in soil levels around the house and in play areas (check state requirements)
4. Deteriorated exterior painted surfaces and features
5. Friction surfaces subject to abrasion (windows, doors, painted floors)
6. Accessible, chewable surfaces (sills, rails) if small children are present
7. Impact surfaces (baseboards and door jambs)
8. Other interior surfaces showing age or deterioration (walls and ceilings)

III. Evaluate options for hazard control in the context of historic preservation standards.

The Secretary of the Interior's Standards for the Treatment of Historic Properties—established principles used to evaluate work that may impact the integrity and significance of National Register properties—can help guide suitable health control methods. The *preservation standards* call for the protection of historic materials and historic character of buildings through stabilization, conservation, maintenance, and repair. The *rehabilitation standards* call for the repair of historic materials with replacement of a character-defining feature appropriate only when its deterioration or damage is so extensive that repair is infeasible. From a preservation standpoint, selecting a hazard control method that removes *only* the deteriorating paint, or that involves some degree of repair, is always preferable to the total replacement of a historic feature.

By tying the remedial work to the areas of risk, it is possible to limit the amount of intrusive work on delicate or aging features of a building without jeopardizing the health and safety of the occupants. To make historic housing lead-safe, the gentlest method possible should be used to remove the offending substance—lead-laden dust, visible paint chips, lead in soil, or extensively deteriorated paint. Overly aggressive abatement may damage or destroy much more historic material than is necessary to remove lead paint, such as abrading historic surfaces. Another reason for targeting paint removal is to limit the amount of lead dust on the work site. This, in turn, helps avoid expensive worker protection, cleanup, and disposal of larger amounts of hazardous waste.

Whenever extensive amounts of lead must be removed from a property, or when methods of removing toxic substances will impact the environment, it is extremely important that the owner be aware of the issues surrounding worker safety, environmental controls, and proper disposal (see fig. 10, 11). Appropriate architectural, engineering and environmental professionals should be consulted when lead hazard projects are complex.

Following are brief explanations of the two approaches for controlling lead hazards, once they have been identified as a risk. These controls are recommended by the Department of Housing and Urban Development in *Guidelines for the Evaluation and Control of Lead-Paint Hazards in Housing*, and are summarized here to focus on the special considerations for historic housing:

Interim Controls: Short-term solutions include thorough dust removal; thorough washdown and clean-up of exposed surfaces; paint film stabilization and repainting; covering of lead-contaminated soil; and making tenants aware of lead hazards. Interim controls require ongoing maintenance and evaluation.

Figure 10. The choice of paint removal method will trigger various environmental controls and worker protection. The chemical poultice-type paint remover uses a paper backing that keeps the lead waste contained for proper disposal. The worker is adequately protected by a suit and gloves; for this work a respirator was not required. Local laws required containment and neutralization of any after-wash water run off. Photo: NPS Files.

Figure 11. New methods are being developed or adapted to safely remove lead-based paint from various substrates. On this cast iron building undergoing rehabilitation for apartment units, multiple layers of lead-based paint were removed with pneumatic needle guns with vacuum attachments. Paint chips and waste containing lead-based paint were placed in 55 gallon drums for transport to a special waste site, and the workers were fully protected. The cleaned metal was primed and repainted. Photo: Building Conservation Associates, Inc.

Hazard Abatement: Long-term solutions are defined as having an expected life of 20 years or more, and involve permanent removal of hazardous paint through chemicals, heat guns or controlled sanding/abrasive methods; permanent removal of deteriorated painted features through replacement; the removal or permanent covering of contaminated soil; and the use of enclosures (such as drywall) to isolate painted surfaces. The use of specialized elastomeric encapsulant paints and coatings can be considered as permanent containment of lead-based paint if they receive a 20-year manufacturer's warranty or are approved by a certified risk assessor. One should be aware of their advantages and drawbacks for use in historic housing.

Within the context of the historic preservation standards, the most appropriate method will always be the least invasive. More invasive approaches are considered only under the special circumstances outlined in the three-step process. An inverted triangle (see fig. 12) shows the greatest number of residential projects fall well within the "interim controls" section. Most housing can be made safe for children using these sensitive treatments, particularly if no renovation work is anticipated. Next, where owners may have less control over the care and upkeep of housing and rental units, more aggressive means of removing hazards may be needed. Finally, large-scale projects to rehabilitate housing or convert non-residential buildings to housing may successfully incorporate "hazard abatement" as a part of the overall work.

Appropriate Methods for Controlling Lead Hazards

In selecting appropriate methods for controlling lead hazards, it is important to refer to Step I. of the survey where architecturally significant features and finishes are identified and need to be preserved. Work activities will vary according to hazard abatement needs; for example, while an interim control would be used to stabilize paint on most trimwork, an accessible window sill might need to be stripped prior to repainting. Since paint on a window sill is usually not a significant finish, such work would be appropriate. Other appropriate methods for controlling lead hazards are summarized in the accompanying chart (see fig. 13).

The method selected for removing or controlling the hazards has a direct bearing on the type of worker protection as well as the type of disposal needed, if waste is determined to be hazardous (see fig. 14). Following are

Figure 12. An inverted triangle makes the point that most of the nation's housing can be made lead-safe using interim control methods, such as dust control, paint stabilization, and good housekeeping. Shaded from light to dark, the lighter interim controls will generally not harm the historic materials. The darker, more aggressive controls, can be implemented with rehabilitation projects where paint removal, selective replacement of deteriorated elements, and encapsulation or enclosure are incorporated into other work.

MANAGING OR REMOVING LEAD-BASED PAINT IN HISTORIC BUILDINGS

Interim solutions, the preferred approach, include a combination of the following:

General maintenance	Dust control	Paint stabilization	Soil treatment	Tenant education
Repair deteriorated materials; Control leaks; Maintain exterior roofs, siding, etc. to keep moisture out of building; Perform emergency repairs quickly if lead-based paint is exposed; Maintain building file with lead test data and reports, receipts or invoices on completed lead mitigation work.	Damp mop floor; wet broom sweep porches and steps; Damp dust window sills and window troughs; Washdown painted surfaces periodically (use tri-sodium phosphate or equivalent, if necessary); Clean or vacuum carpets regularly (use HEPA vacuum if lead dust returns); Undertake periodic inspection with annual dust wipe tests.	Wet-sand loose paint and repaint; Keep topcoats of paint in good condition; Selectively remove paint from friction & chewable surfaces (sills) and repaint; Use good quality latex, latex acrylic or oil/ alkyd paints compatible with existing paint; Consider more durable encapsulating paints and wall lining systems if necessary.	Add bark mulch, sod or topsoil to bare dirt areas with high lead levels; Discourage children from playing in these areas by providing sand box or other safe areas; Do not plant vegetable garden in areas with lead in soil; Be careful that pets do not track contaminated soil inside house.	Notify tenants and workers as to the location of lead-based paint; Instruct tenants to keep property clean; Instruct tenants to notify owner or manager when repairs are necessary; Provide tenants with health department pamphlets on the hazards of lead-based paint.

Hazard abatement removes the hazard - not necessarily all the paint or the feature, and may include:

Paint removal	Paint Encapsulation Enclosure	Replace deteriorated elements	Soil treatment	Compliance
Remove deteriorated paint or paint on friction, chewable, or impact surfaces to sound layer, repaint; Consider using the gentlest means possible to remove paint to avoid damage to substrate: wet sanding, low level heat guns, chemical strippers, or HEPA sanding; Send easily removable items (shutters, doors) off-site for paint stripping, then reinstall and paint.	Consider encapsulating paints with 20 years warranty to seal-in older paint; or use in combination with wall liners to stabilize plaster wall surfaces prior to repainting; Seal lead-based painted surfaces behind rigid enclosures, such as drywall, or use luan or plywood with new coverings over previously painted floors; Use rubber stair treads on painted steps.	Remove, only when necessary, seriously deteriorated painted elements such as windows, doors, and trimwork. Replace with new elements that match the historic in appearance, detailing, and materials, when possible; Replace component element of a friction surface (parting bead or stops of windows) or of impact surfaces (shoe moldings) with new elements.	Remove contaminated soil around foundation to a depth of 3" and replace with new soil and appropriate planting material or paving; If site is highly contaminated from other lead sources (smelter, sandblasted water tank) consult an environmental specialist as well as a landscape architect; Do not alter a significant historic landscape	Be aware of all federal, state and local laws regarding lead-based paint abatement, environmental controls and worker safety; Dispose of all hazardous waste according to applicable laws; Be aware that methods to remove lead-based paint can cause differing amounts of lead dust which can be dangerous to workers and residents.

Figure 13. This chart indicates the wide variety of treatments that can be used to control or eliminate lead-based paint hazards. For historic buildings, the least invasive method should be used to control the hazards identified during a risk assessment and are shown in the lighter shaded portion of the chart. The darker portions show the more invasive hazard control methods which must be carefully implemented to ensure that whenever possible, historic materials are protected. The total abatement of all surfaces is not recommended for historic buildings because it can damage historic materials and destroy the evidence of early paint colors and layering. Prepared by Sharon C. Park, AIA.

IMPACT OF VARIOUS PAINT REMOVAL/ABATEMENT TECHNIQUES

REMOVAL METHOD	IMPACT ON MATERIALS	LEAD DUST GENERATED	IMPACT ON WORKER	IMPACT ON ENVIRONMENT
Wet scraping; wet sanding; repainting	Low: Gentle to substrate; feather edges to obtain smooth paint surface	Low: Misting surfaces reduces lead dust	Low: No special protection for respiration, but wash before eating, drinking, etc.	Low-medium: Debris often general waste; check disposal requirements
Heat gun; paint removal w/ scrapers < 450°F	Low: Gentle to substrate	Medium: Flicking softened paint does create airborne lead dust	Medium: Respirator w/HEPA filters usually required	Medium: Lead-paint sludge is hazardous waste
Chemical stripping on-site; use liquid or poultice; avoid methylene chloride	Low to Medium: Avoid damage to wood texture/grain with long dwell time	Low: Chemicals are moist and reduce lead dust	Low: For lead dust; for volatile chemicals may require solvent filter mask	Medium: Lead residue hazardous; off/rinse must be filtered or contained
Controlled HEPA sanding; primarily for wooden surfaces; sander uses HEPA vacuum shroud	Low to Medium: Avoid gouging wooden surfaces; good for feathering edges	Medium to High: Worker must know how to use equipment	Medium to High: Requires respirator with HEPA filter and possibly containment of area	Medium to High: Paint debris is hazardous and must be contained in drums for disposal
Dry Abrasives on cast iron; CO_2, walnut shells, needle gun removal; can use vacuum shrouds	Low to Medium: Substrate must be durable and in good condition; not for soft or porous materials	Generally High: Large volume of paint chips fall freely unless there is a vacuum shroud	High; Generally requires full suiting, respirators and containment, even if vacuum shroud used	Medium to High: Increased volume of hazardous waste if abrasive is added to lead debris
Chemical stripping off-site; cold tank reduces ungluing caused by hot tank	Medium to High: Elements can be damaged during removal or in tank	Usually low: Take care when removing elements to minimize lead-laden dust	Low: Take care when washing up to remove dust; wash clothes separately	Low to Medium: Stripping contractor responsible for disposal
Feature or substrate removal and replacement	High: Loss of feature is irretrievable; Avoid wholesale removal of significant elements	Usually low: Worker exposure can be high if element hazardous due to high amounts of lead-based paint	Usually low: Varies with lead dust generated; use air monitors and wet mist area	Varies: Must do a TCLP leach test to determine if debris can go to landfill or is hazardous waste

Figure 14. This chart shows how the impact of lead hazard control work can impact a property. The paint or hazard removal methods, shaded from light to dark, are listed from low to medium to high impact on historic materials. Each method will generate varying amounts of lead dust and hazardous materials; the impact on workers and the environment will thus vary accordingly. This information gives a general overview and is not a substitute for careful air monitoring and compliance with worker protection as established by OSHA regulations, and the proper handling/disposal of hazardous waste. Prepared by Sharon C. Park, AIA.

examples of appropriate methods to use to control lead hazards within an historic preservation context.

Historic Interiors (deteriorating paint and chewed surfaces). Whenever lead-based paint (or lead-free paint covering older painted surfaces) begins to peel, chip, craze, or otherwise comes loose, it should be removed to a sound substrate and the surface repainted. If children are present and there is evidence of painted surfaces that have been chewed, such as a window sill, then these surfaces should be stripped to bare wood and repainted. The removal of peeling, flaking, chalking, and deteriorating paint may be of a small scale and undertaken by the owner, or may be extensive enough to require a paint contractor. In either case, care must be taken to avoid spreading lead dust throughout the dwelling unit. If the paint failure is extensive and the dwelling unit requires more permanent hazard removal, then an abatement contractor should be considered. Many states are now requiring that this work be undertaken by specially trained and certified workers.

If an owner undertakes interim controls, it would be advisable to receive specialized training in handling lead-based paint. Such training emphasizes isolating the area, putting plastic sheeting down to catch debris, turning off mechanical systems, taping registers closed, and taking precautions to clean up prior to handling food. Work clothes should be washed separately from regular family laundry. The preferred method for removing flaking paint is the wet sanding of surfaces because it is gentle to the substrate and controls lead dust. The key to reducing lead hazards while stabilizing flaking paint is to keep the surfaces slightly damp to avoid ingesting lead dust. Wet sanding uses special flexible sanding blocks or papers that can be rinsed in water or used along with a bottle mister. This method will generally not create enough debris to constitute hazardous waste (see fig. 15).

Other methods for selectively removing more deteriorated paint in historic housing include controlled sanding, using low-temperature heat guns, or chemical strippers. Standard safety precautions and appropriate worker protection should be used. Methods to *avoid* include uncontrolled dry abrasive methods, high heat removal (lead vaporizes at 1100° F), uncontrolled water blasting, and some chemicals considered carcinogenic (methylene chloride). When possible and practicable, painted elements, such as radiators, doors, shutters, or other easily removable items, can be taken to an off site location for paint removal.

In most cases, when interior surfaces are repainted, good quality interior latex or oil/alkyd paints may be used. The paint and primer system must be compatible with the substrate, as well as any remaining, well-bonded, paint.

Encapsulant paints and coatings, developed to contain lead-based paint, rely on an adhesive bonding of the new paint through the layers of the existing paint. The advantages of these special paint coatings is that they allow the historic substrate to remain in-place; reduce the amount of existing paint removed; can generally be applied without extensive worker protection; and are a durable finish. (They cannot, however, be used on friction surfaces.) The drawbacks include their ability to obscure carved details, unless thinly applied in several applications, and difficulty in future removal. If a specialized paint, such as an elastomeric encapsulant paint, is considered, the manufacturer should be contacted for specific instructions for its application. Unless these specialized paint systems are warranted for 20 years, they are considered as less permanent interim controls.

Lead-dust on interior finishes. Maintaining and washing painted surfaces is one of the most effective measures to prevent lead poisoning. Houses kept in a clean condition, with paint film intact and topcoated with lead-free paint or varnish, may not even pose a health risk. Dust wipe tests, which are sent to a laboratory for processing, can identify the level of lead dust present on floors, window sills, and window troughs. If lead dust is above acceptable levels, then specially modified maintenance procedures can be undertaken to reduce it. All paints deteriorate over time, so maintenance must be ongoing to control fine lead dust. The periodic washing of surfaces with a surfactant, such as tri-sodium phosphate (TSP) or its equivalent, loosens dirt and removes lead dust prior to a water rinse and touch-up painting, if necessary. This interim treatment can be extremely beneficial in controlling lead dust that is posing a hazard (see fig. 16).

Soil/landscape. Soil around building foundations may contain a high level of lead from years of chalking and peeling exterior paint. This dirt can be brought indoors on shoes or by pets and small children if they play outside a house. Lead in the soil is generally found in a narrow band

Figure 15. Wet sanding of interior surfaces will keep dust levels down, reduce the need for workers' protection, and provide a sound surface for repainting. Priming and repainting with oil/ alkyd, latex or latex acrylic should be undertaken according to manufacturers' instructions.

Figure 16. Washing windows and cleaning debris from window wells on a periodic basis can substantially reduce lead dust. Using water and tri-sodium phosphate (TSI' or equivalent) will remove loose paint, and, after rinsing, the surface can be repainted with latex, oil/ alkyd, or latex acrylic paints.

directly adjacent to the foundation. If the bare soil tests high in lead (see Action Levels Chart, pg. 6), it should be replaced to a depth of several inches or covered with new sod or plantings. Care should be taken to protect historic plantings on the building site and, in particular, historic landscapes, while mitigation work is underway (see fig. 17). If an area has become contaminated due to a variety of environmental conditions (for example, a smelter nearby or water tanks that have been sandblasted in the past), then an environmental specialist as well as a landscape preservation architect should be consulted on appropriate site protection and remedial treatments. It is inappropriate to place hard surfaces, such as concrete or macadam, over historically designed landscaped areas, which is often the recommendation of typical abatement guidelines.

Figure 17. When historic sites are found to contain high levels of lead in bare soil — particularly around foundations — it is important to reduce the hazard without destroying significant landscapes. In many cases, contaminated soil can be removed from the foundation area and appropriate plantings or ground covers replanted in new soil. Photo: Charles A. Birnbaum, ASLA.

Deteriorating paint on exteriors. Deteriorating exterior paint will settle onto window ledges and be blown into the dwelling, and will also contaminate soil at the foundation, as previously discussed. Painted exteriors may include wall surfaces, porches, roof trim and brackets, cornices, dormers, and window surrounds. Most exteriors need repainting every 5-10 years due to the cumulative effect of sun, wind, and rain or lack of maintenance. Methods of paint removal that do not abrade or damage the exterior materials should be evaluated. Because there is often more than one material (for example, painted brick and galvanized roof ornaments), the types of paint removal or paint stabilization systems need to be compatible with each material (see fig. 18). If paint has failed down to the substrate, it should be removed using either controlled sanding/scraping, controlled light abrasives for cast iron and durable metals, chemicals, or low heat. If chemicals are used, it may be necessary to have the contractor contain, filter, or otherwise treat any residue or rinse water. Environmental regulations must be checked prior to work, particularly if a large amount of lead waste will be generated or public water systems affected.

A cost analysis may show that, in the long run, repair and maintenance of historic materials or in-kind replacement can be cost effective. Due to the physical condition and location of wood siding, together with the cost of paint removal, a decision may be made to remove and replace

Figure 18. As part of an urban housing grant program, the exterior of this row house was sucessfully made lead-safe and met the Secretary of the Interior's Standards for Rehabilitation. The exterior was washed, then repainted with exterior grade alkyd paint. The decorative roof brackets and cornice were repainted; not removed or covered as is often recommended in typical abatement guidelines. The previously altered, deteriorated window sash were replaced with new sash and jamb liners set within the historic frames. Photos: Deborah Birch.

these materials on some historic frame buildings. If the repair or replacement of historic cladding on a primary elevation is being undertaken, such replacement materials should match the historic cladding in material, size, configuration, and detail (see fig. 19). The use of an artificial siding or aluminum coil stock panning systems over wooden trimwork or sills and lintels (as recommended in some abatement guidelines) is not appropriate, particularly on principal facades of historic buildings because they change the profile appearance of the exterior trimwork and may damage historic materials and detailing during installation. Unless the siding is too deteriorated to warrant repair and the cost is too prohibitive to use matching replacement materials (i.e., wood for wood), substitute materials are not recommended.

The use of specialized encapsulant paint coatings on exteriors—in particular, moist or humid climates, and, to some extent, cold climates—is discouraged because such coatings may serve to impede the movement of moisture that naturally migrates through other paints or mask leaks that may be causing substrate decay. Thus, a carefully applied exterior paint system (either oil/alkyd or latex) with periodic repainting can be very effective.

Friction Surfaces. Interior features with surfaces that—functionally—rub together such as windows and doors, or are subject to human wear and tear, such as floor and steps, are known as friction surfaces. It is unclear how much lead dust is created when friction surfaces that contain lead-based paint, but are top-coated with lead-free paint, rub together because much of the earlier paint may have worn away. For example, if lead dust levels around windows or on painted floors are consistently above acceptable levels, treating nearby friction surfaces should be considered. If surfaces, such as operable windows, operable doors, painted porch decks, painted floors and painted steps appear to be generating lead dust, they should be controlled through isolating or removing the lead-based paint. Window and door edges can be stripped or planed, or the units stripped on or off site to remove paint prior to repainting. Simple wooden stops and parting beads for windows, which often split upon removal, can be replaced.

Before

After

Figure 19. In many cases, exterior wood siding can be repaired, selectively replaced, and repainted, as illustrated in this successful residential rehabilitation. Deteriorating wood siding was removed from the foundation to the top of the first floor windows and replaced with matching wood siding. The entire building was repainted. Photos: Crispus Attucks Community Development Corporation.

Figure 20. Operable windows have friction surfaces between the sash and the frames, which can be a source of fine lead dust. In this case, the deteriorated sash was replaced, but the historic frame remains in place, sucessfully isolated from the sash with a simple vinyl jamb liner that is part of the new sash operation.

Figure 21. Painted stairs and floors can cause a problem because lead dust settles between the wooden boards. In this case, the steps were sanded, repainted, and covered with rubber stair treads. The floors could not be effectively cleaned and sealed so they were isolated with a new subflooring, and a washable tile finish installed.

If window sash are severely deteriorated, it is possible to replace them; and vinyl jamb liners can effectively isolate remaining painted window jambs (see fig. 20). When windows are being treated within rehabilitation projects, their repair and upgrading are always recommended. In the event that part or all of a window needs to be replaced, the new work should match in size, configuration, detail, and, whenever possible, material.

Painted floors often present a difficult problem because walking on them abrades the surface, releasing small particles of lead-based paint. It is difficult to remove lead dust between the cracks in previously painted strip flooring even after sanding and vacuuming using special High Efficiency Particulate Air (HEPA) filters to control the lead dust. If painted floors are not highly significant in material, design, or craftsmanship, and they cannot be adequately cleaned and refinished, then replacing or covering them with new flooring may be considered. Stair treads can be easily fitted with rubber or vinyl covers (see fig. 21).

Accessible, projecting, mouthable surfaces. Accessible, chewable surfaces that can be mouthed by small children need not be removed entirely, as some health guidelines recommend. These accessible surfaces are listed as projecting surfaces within a child's reach, including window sills, banister railings, chair rails, and door edges. In many cases, the projecting edges can have all paint removed using wet sanding, a heat gun or chemical strippers, prior to repainting the feature (see fig. 22). If the homeowner feels that there is no evidence of unsupervised mouthing of surfaces, a regular paint may be adequate once painted surfaces have been stabilized. An encapsulant paint that adhesively bonds existing paint layers onto the substrate extends durability. While encapsulant paint systems are difficult to remove from a surface in the future, they permit retention of the historic feature itself. If encapsulant paint is used on molded or decorative woodwork, it should be applied in several thin coats to prevent the architectural detail from being obscured by the heavy paint (see fig 23).

Figure 22. Research has shown that some small children will chew on projecting window sills while teething. As part of a lead hazard control project, the edge of the sill can be stripped to bare wood or an encapsulating paint applied. In this case, a new window sill was installed as part of a window upgrade that retained the historic trim and frame.

Figure 23. Stair banisters and railings are considered mouthable surfaces. In this case, the old paint was wet sanded to a sound layer. Special encapsulant paints were then applied in three thin layers to avoid obscuring the woodwork's fine detailing. It should be noted that many encapsulant paints are now treated with a bitter agent to discourage mouth contact. Photo: Landmarks Design Associates.

Impact Surfaces. Painted surfaces near doorways and along corridors tend to become chipped and scraped simply because of their location. This is particularly true of baseboards, which were designed to protect wall surfaces, and also for doorjambs. Owners should avoid hitting painted impact surfaces with vacuums, brooms, baby carriages, or wheeled toys. Adding new shoe moldings can give greater protection to some baseboards. In most cases, stabilizing loose paint and repainting with a high quality interior paint will provide a durable surface. Clear panels or shields can be installed at narrow doorways, if abrasion continues, or these areas can be stripped of paint and repainted. Features in poor condition may need to be replaced with new, matching materials (see fig. 24).

Other surfaces showing age or deterioration/ walls and ceilings. Many flat wall surfaces and ceilings were not painted with lead-based paint, so will need to be tested for its presence prior to any treatment. Flat surfaces that contain deteriorating lead-based paint should be repaired following the responsible approach previously cited (i.e., removing loose paint to a sound substrate, then repairing damaged plaster using a skim coat or wet plaster repair (see fig. 25). Drywall is used *only* when deterioration is too great to warrant plaster repair. If walls and ceilings have a high lead content, and extensive paint removal is not feasible, there are systems available that use elastomeric paints with special fabric liners to stabilize older, though intact, wall surfaces.

Figure 24. Historic baseboards are often bumped by brooms and vacuum cleaners, causing lead-based paint chips to fall on the floor. Shoe moldings can be added or replaced to increase protection to the baseboard itself. In this case, because the condition of the interior warranted substantial repair, simple historic board trim was replaced with new matching trim. Note the HEPA filter vacuum in the foreground. Photo: NPS file.

Figure 25. In some cases, skim coating deteriorated plaster and repainting is adequate. If the plaster is seriously damaged or failing, drywall may be considered so long as the molding and window reveal relationships are retained. In this case, plaster between the windows was repaired and repainted and the side wall plaster was replaced with drywall. Photo: Landmarks Design Associates.

If a new drywall surface needs to be applied, care should be taken that the historic relationship of wall to trim is not lost. Also, if there are significant features, such as crown moldings or ceiling medallions, they should always be retained and repaired (see fig. 26).

Figure 26. Deteriorated ceiling plaster was removed and a new drywall ceiling installed. The historic ceiling medallion was preserved, and the plaster cornices repaired in place. Photo: Landmarks Design Associates.

Maintenance after Hazard Control Treatment

Following treatment, particularly where interim controls have been used, ongoing maintenance and re-evaluation become critical. In urban areas, even fully lead-safe houses can be re-contaminated within a year from lead or dirt outside the immediate property. Thus, housing interiors must be kept clean, once lead hazard control measures have been implemented. Dust levels should be kept down by wet sweeping porch steps and entrances on a regular basis. Vacuum cleaning and dusting should be repeated inside on a weekly basis or even more often. Vinyl, tile, and wood floor surfaces should be similarly damp mopped. Damp washing of window troughs and sills to remove new dust should be encouraged several times a year, particularly in the spring and fall when windows will be open. Carpets and area rugs should be steam cleaned or washed periodically if they appear to hold outside dirt.

Housing should be inspected frequently for signs of deterioration by both owner and occupant. Tenants need to be made aware of the location of lead-based paint under lead-free top coats and instructed to contact the owners or property managers when the paint film becomes disturbed (see figure 27). Any leaks, peeling paint, or evidence of conditions that may generate lead-dust should be identified and corrected immediately. Occupants must be notified prior to any major dust-producing project. Dry sanding, burning, compressed air cleaning or blasting should be not be used. Repairs, repainting, or remodeling activities that have the potential of raising significant amounts of lead dust should be undertaken in ways that isolate the area, reduce lead-laden dust as much as possible, and protect the occupants.

Figure 27. Wall leaks can cause historic surfaces to deteriorate, thereby exposing underlayers of lead-based paint. If painted surfaces show signs of deterioration, they should be repaired as soon as possible.

Yearly dust wipe tests are recommended to ensure that dust levels remain below actionable levels. Houses or dwelling units that fail the dust-wipe test should be thoroughly re-cleaned with TSP, or its equivalent, washed down, wet vacuumed and followed by HEPA vacuuming, if necessary, until a clearance dust wipe test shows the area to be under actionable levels (see Action Levels chart). Spaces that are thoroughly cleaned and maintained in good condition are not a health risk (see fig. 28).

Figure 28. This recently completed housing, which is now lead-safe, could become re-contaminated from lead if safe conditions are not maintained. Damp mopping floor surfaces and regular dusting to keep the house clean will ensure its continuing safety.

Conclusion

The three-step planning process outlined in this Brief provides owners and managers of historic housing with responsible methods for protecting historic paint layers and architectural elements, such as windows, trimwork, and decorative finishes. Exposed decorative finishes, such as painted murals or grained doors can be stabilized by a paint conservator without destroying their significance.

Reducing and controlling lead hazards can be successfully accomplished without destroying the character-defining features and finishes of historic buildings. Federal and state laws generally support the reasonable control of lead-based paint hazards through a variety of treatments, ranging from modified maintenance to selective substrate removal. The key to protecting children, workers, and the environment is to be informed about the hazards of lead, to control exposure to lead dust and lead in soil, and to follow existing regulations. In all cases, methods that control lead hazards should be selected that minimize the impact to historic resources while ensuring that housing is lead-safe for children.

LEAD-BASED PAINT LEGISLATION

Federal Legislation: **Title X (Ten) Residential Lead-Based Paint Hazard Reductions Act of 1992.** Title X is part of Housing and Urban Development (HUD) Housing and Community Development Act of 1992 (Public Law 102-550). Title X calls for the reduction of lead in housing that is *federally supported* and outlines the federal responsibility towards its own residential units and the need for disclosure of lead in residences, even private residences, prior to sale.

Interim Final Regulations of Lead in Construction Standards (29 CFR 1926.62). Issued by the Department of Labor, Occupational Safety and Health Administration (OSHA), these regulations address worker safety, training, and protective measures. It is based in part on environmental air sampling to determine the amount of lead dust generated by various activities.

Lead: Identification of Dangerous Levels of Lead; Final Rule (Environmental Protection Agency (EPA) 40 CFR Part 745). This regulation supports the efforts of Title X to reduce and prevent lead poisoning in children under the age of six. This rule issues uniform national standards for lead paint hazards. EPA Regional Offices can provide guidance on the appropriate regulatory agency for states within their region. See www.epa.gov/lead.

State Laws: States generally have the authority to regulate the removal and transportation of lead-based paint and the generated waste for disposal through the appropriate state environmental and public health agencies. Most states have requirements for mitigation in the case of a lead-poisoned child, or for protection of children, or for oversight to ensure the safe handling and disposal of lead waste. When undertaking a lead-based paint reduction program, it is important to determine which laws are in place that may affect your project. Call the appropriate officials.

Local Ordinances: Check with local health departments, Poison Control Centers, and offices of housing and community development to determine if there are laws that require compliance with building owners. Some cities have their own rules, so check with your local authorities to see which laws apply to you or for assistance in finding firms licensed to handle lead-based paint projects.

Owner's Responsibility: Owners are ultimately responsible for ensuring that hazardous waste is properly disposed of when generated on site. Owners should check with the state or local authorities to determine requirements for proceeding with abatement or management of lead-based paint in either commercial or residential projects. Owners should establish that the contractor is responsible for the safety of the crew and that all applicable laws are followed, and that transporters and disposers of hazardous waste have liability insurance as a protection for the owner. If an interim treatment is being used to reduce lead hazards, the owner should notify the contractor that lead-based paint is present and that it is the contractor's responsibility to follow appropriate work practices to protect workers and complete a thorough clean-up to ensure that lead-laden dust is not present after the work is completed.

Glossary of Terms

Deteriorated Lead-Based Paint: Paint known to contain lead that shows signs of peeling, chipping, chalking, blistering, alligatoring or otherwise separating from its substrate.

Dust Removal: The process of removing dust to avoid creating a greater problem of spreading lead particles, usually through wet or damp collection or through the use of special HEPA vacuums.

Hazard Abatement: Long-term measures to remove the hazards of lead-based paint through selective paint stripping of deteriorated areas, or, in some cases, replacement of deteriorated features.

Hazard Control: Measures to reduce lead hazards to make housing safe for young children. Can be accomplished with interim (short-term) or hazard abatement (long-term) controls.

Interim Control: Short-term methods to remove lead dust, stabilize deteriorating surfaces, and repaint surfaces. Maintenance can ensure that housing remains lead-safe.

Lead-based Paint: Any existing paint, varnish, shellac, or other coating that is in excess of 1.0 mg/cm2 as measured by an XRF detector or greater than 0.5% by weight from laboratory analysis (5,000 ppm, 5,000 ug /g, or 5,000 mg/kg). For new products, the Consumer Safety Act notes 0.06% as the maximum amount of lead allowed in paint.

Lead-safe: The act of making a property safe from contamination by lead-based paint, lead-dust, and lead in soil generally through short and long-term methods to remove it, or to isolate it from small children.

Risk Assessment: An on-site investigation to determine the presence and condition of lead-based paint, including limited test samples, and an evaluation of the age, condition, housekeeping practivces, and uses of a residence.

Further Reading

Chase, Sara B. *Preservation Brief 28,* "Painting Historic Interiors." Washington, DC: U.S. Department of the Interior, National Park Service, 1992.

"Coping with Contamination: A Primer for Preservationists," *Information Booklet No. 70.* Washington, DC: National Trust for Historic Preservation, 1993.

Historic Buildings and the Lead Paint Hazard. Hartford, CT: Connecticut Historical Commission, 1990.

"Health Hazards in National Park Service Buildings," *NPS-76 Housing Design and Rehabilitation.* Washington, DC: U.S. Department of the Interior, National Park Service, 1995.

Guidelines for the Evaluation and Control of Lead-Based Paint Hazards in Housing. Washington, DC: U.S. Department of Housing and Urban Development, 1995.

Jandl, H. Ward. *Preservation Brief 18:* "Rehabilitating Historic Interiors – Identifying and Preserving Character-Defining Elements." Washington, DC: U.S. Department of the Interior, National Park Service, 1988.

Lead Paint Safety: A Field Guide for Painting, Home Maintenance, and Renovation Work. HUD, EPA. CDC. HUD Office of Lead Hazard Control, HUD-1779-LHC, June, 1999; available in pdf format at www.hud.gov/offices/lead/

MacDonald, Marylee. "Getting Rid of Lead," *Old House Journal,* July/August. 1992.

Myers, John H. *Preservation Brief 9,* "Repair of Historic Wooden Windows." Washington, DC: U.S. Department of the Interior, National Park Service, 1981.

OSHA Lead in Construction Standard (29 CFR 1926.62), Occupational Safety and Health Administration, May 4, 1993 (Federal Register).

Park, Sharon C. and Camille Martone. "Lead-Based Paint in Historic Buildings," *CRM Bulletin.* Washington, DC: U.S. Department of the Interior, National Park Service. Vol. 13, No.1, 1990.

Park, Sharon C. "Managing Lead in Building Interiors: An Emerging Approach," *Interiors Handbook for Historic Buildings, Vol. II.* Washington, DC: U.S. Department of the Interior, National Park Service and Historic Preservation Education Foundation, 1993.

Park, Sharon C. "What to do about Lead-Based Paint," *CRM Bulletin.* Washington, DC: U.S. Department of the Interior, National Park Service. Vol. 17, No.4, 1994.

The Secretary of the Interior's Standards for the Treatment of Historic Properties. Washington, DC: U.S. Department of the Interior, National Park Service, 1992.

Title X (Residential Lead-Based Paint Hazard Reduction Act of 1992) of Housing and Community Development Act of 1992 (P.L. 102-550), October 28, 1992.

Weeks, Kay D. and David Look, AIA. *Preservation Brief 10,* "Exterior Paint Problems on Historic Woodwork." Washington, DC: U.S. Department of the Interior, National Park Service, 1982.

Photographs courtesy of the authors unless identified.

Front cover:
Most residences painted prior to 1978 will contain some lead-based paint. It was widely used on exterior woodwork, siding, and windows as well as interior finishes. This apartment stairhall retains its historic character after a successful rehabilitation project that included work to control lead-based paint hazards. Photo: Crispus Attucks Community Development Corporation.

Acknowledgements

Sharon C. Park, FAIA is the Chief, Technical Preservation Services, National Park Service. Douglas C. Hicks is the Deputy Superintendent, Historic Preservation Training Center, National Park Service. Both authors served on the National Park Service Housing Task Force addressing lead-safe employee housing and on various national panels to discuss combing lead-safe housing with historic preservation concerns.

Kay D. Weeks was technical editor for the initial publication. The publication was first issued in 1995 and was updated in 2006 to reflect current regulatory standards. The authors wish to thank the following individuals for providing technical information or for supplying case study projects for the original text: Claudia Kavenagh, Building Conservation Associates, Inc.; David E. Jacobs, Armand C. Magnelli, National Center for Lead-Safe Housing; Ellis Goldman, William Wisner, and Catherine Hillard, HUD Office of Lead-Based Paint Abatement; Ellis Schmidlapp, Landmarks Design Associates (Pittsburgh, PA); Cripus Attucks Community Development Corporation (York, PA); Charlene Dwin Vaughn and Rebecca Rogers, Advisory Council on Historic Preservation, George Siekkinen, National Trust for Historic Preservation; Deborah Birch, Einhorn Yaffee Prescott Architects; Baird M. Smith, Quinn Evans Architects; Jack Waite, Messick Cohen Waite Architects, Jim Caulfield, Pennsylvania Historical and Museum Commission; Mike Jackson, Illinois Historic Preservation Agency; Martha Raymond, Ohio Historic Preservation Office; Susan Chandler, Connecticut Historic Commission; Steade Craigo, California Office of Historic Preservation; and National Park Service staff - Christopher Jones, Rebecca Shiffer, Kathleen Catalano Milley, Peggy Albee, Victoria Jacobson, Blaine Cliver, Anne E. Grimmer, Thomas C. Jester, Michael J. Auer, Charles A. Birnbaum, Charles E. Fisher and Thomas McGrath. In addition, thanks is given to Elizabeth Creveling for assistance in updating this publication.

This publication has been prepared pursuant to the National Historic Preservation Act of 1966, as amended, which directs the Secretary of the Interior to develop and make available information concerning the protection of historic properties. Comments about this publication should be directed to Heritage Preservation Services Division, National Park Service, 1849 C Street, NW (2255), Washington, DC 20240.

ISBN: 0-16-076640-0
U.S. Government Printing Office 2006 Stock Number: 024-005-01245-1

Revised October 2006

Exhibit D

Hazardous Materials Survey Report

Hazardous Materials Survey Report

Windsor Locks Train Station Building
Windsor Locks, CT

Crosskey Architects, LLC

Hartford, CT

May 6, 2013

FUSS & O'NEILL

Fuss & O'Neill EnviroScience, LLC
146 Hartford Road
Manchester, CT 06040

Project No. 20121217.A1E

FUSS & O'NEILL
EnviroScience, LLC

May 6, 2013

Mr. William Crosskey
Crosskey Architects, LLC
One Union Place
Hartford, CT 06103

RE: Hazardous Materials Survey
Windsor Locks Train Station Building
Windsor Locks, CT
Fuss & O'Neill EnviroScience Project No. 20121217.A1E

Dear Mr. Crosskey:

Enclosed is the report for the hazardous materials survey performed at the Windsor Locks Train Station Building located in Windsor Locks, Connecticut.

The survey was performed on April 24, 2013 by a Fuss & O'Neill EnviroScience, LLC licensed inspector and included an asbestos inspection, screening for lead-based paint, and PCB source material testing of window glazing compounds.

The information summarized in this document is for the above-mentioned materials only. It does not include information on other hazardous materials that may exist in the property (such as underground storage tanks).

If you have any questions regarding the contents of this report, please do not hesitate to contact me at (860) 646-2469, extension 5570. Thank you for this opportunity to have served your environmental needs.

Sincerely,

Carlos Texidor
Project Manager

CT/kr

146 Hartford Road
Manchester, CT
06040
t 860.646.2469
800.286.2469
f 860.533.5143

www.fando.com

Connecticut
Massachusetts
Rhode Island
South Carolina

FUSS & O'NEILL
EnviroScience, LLC

Table of Contents

Hazardous Materials Survey Report
Crosskey Architects, LLC

Appendices

1 Introduction

On April 24, 2013, Fuss & O'Neill EnviroScience, LLC (EnviroScience) Senior Environmental Technician Eduardo Miguel Marques, a State of Connecticut Licensed Asbestos and Certified Lead Paint Inspector, performed a hazardous materials survey of the Windsor Locks Train Station building which is slated for renovation.

This inspection was performed in response to the planned renovation of the building and consisted of a survey for asbestos containing materials (ACM), a screening of painted surfaces for lead, and PCB source material testing of window glazing compounds.

The interior and exterior of the target areas were inspected in accordance with EnviroScience's written proposal dated August 16, 2012

2 Asbestos Inspection

Suspect ACM were sampled. Materials that were sampled were analyzed by Polarized Light Microscopy (PLM). If suspect ACM was not sampled, it was assumed to contain asbestos.

Finally, all ACM were quantified in linear and square footage, depending on the nature of the material. The asbestos content, quantities, and locations of ACM identified by bulk sample analysis are listed in *Table 1* of the Results section.

2.1 Results

Utilizing the USEPA protocol and criteria, the following materials were determined to be ACM:

TABLE 1

Sample ID	Location	Material Type	% Asbestos	Estimated Quantity
0424EMM-07	Basement	Mudded insulation on pipe fittings and pipe insulation	35% Chrysotile	-40 linear feet, pipe - 15 fittings -debris on ground
0424EMM-08	D-side rooms	Transite panel	20% Chrysotile	200 SF
0424EMM-09A	Basement – boiler	Boiler caulk at sectional seams	6% Chrysotile	All
N/A	Roof	Chimney (2) flashing	Assumed	4 SF each (2) 8 SF total

LF = Linear Feet, SF = Square Feet

Utilizing the USEPA protocol and criteria, the following materials were determined to be **non-ACM**:

TABLE 2

Sample ID	Location	Material Type
0424EMM-01A-C	Roof	Top layer roof shingle
0424EMM-02A-C	Roof	Bottom layer roof shingle
0424EMM-03A-C	Roof – slate louvers	Vapor barrier under slate shingle
0424EMM-04A-C	Basement windows	Basement window glazing compound
0424EMM-05A-C	Windows	Window glazing compound
0424EMM-10A-C	Throughout	Skim coat plaster
0424EMM-11A-C	Throughout	Rough coat plaster
0424EMM-12A-C	B-side rooms	2x4 ceiling tile
0424EMM-13A-C	Throughout	Sheetrock/joint compound (composite)
0424EMM-14A-B	Throughout	Joint compound
0424EMM-15A-C	Center room	Sheetrock ceiling panel
0424EMM-16A-C	Center room	Underlayment paper under hardwood floor
0424EMM-17A-B	Interior	Electrical wiring insulation
0424EMM-18	Exterior	Electrical wiring insulation
0424EMM-19A-B	Center room	Flue cement

2.2 Discussion

The USEPA defines any material that contains greater than one percent (>1%) asbestos, utilizing PLM, as being an ACM. Materials that are identified as "none detected" are specified as not containing asbestos. At EnviroScience, materials that are identified as containing less than four percent (<4%) asbestos are analyzed further utilizing the "point-counting" technique to verify asbestos content. This policy is supported by USEPA requirements for "point-counting" confirmation of low level PLM results. The following samples were analyzed by point-counting based on initial PLM results of <4% asbestos.

TABLE 3

SAMPLE ID	LOCATION	MATERIAL	% ASBESTOS	VERIFIED ACM?
0424EMM-05A	Windows	Window glazing compound	0.75% Chrysotile	No
0424EMM-05B			0.75% Chrysotile	No
0424EMM-05C			0.50% Chrysotile	No

2.3 Conclusion

ACM as identified in Section 2.1 (*Table 1*) must be removed by a State of Connecticut Licensed Asbestos Abatement Contractor prior to building demolition. This is a requirement of the State of Connecticut Department of Public Health (CT DPH) Standards for Asbestos Abatement.

Any suspect material encountered during renovation/demolition that is not identified in this report as being non-ACM, should be assumed to be ACM unless sample results prove otherwise.

Please see *Appendix A* for the chain-of-custody and sample results.

2.4 Observations

On April 24, 2013, Mr. Marques performed a hazardous materials survey of the Windsor Locks Train Station Building. The building has experienced fire damage and the attic space was deemed unsafe. However, based on visual observations from the top of the stair access to the attic space, only fiberglass insulated (not suspect asbestos-containing) ductwork was observed. The basement was identified to contain damaged friable asbestos-containing pipe/mudded fitting insulation. Therefore; during the remediation/abatement process, the floor/ground should be considered contaminated with asbestos-containing debris and cleaned.

2.5 Cost of Abatement

The estimated cost of abating the ACM listed in Section 2.1, *Table 1* was determined using unit prices currently associated with industry standards. Costs were then adjusted using job cost multipliers to account for specific job conditions. This is an estimate only and is solely intended to assist the client for budgetary purpose. Actual cost will vary inversely with the size of the project and will depend on market condition. The estimated removal costs are as follows:

Table 4

Location	Material	Quantity	Unit Cost	Total Cost
Basement	Mudded pipe fitting insulation and pipe insulation	-40 linear feet of pipe -15 fittings -debris on ground	$35/LF	$1,925.00
D-side rooms	Transite panel	200 SF	$9/SF	$1,800.00
Basement – boiler	Boiler caulk at sectional seams	All	$750 each	$750.00
Roof	Chimney (2) flashing	4 SF each (2) 8 SF total	$25/SF	$200.00
			Subtotal:	**$4,675.00**
			~5% Contingency:	**$225.00**
			Total:	**$4,900.00**

3 Lead-Based Paint Screening

A lead paint screen was performed at the Windsor Locks Train Station Building located in Windsor Locks, Connecticut by EnviroScience inspector Eduardo Miguel Marques on April 24, 2013. A direct reading X-ray fluorescence (XRF) analyzer was used to perform the screening. The screen was conducted in accordance with the protocol outlined in the attached document: Testing Procedures and Equipment (*Appendix B*).

For the purpose of this screen, various interior and exterior components representing the initial painting history of the building and any building-wide repainting by the owners/managers of these building components were tested. Of course, individual repainting efforts are not discoverable in such a limited testing program. The purpose of this screen was to identify trends in the painting history of the building in order to determine if Toxicity Characteristic Leachate Procedure (TCLP) analysis was required.

The exterior of the building is constructed with brick. Window and door systems are composed of wood. Interior walls/ceilings are composed of plaster and sheetrock.

3.1 Results

The screen indicated consistent painting trends throughout the building interior and exteriors. No painted components were determined to contain toxic levels of lead (greater than 1.0 milligrams of lead per square centimeter of paint) with the exception of the following:

TABLE 4

ITEM	LOCATION	READING (MG/CM²)
Exterior wood supports/joists and fascia (yellow)	Exterior	1.9, 8.1
Exterior wood door trim	Exterior	1.0, 2.9, 5.5
Wood door jamb	Doors	1.0
Exterior wood stair stringer	Exterior (rear) C side	1.0
Wood window jamb	Windows	1.6
Wood walls	Basement	>9.9
Wood ceiling	Basement	>9.9

3.2 TCLP Analysis

If components of building that is slated for renovation have toxic levels of lead-based paint, a TCLP analysis needs to be conducted to determine whether the debris generated from demolition needs to be disposed of as lead waste. EPA has determined that if the result of the analysis is more than 5.0 mg/L (milligram per liter), the waste needs to be disposed of as lead-contaminated waste.

3.3 Conclusion

Toxic levels of lead (greater than 1.0 milligrams of lead per square centimeter of paint) were identified on the following components:

- Exterior wood support/joists/fascia (yellow)
- Wood door trim/jamb
- Exterior wood stair stringer
- Wood window jamb
- Wood wall panels
- Wood ceiling - basement

The TCLP sample came back with a result of 0.108 mg/L, which is below the RCRA standard of 5.0 mg/L. Therefore, the waste generated from renovation activities at the Windsor Locks Train Station may be treated as and disposed of as standard construction debris.

The field testing sheets are provided as *Appendix C* in this report. The TCLP testing results are provided as *Appendix D* in this report.

4 PCB Source Material Testing

On April 24, 2013, EnviroScience representative Eduardo Miguel Marques collected samples of window glazing compounds to be analyzed in order to determine PCB content. Materials with PCB concentrations in excess of 50 mg/Kg (parts-per-million) of PCBs are determined to be a federally regulated waste under the Toxic Substance Control Act (TSCA) (40 CFR 760). In addition, if the material sampled has greater than 1 mg/kg PCBs but less that 50 mg/kg PCBs the State of Connecticut Department of Energy and Environmental Protection (DEEP) will require the waste to be handled as a PCB waste under State regulations (22a-463 through 22a-469). The following samples were collected and analyzed by Phoenix Environmental of Manchester, Connecticut:

TABLE 7

Sample #	Material	Location	Analysis Method - Parameter	Results Concentrations (mg/Kg)
0424EMM-01A	Basement Window glazing compound	Basement windows	3540/8082 – Aroclor1016 3540/8082– Aroclor-1221 3540/8082– Aroclor-1232 3540/8082– Aroclor-1242 3540/8082– Aroclor-1248 3540/8082– Aroclor-1254 3540/8082– Aroclor-1260 3540/8082– Aroclor-1262 3540/8082– Aroclor-1268	None detected None detected None detected None detected None detected None detected None detected None detected None detected Reporting limit, 0.38
0424EMM-01B	Basement Window glazing compound	Basement windows	3540/8082 – Aroclor1016 3540/8082– Aroclor-1221 3540/8082– Aroclor-1232 3540/8082– Aroclor-1242 3540/8082– Aroclor-1248 3540/8082– Aroclor-1254 3540/8082– Aroclor-1260 3540/8082– Aroclor-1262 3540/8082– Aroclor-1268	None detected None detected None detected None detected None detected None detected None detected None detected None detected Reporting limit, 0.34

Sample #	Material	Location	Analysis Method - Parameter	Results Concentrations (mg/Kg)
0424EMM-01C	Basement Window glazing compound	Basement windows	3540/8082 – Aroclor1016 3540/8082– Aroclor-1221 3540/8082– Aroclor-1232 3540/8082– Aroclor-1242 3540/8082– Aroclor-1248 3540/8082– Aroclor-1254 3540/8082– Aroclor-1260 3540/8082– Aroclor-1262 3540/8082– Aroclor-1268	None detected None detected None detected None detected None detected None detected None detected None detected None detected Reporting limit, 0.75
0424EMM-02A	Window glazing compound	Windows	3540/8082 – Aroclor1016 3540/8082– Aroclor-1221 3540/8082– Aroclor-1232 3540/8082– Aroclor-1242 3540/8082– Aroclor-1248 3540/8082– Aroclor-1254 3540/8082– Aroclor-1260 3540/8082– Aroclor-1262 3540/8082– Aroclor-1268	None detected None detected None detected None detected None detected None detected None detected None detected None detected Reporting limit, 0.32
0424EMM-02B	Window glazing compound	Windows	3540/8082 – Aroclor1016 3540/8082– Aroclor-1221 3540/8082– Aroclor-1232 3540/8082– Aroclor-1242 3540/8082– Aroclor-1248 3540/8082– Aroclor-1254 3540/8082– Aroclor-1260 3540/8082– Aroclor-1262 3540/8082– Aroclor-1268	None detected None detected None detected None detected None detected None detected None detected None detected None detected Reporting limit, 0.32
0424EMM-02C	Window glazing compound	Windows	3540/8082 – Aroclor1016 3540/8082– Aroclor-1221 3540/8082– Aroclor-1232 3540/8082– Aroclor-1242 3540/8082– Aroclor-1248 3540/8082– Aroclor-1254 3540/8082– Aroclor-1260 3540/8082– Aroclor-1262 3540/8082– Aroclor-1268	None detected None detected None detected None detected None detected None detected None detected None detected None detected Reporting limit, 0.31

4.1 Sample Collection and Analysis

Testing of source materials (window glazing compounds) was conducted by Fuss & O'Neill EnviroScience representative Eduardo Miguel Marques. Samples were collected prior to renovation.

Bulk Sampling

Sampling involved removal of bulk product materials (source materials) such as caulking and glazing compounds using hand tools to submit for PCB analysis. The tools utilized to collect samples were cleaned using hexane wash procedure between collecting each unique sample. Each sample was placed in containers, labeled, and delivered to the laboratory using chain of custody. Samples were analyzed at Phoenix Environmental of Manchester, Connecticut. The analytical method for analysis included extraction method 3540C and analysis method SW846 8082.

4.2 Results

The window glazing compounds tested during this inspection resulted in none detected for PCBs.

4.3 Conclusion

PCBs were not detected in the window glazing compounds.

Report prepared by Senior Environmental Technician Eduardo Miguel Marques.

Reviewed by:

Carlos Texidor
Project Manager

Stephen W. Connelly
Senior Vice President

FUSS & O'NEILL
EnviroScience, LLC

Appendix A

Asbestos Bulk Sample Results and Chain of Custody

EMSL Analytical, Inc.
200 Route 130 North Cinnaminson, NJ 08077
Phone/Fax: (800) 220-3675 / (856) 786-5974
http://www.emsl.com / cinnasblab@EMSL.com

EMSL Order ID: 041310388
Customer ID: ENVI54
Customer PO:
Project ID:

Attn: Carlos Texidor
Fuss & O'Neill EnviroScience, LLC
146 Hartford Road
Manchester, CT 06040

Phone: (860) 646-2469
Fax: (888) 838-1160
Collected:
Received: 4/25/2013
Analyzed: 4/26/2013

Proj: CROSSKEY ARCHITECTS, LLC/ WINDSOR LOCKS TRAIN STATION BUILDING/ 20121217.A1E

Summary Test Report for Asbestos Analysis via EPA 600/R-93/116 and/or EPA 600/M4-82-020

Client Sample ID: 0424EMM-01A **Lab Sample ID:** 041310388-0001
Sample Description: ROOF/TOP LAYER ROOF SHINGLE

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Fibrous	Asbestos	Comment
PLM	4/25/2013	Black	10%	90%	None Detected	

Client Sample ID: 0424EMM-01B **Lab Sample ID:** 041310388-0002
Sample Description: ROOF/TOP LAYER ROOF SHINGLE

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Fibrous	Asbestos	Comment
PLM	4/25/2013	Black	10%	90%	None Detected	

Client Sample ID: 0424EMM-01C **Lab Sample ID:** 041310388-0003
Sample Description: ROOF/TOP LAYER ROOF SHINGLE

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Fibrous	Asbestos	Comment
PLM	4/26/2013	Black	10%	90%	None Detected	

Client Sample ID: 0424EMM-02A **Lab Sample ID:** 041310388-0004
Sample Description: ROOF/BOTTOM LAYER ROOF SHINGLE

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Fibrous	Asbestos	Comment
PLM	4/25/2013	Black	10%	90%	None Detected	

Client Sample ID: 0424EMM-02B **Lab Sample ID:** 041310388-0005
Sample Description: ROOF/BOTTOM LAYER ROOF SHINGLE

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Fibrous	Asbestos	Comment
PLM	4/25/2013	Black	10%	90%	None Detected	

Client Sample ID: 0424EMM-02C **Lab Sample ID:** 041310388-0006
Sample Description: ROOF/BOTTOM LAYER ROOF SHINGLE

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Fibrous	Asbestos	Comment
PLM	4/26/2013	Black	10%	90%	None Detected	

Client Sample ID: 0424EMM-03A **Lab Sample ID:** 041310388-0007
Sample Description: ROOF- SLATE LOUVRE/VAPOR BARRIER UNDER SLATE SHINGLE

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Fibrous	Asbestos	Comment
PLM	4/25/2013	Black	95%	5%	None Detected	

EMSL Analytical, Inc.
200 Route 130 North Cinnaminson, NJ 08077
Phone/Fax: (800) 220-3675 / (856) 786-5974
http://www.emsl.com / cinnasblab@EMSL.com

EMSL Order ID: 041310388
Customer ID: ENVI54
Customer PO:
Project ID:

Summary Test Report for Asbestos Analysis via EPA 600/R-93/116 and/or EPA 600/M4-82-020

Client Sample ID: 0424EMM-03B **Lab Sample ID:** **041310388-0008**
Sample Description: ROOF- SLATE LOUVRE/VAPOR BARRIER UNDER SLATE SHINGLE

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	4/25/2013	Black	95%	5%	None Detected	

Client Sample ID: 0424EMM-03C **Lab Sample ID:** **041310388-0009**
Sample Description: ROOF- SLATE LOUVRE/VAPOR BARRIER UNDER SLATE SHINGLE

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	4/26/2013	Black	95%	5%	None Detected	

Client Sample ID: 0424EMM-04A **Lab Sample ID:** **041310388-0010**
Sample Description: BASEMENT WINDOWS/BASEMENT WINDOW GLAZING COMPOUND

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	4/25/2013	Tan	0%	100%	None Detected	

Client Sample ID: 0424EMM-04B **Lab Sample ID:** **041310388-0011**
Sample Description: BASEMENT WINDOWS/BASEMENT WINDOW GLAZING COMPOUND

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	4/25/2013	Tan	0%	100%	None Detected	

Client Sample ID: 0424EMM-04C **Lab Sample ID:** **041310388-0012**
Sample Description: BASEMENT WINDOWS/BASEMENT WINDOW GLAZING COMPOUND

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	4/26/2013	Tan	0%	100%	None Detected	

Client Sample ID: 0424EMM-05A **Lab Sample ID:** **041310388-0013**
Sample Description: WINDOWS/WINDOW GLAZING COMPOUND

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
400 PLM Pt Ct	4/25/2013	Gray	0%	99.25%	**0.75% Chrysotile**	

Client Sample ID: 0424EMM-05B **Lab Sample ID:** **041310388-0014**
Sample Description: WINDOWS/WINDOW GLAZING COMPOUND

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
400 PLM Pt Ct	4/25/2013	Gray	0%	99.25%	**0.75% Chrysotile**	

Client Sample ID: 0424EMM-05C **Lab Sample ID:** **041310388-0015**
Sample Description: WINDOWS/WINDOW GLAZING COMPOUND

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
400 PLM Pt Ct	4/26/2013	Gray	0%	99.50%	**0.50% Chrysotile**	

EMSL Analytical, Inc.
200 Route 130 North Cinnaminson, NJ 08077
Phone/Fax: (800) 220-3675 / (856) 786-5974
http://www.emsl.com / cinnasblab@EMSL.com

EMSL Order ID: 041310388
Customer ID: ENVI54
Customer PO:
Project ID:

Summary Test Report for Asbestos Analysis via EPA 600/R-93/116 and/or EPA 600/M4-82-020

Client Sample ID: 0424EMM-06 ***Lab Sample ID:*** **041310388-0016**
Sample Description: BASEMENT/PIPE INSULATION

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Fibrous	Asbestos	Comment
PLM	4/25/2013	Gray	35%	65%	None Detected	

Client Sample ID: 0424EMM-07 ***Lab Sample ID:*** **041310388-0017**
Sample Description: BASEMENT/MUDDED FITTING INSULATION

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Fibrous	Asbestos	Comment
PLM	4/25/2013	Tan	0%	65%	**35% Chrysotile**	

Client Sample ID: 0424EMM-08 ***Lab Sample ID:*** **041310388-0018**
Sample Description: D-SIDE ROOMS/TRANSITE PANEL

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Fibrous	Asbestos	Comment
PLM	4/25/2013	Gray	0%	80%	**20% Chrysotile**	

Client Sample ID: 0424EMM-09A ***Lab Sample ID:*** **041310388-0019**
Sample Description: BASEMENT- BOILER/BOILER CAULK AT SECTIONAL SEAMS

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Fibrous	Asbestos	Comment
PLM	4/25/2013	Gray/Rust	0%	94%	**6% Chrysotile**	

Client Sample ID: 0424EMM-09B ***Lab Sample ID:*** **041310388-0020**
Sample Description: BASEMENT- BOILER/BOILER CAULK AT SECTIONAL SEAMS

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Fibrous	Asbestos	Comment
PLM	4/25/2013				Stop Positive (Not Analyzed)	

Client Sample ID: 0424EMM-09C ***Lab Sample ID:*** **041310388-0021**
Sample Description: BASEMENT- BOILER/BOILER CAULK AT SECTIONAL SEAMS

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Fibrous	Asbestos	Comment
PLM	4/25/2013				Stop Positive (Not Analyzed)	

Client Sample ID: 0424EMM-10A ***Lab Sample ID:*** **041310388-0022**
Sample Description: THROUGHOUT/SKIM COAT PLASTER

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Fibrous	Asbestos	Comment
PLM	4/25/2013	White	0%	100%	None Detected	

Client Sample ID: 0424EMM-10B ***Lab Sample ID:*** **041310388-0023**
Sample Description: THROUGHOUT/SKIM COAT PLASTER

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Fibrous	Asbestos	Comment
PLM	4/25/2013	White	0%	100%	None Detected	

EMSL Analytical, Inc.
200 Route 130 North Cinnaminson, NJ 08077
Phone/Fax: (800) 220-3675 / (856) 786-5974
http://www.emsl.com / cinnasblab@EMSL.com

EMSL Order ID: 041310388
Customer ID: ENVI54
Customer PO:
Project ID:

Summary Test Report for Asbestos Analysis via EPA 600/R-93/116 and/or EPA 600/M4-82-020

Client Sample ID: 0424EMM-10C **Lab Sample ID:** **041310388-0024**
Sample Description: THROUGHOUT/SKIM COAT PLASTER

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	4/26/2013	White	0%	100%	None Detected	

Client Sample ID: 0424EMM-11A **Lab Sample ID:** **041310388-0025**
Sample Description: THROUGHOUT/ROUGH COAT PLASTER

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	4/25/2013	Gray	3%	97%	None Detected	

Client Sample ID: 0424EMM-11B **Lab Sample ID:** **041310388-0026**
Sample Description: THROUGHOUT/ROUGH COAT PLASTER

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	4/25/2013	Gray	3%	97%	None Detected	

Client Sample ID: 0424EMM-11C **Lab Sample ID:** **041310388-0027**
Sample Description: THROUGHOUT/ROUGH COAT PLASTER

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	4/26/2013	Gray	3%	97%	None Detected	

Client Sample ID: 0424EMM-12A **Lab Sample ID:** **041310388-0028**
Sample Description: B- SIDE ROOMS/2 X 4 CEILING TILE

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	4/25/2013	Gray	90%	10%	None Detected	

Client Sample ID: 0424EMM-12B **Lab Sample ID:** **041310388-0029**
Sample Description: B- SIDE ROOMS/2 X 4 CEILING TILE

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	4/25/2013	Gray	90%	10%	None Detected	

Client Sample ID: 0424EMM-12C **Lab Sample ID:** **041310388-0030**
Sample Description: B- SIDE ROOMS/2 X 4 CEILING TILE

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	4/26/2013	Gray	90%	10%	None Detected	

Client Sample ID: 0424EMM-13A **Lab Sample ID:** **041310388-0031**
Sample Description: THROUGHOUT/SHEETROCK/ JOINT COMPOUND

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	4/25/2013	White	15%	85%	None Detected	This is a composite result of wallboard, jt. compound, and tape

EMSL Analytical, Inc.
200 Route 130 North Cinnaminson, NJ 08077
Phone/Fax: (800) 220-3675 / (856) 786-5974
http://www.emsl.com / cinnasblab@EMSL.com

EMSL Order ID: 041310388
Customer ID: ENVI54
Customer PO:
Project ID:

Summary Test Report for Asbestos Analysis via EPA 600/R-93/116 and/or EPA 600/M4-82-020

Client Sample ID: 0424EMM-13B **Lab Sample ID:** **041310388-0032**
Sample Description: THROUGHOUT/SHEETROCK/ JOINT COMPOUND

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	4/25/2013	Gray	15%	85%	None Detected	Sample contains no joint compound.

Client Sample ID: 0424EMM-13C **Lab Sample ID:** **041310388-0033**
Sample Description: THROUGHOUT/SHEETROCK/ JOINT COMPOUND

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	4/26/2013	White	15%	85%	None Detected	

Client Sample ID: 0424EMM-14A **Lab Sample ID:** **041310388-0034**
Sample Description: THROUGHOUT/JOINT COMPOUND

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	4/25/2013	White	0%	100%	None Detected	

Client Sample ID: 0424EMM-14B **Lab Sample ID:** **041310388-0035**
Sample Description: THROUGHOUT/JOINT COMPOUND

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	4/26/2013		0%	100%	None Detected	

Client Sample ID: 0424EMM-15A **Lab Sample ID:** **041310388-0036**
Sample Description: CENTER ROOM/SHEETROCK CEILING PANEL

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	4/25/2013	Brown/Gray	15%	85%	None Detected	

Client Sample ID: 0424EMM-15B **Lab Sample ID:** **041310388-0037**
Sample Description: CENTER ROOM/SHEETROCK CEILING PANEL

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	4/25/2013	Brown/Gray	15%	85%	None Detected	

Client Sample ID: 0424EMM-15C **Lab Sample ID:** **041310388-0038**
Sample Description: CENTER ROOM/SHEETROCK CEILING PANEL

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	4/26/2013	Brown/Gray	10%	90%	None Detected	

Client Sample ID: 0424EMM-16A **Lab Sample ID:** **041310388-0039**
Sample Description: CENTER ROOM/UNDERLAYMENT PAPER UNDER HARDWOOD FLOOR

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	4/25/2013	Brown	90%	10%	None Detected	

EMSL Analytical, Inc.
200 Route 130 North Cinnaminson, NJ 08077
Phone/Fax: (800) 220-3675 / (856) 786-5974
http://www.emsl.com / cinnasblab@EMSL.com

EMSL Order ID: 041310388
Customer ID: ENVI54
Customer PO:
Project ID:

Summary Test Report for Asbestos Analysis via EPA 600/R-93/116 and/or EPA 600/M4-82-020

Client Sample ID: 0424EMM-16B **Lab Sample ID:** **041310388-0040**
Sample Description: CENTER ROOM/UNDERLAYMENT PAPER UNDER HARDWOOD FLOOR

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	4/25/2013	Brown	90%	10%	None Detected	

Client Sample ID: 0424EMM-16C **Lab Sample ID:** **041310388-0041**
Sample Description: CENTER ROOM/UNDERLAYMENT PAPER UNDER HARDWOOD FLOOR

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	4/26/2013		90%	10%	None Detected	

Client Sample ID: 0424EMM-17A **Lab Sample ID:** **041310388-0042**
Sample Description: INTERIOR/ELECTRICAL WIRING INSULATION

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	4/26/2013	Black	0%	100%	None Detected	

Client Sample ID: 0424EMM-17B **Lab Sample ID:** **041310388-0043**
Sample Description: INTERIOR/ELECTRICAL WIRING INSULATION

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	4/26/2013	Black	0%	100%	None Detected	

Client Sample ID: 0424EMM-18 **Lab Sample ID:** **041310388-0044**
Sample Description: EXTERIOR/ELECTRICAL WIRING INSULATION

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	4/26/2013	Gray/Black	0%	100%	None Detected	

Client Sample ID: 0424EMM-19A **Lab Sample ID:** **041310388-0045**
Sample Description: CENTER ROOM/FLUE CEMENT

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	4/26/2013	Gray	0%	100%	None Detected	

Client Sample ID: 0424EMM-19B **Lab Sample ID:** **041310388-0046**
Sample Description: CENTER ROOM/FLUE CEMENT

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	4/26/2013	Gray	0%	100%	None Detected	

EMSL Analytical, Inc.
200 Route 130 North Cinnaminson, NJ 08077
Phone/Fax: (800) 220-3675 / (856) 786-5974
http://www.emsl.com / cinnasblab@EMSL.com

EMSL Order ID:	041310388
Customer ID:	ENVI54
Customer PO:	
Project ID:	

Summary Test Report for Asbestos Analysis via EPA 600/R-93/116 and/or EPA 600/M4-82-020

Analyst(s)

Chelsey Bilhear	PLM	(28)
	400 PLM Pt Ct	(2)
Nancy Stalter	PLM	(13)
	400 PLM Pt Ct	(1)

Stephen Siegel, CIH, Laboratory Manager
or other Approved Signatory

Any questions please contact Steve Siegel.

Initial report from: 04/26/201307:04:37

FUSS & O'NEILL
EnviroScience, LLC

146 Hartford Road, Manchester, CT 06040 Phone (860)646-2469 Fax (860) 649-6883

www.fando.com

04131038

46 PLM

SAMPLE LOG FOR ASBESTOS BULKS

Sheet 1 of 2

Project Name: Crosskey Architects, LLC Project No. 20121217.A1E

Building: Windsor Locks Train Station Building Project Manager: CT

Sample ID	Sample Location	Material	Result (%)
0424EMM-01A-C	Roof	Top layer roof shingle	
0424EMM-02A-C	Roof	Bottom layer roof shingle	
0424EMM-03A-C	Roof – slate louvre	Vapor barrier under slate shingle	
0424EMM-04A-C	Basement windows	Basement window glazing compound	
0424EMM-05A-C	Windows	Window glazing compound	
0424EMM-06	Basement	Pipe insulation	
0424EMM-07	Basement	Mudded fitting insulation	
0424EMM-08	D-side rooms –	Transite panel	
0424EMM-09A-C	Basement – boiler	Boiler caulk at sectional seams	
0424EMM-10A-C	Throughout	Skim coat plaster	
0424EMM-11A-C	Throughout	Rough coat plaster	
0424EMM-12A-C	B-side rooms	2x4 ceiling tile	

Analysis Method: ☒ PLM ☐ Other Turnaround Time: 24 hour

Based on the turnaround time indicated above, analyses are due to EnviroScience on or before this date: _____. Please call the EnviroScience Laboratory if analyses will be late at (860) 646-2469.

Fax Results to the EnviroScience Laboratory at: 888-838-1160.

Special Instruction: Stop analysis on first positive sample in each homogeneous set of samples unless otherwise noted. Do not layer samples unless indicated. EPA 400 point count all samples of asbestos content ≤4%, positive stop on all point counts.

Samples collected by: EMM **Date:** 4-24-13 **Time:** _____

Samples [Rec'd][Sent by] [ ] [ ] **Date:** [ ] [ ] **Time:** _____

Samples Received by: AK EMSL Fx **Date:** 4/25/13 **Time:** 9:10A

Shipped To: ☒ EMSL State: NJ ☐ Other _____

Method of Shipment: ☒ Fed Ex ☐ Other _____

(PLM)

FUSS & O'NEILL
EnviroScience, LLC

www.fando.com

146 Hartford Road, Manchester, CT 06040 Phone (860)646-2469 Fax (860) 649-6853

04131038B

SAMPLE LOG FOR ASBESTOS BULKS

Sheet 2 of 2

Project Name: Crosskey Architects, LLC Project No. 20121217.A1E

Building: Windsor Locks Train Station Building Project Manager: CT

Sample ID	Sample Location	Material	Result (%)
0424EMM-13A-C	Throughout	Sheetrock/joint compound (composite)	
0424EMM-14A-B	Throughout	Joint compound	
0424EMM-15A-C	Center room	Sheetrock ceiling panel	
0424EMM-16A-C	Center room	Underlayment paper under hardwood floor	
0424EMM-17A-B	Interior	Electrical wiring insulation	
0424EMM-18	Exterior	Electrical wiring insulation	
0424EMM-19A-B	Center room	Flue cement	

Analysis Method: ☒ PLM ☐ Other Turnaround Time: 24 hour

Based on the turnaround time indicated above, analyses are due to EnviroScience on or before this date: _____. Please call the EnviroScience Laboratory if analyses will be late at (860) 646-2469.

Fax Results to the EnviroScience Laboratory at: 888-838-1160.

Special Instruction: Stop analysis on first positive sample in each homogeneous set of samples unless otherwise noted. Do not layer samples unless indicated. EPA 400 point count all samples of asbestos content <4%, positive stop on all point counts.

Samples collected by: EMM **Date:** 4-22-13 **Time:** _____

Samples [Rec'd][Sent by] [_____][_____] **Date:** [_____][_____] **Time:** _____

Samples Received by: _____ **Date:** _____ **Time:** _____

Shipped To: ☒ EMSL State: NJ ☐ Other _____

Method of Shipment: ☒ Fed Ex ☐ Other _____

FUSS & O'NEILL
EnviroScience, LLC

Appendix B

Lead Paint Testing Procedures and Equipment

FUSS & O'NEILL
EnviroScience, LLC

STANDARD OPERATING PROCEDURES
LEAD-BASED PAINT LIMITED SCREENINGS

TESTING PROCEDURES AND EQUIPMENT

The U. S. Department of Housing and Urban Development (HUD) "Guidelines for the Evaluation and Control of Lead Hazards in Housing, September 1997," were consulted for this lead paint screening. HUD has been the agency at the federal level with responsibility for the establishment of national lead-based paint standards for testing and abatement. The HUD document will be referenced as the Guidelines in this document. The HUD Guidelines are specific to child occupied dwelling units or target housing and are not wholly applicable to limited screenings. Additionally, most New England States have regulations and standards with regard to lead paint testing and abatement in child occupied facilities. EnviroScience shall consult these regulations and standards prior to beginning testing. Some states have reporting requirements if certain threshold values for lead paint are found and certain conditions exist. EnviroScience reports any specific testing results required by State laws as licensed inspectors and consultants in these circumstances.

This lead evaluation was a Lead Based Paint Limited Screening. Both the proposed scope of work and the final report will note this type of evaluation was done. A Lead Paint Limited Screening is performed in order to determine through representative testing the lead paint history of a property. However, conclusions about untested areas cannot be reliably determined based on the limited testing that was done. Comprehensive inspections involve testing of representative components in each and every room of a building. A Lead Based Paint Limited Screening is conducted in representative locations and not necessarily every room. The intent is to collect a sufficient number of readings using field instrumentation to characterize a given component or surface. Representative components are classified as testing combinations. The age and use of the functional space, component type, and substrate type are used to characterize a testing combination for purposes of a Lead Based Paint Limited Screening. Considering age of the structure inspectors determine original dates of construction and any major renovations to the original building. Interior spaces where major renovation has occurred are also treated as separate spaces. A functional space is a room or group of rooms used for similar purposes where painting is presumed to be uniform.

Inspectors perform Lead Based Paint Limited Screening on representative components ensuring randomization in the selection of components. EnviroScience utilizes a protocol of a minimum of three (3) rooms with similar building components and surfaces are comprehensively tested similar to inspections for HUD compliance or state regulated inspections. (For example, living room, kitchen, and a bedroom may be comprehensively tested in a 6-room apartment). In this protocol specific unique components are tested in any other locations in the dwelling. Inspectors shall record readings utilizing portable field instrumentation.

Conclusions in a Lead Based Paint Limited Screening are made based on consistent findings in the limited number of readings collected for a given testing combination. Inspectors conduct more readings if trends or similar findings are not found during such a limited screening process. In reporting findings and use in cost estimating, EnviroScience shall use limited screening information to extrapolate (or presume) that the untested areas have similar paint history as to those areas where limited screenings were conducted. (For example if in the three locations tested, all window sashes

contained threshold values of lead paint above HUD or other State regulatory levels, then EnviroScience would detail in the report that all such components in the dwelling should be presumed to contain lead paint or recommend them to be tested further).

Lead-based paint surfaces and components were identified by utilizing on-site x-ray fluorescence (XRF) instruments. Fuss & O'Neill EnviroScience, LLC owns and maintains XRFs for testing for lead-based paint. These instruments are four Radiation Monitoring Devices LPA-1 (RMD). Each of these instruments is operated in accordance with state and federal and manufacturer standards on the use of the instruments. State and federal protocols provide, with the exception of wall surfaces, one reading with the instrument on a representative component in each room, i.e., baseboard, chair rail, etc., as sufficient to establish the lead paint classification of all the representatives of that component type in a room. In the case of walls, because of the large spacial areas involved and the variability in lead content in paint over such large areas, the federal and state governments want a reading on each wall surface in a room. Therefore, representative testing is not permitted for walls.

The federal government has developed Performance Characteristic Sheets (PCS) for each of the types of instruments cited above. Each instrument must be calibrated in accordance with these PCSs on a 1.0-milligram lead standard. Each of EnviroScience's instruments has one of these standards assigned to it. Some of the standards were purchased directly from the government and the others from the manufacturers of the instruments.

Each of the instruments has federal government-determined positive and negative ranges for the definition of lead-based paint. XRF results are classified using either the threshold or the inconclusive range. For the threshold, results are classified as positive if they are greater than or equal to the threshold and negative if they are less than the threshold. There is no inconclusive classification when using the threshold. For the inconclusive range, results are classified as positive if they are greater than the upper limit of the inconclusive range and negative if they are less than the lower limit of the inconclusive range. The ranges for each of the types of instruments and their various operating modes are as follows:

Radiation Monitoring Device LPA Analyzer 1

30-Second Standard Mode Reading Description	Substrate	Threshold (mg/cm^2)
Results corrected for substrate bias on metal substrate only.	Brick	1.0
	Concrete	1.0
	Drywall	1.0
	Metal	0.9
	Plaster	1.0
	Wood	1.0

Quick Mode Reading Description	Substrate	Threshold (mg/cm^2)	Inconclusive Range (mg/cm^2)
Readings not corrected for substrate bias on any substrate.	Brick	1.0	None
	Concrete	1.0	None
	Drywall	1.0	None
	Metal	1.0	None
	Plaster	1.0	None
	Wood	1.0	None

If a reading falls in the inconclusive range, either the lead inspector should be authorized by the client to take a paint chip sample to determine whether the final result is either positive or negative after laboratory analysis, or the result can be categorized as suspect positive and treated accordingly. If it is not confirmed with laboratory analysis, it cannot be assumed to be negative for toxic levels of lead. If it is assumed to be positive, it can either be abated as a positive if the condition of the surface and/or location of the component requires this treatment under Connecticut and/or HUD regulations, or it can be managed in place as a positive component in accordance with the requirements of Connecticut and HUD regulations.

Prior to the start of any testing, a sketch of the building is drawn, and side designations are given to help identify exactly where readings were taken. Drawings depicting the room-numbering scheme are located on the cover page(s) for the building(s) inspected. Each side of the building was labeled A, B, C, or D. The wall "A" side of the unit is generally the side of primary entrance into a dwelling, and this room is always Room 1. Areas in the units include rooms, hallways, and closets. Areas are numbered in a clockwise fashion as building construction allows. This allows the inspector to indicate which substrate surface was tested. The condition of the surface is described by a check mark in the appropriate column, under the heading "condition of surface" on the testing form.

When more than one surface type was present on a side, the component tested was indicated with a number. If two windows were present on a building side, they were numbered left to right. Closet shelves and shelf supports were numbered top to bottom.

It is understood that the room layouts presented in the report are in conformance with the conditions that exist at the time the testing is performed. EnviroScience avoids labeling a room solely by its current functional use (i.e., living room, bedroom, etc.) since this use can change over time. Similarly, room layouts can change dramatically as dwellings are renovated and additions are built, incorporating existing rooms, or existing interior walls are moved or eliminated altogether.

FUSS & O'NEILL
EnviroScience, LLC

Appendix C

Lead Testing Field Data Sheets

FUSS & O'NEILL
EnviroScience, LLC

www.fando.com

146 Hartford Road, Manchester, CT 06040

(860) 646-2469 Fax (860) 649-6883

XRF LEAD SCREENING FIELD DATA SHEET

Inspector Name: E. Miguel Marques Inspector License #: 002132

Date: 4-24-13 XRF Model: RMD Serial: 1157

Project Name: Crosskey Architects, LLC Project Number: 20121217.A1E

Address: Windsor Locks Train Station Bldg. Project PM: SWC/CT

XRF Calibration Check-RMD (0.7 to 1.3 mg/cm² inclusive)

	Hour	First Reading	Second Reading	Third Reading	Average
First Check	9:30	0.9	0.9	1.0	
Second Check	11:30	0.8	0.9	1.0	
Third Check					
Fourth Check					

Side	Surface/Component	Substrate	XRF Reading	Positive (√)	Comments/Notes
A	support - yellow	W	0.6, 1.9	✓	
A	joist - yellow	W	5.1	✓	
A	board - cover	W	-0.1		
A	door trim	W	1.0	✓	
C	drain	M	-0.1		
C	Bnt. w. sash	W	0.1		
C	stair tread	W	0.2		
C	stair riser	W	0.1		
C	stair stringer	W	1.0	✓	
C	railing	M	0.2		
B	door trim	W	2.9	✓	
B	door jamb	W	1.0	✓	
B	door	W	0.0		
B	platform	W	0.1		
	facia	W		✓	Assumed - same as column/joists

* Substrate Type: Metal = M, Wood = W, Plaster = P, Sheetrock = S, Concrete = C, Brick = B
N/A: Not Accessible; N/C: Not Coated; COV: Covered; VR – Vinyl Replacement

FUSS & O'NEILL
EnviroScience, LLC

www.fando.com

146 Hartford Road, Manchester, CT 06040

(860) 646-2469 Fax (860) 649-6883

XRF LEAD SCREENING FIELD DATA SHEET (CONT.)

Project Name: Crosskey Architects, LLC Project Number: 20121217.AIE

Address: Windsor Locks Train Station Bldg. Project PM: SWC/CT

Side	Surface/Component	Substrate	XRF Reading	Positive (√)	Comments/Notes
	Door	W	0.1		
C	window jamb	W	1.6	✓	
C	wall	W	0.1		
D	wall	S	0.1		
D	door jamb	W	-0.0		
A	w. trim	W	-0.1		
A	wall	W	-0.0		
C	door jamb	W	5.5	✓	
	ceiling	S	0.2		
	ceiling paint		-0.1		
	Brick walls	W	>9.9	✓	
	Brick ceiling	W	>9.9	✓	
D	plaster wall	P	0.2		

* Substrate Type: Metal = M, Wood = W, Plaster = P, Sheetrock = S, Concrete = C, Brick = B
N/A: Not Accessible; N/C: Not Coated; COV: Covered; VR – Vinyl Replacement

FUSS & O'NEILL
EnviroScience, LLC

Appendix D

TCLP Sample Results and Chain of Custody

Date Samples Received: 04/24/13

Client Name : **Fuss & O'Neill EnviroScience**	CTL Lab No. : 0413369
Report Date : 04/30/13	PO/ Job No. : 20121217.A1E

RESULTS OF ANALYSIS

TCLP EPA 1311

Date Analyzed: 04/30/13

Matrix Type : **S**
CTL Sample No.: **5296**
Field ID : **0424EMM-01T**

Parameters	RL				
Lead-mg/L	0.005	0.108			

RL= Reporting Limit ND = Not Detected

Matrix Type: W = Water/Aqueous S= Soil/Solid O= Oil/Hydrocarbon

Connecticut Testing Laboratories, Inc.
165 Gracey Avenue / Meriden, CT 06451
(203) 634-3731 (Fax) 630-1336
Certification CT-PH0647/ MA-CT035

FUSS & O'NEILL
EnviroScience, LLC

www.fando.com

146 Hartford Road, Manchester, CT 06040 (860) 646-2469 Fax (860) 649-6883

0413369

SAMPLE LOG FOR TCLP BULKS

Sheet No. 1 of 1

Project Name: Crosskey Architects
Building: Windsor Locks Train Station

Project Number: 20121217.A1E
Project Manager: CT

Sample ID Number	Sample Location/Building	Material Type	Result (ppm)	Lab Number
0424EMM-01	T Windsor Locks Train Station	Renovation - Composite - Bldg Materials		5296

Analysis Method: TCLP Lead

Turnaround Time 5 day

Based on the turnaround time indicated above, analyses are due to Fuss & O'Neill EnviroScience on or before this date: _____.
Please call the Fuss & O'Neill EnviroScience laboratory at 860-646-2469 if analyses will be late.

Fax Results To: Fuss & O'Neill EnviroScience Laboratory at 888-838-1160

Special Instructions: _____

Samples Collected By: [signature] Date: 4-24-13 Time: _____
Samples Rec'd/Sent By: / Date: / Time: /
Samples Received By: [signature] Date: 4/24/13 Time: 1523

Shipped To: ☐ EMSL (State) _____ ☐ Other _____

Method of Shipment: ☐ Fed Ex. ☐ UPS Overnight ☐ UPS Ground ☑ Other CT Testing Labs

FUSS & O'NEILL
EnviroScience, LLC

Appendix E

PCB Source Material Testing and Chain of Custody

PHOENIX
Environmental Laboratories, Inc.

Tuesday, April 30, 2013

Attn: Karron Redfield
Fuss & O'Neill, Inc.
146 Hartford Road
Manchester, CT 06040

Project ID: CROSSKEY ARCHITECTS LLC
Sample ID#s: BD63570 - BD63575

This laboratory is in compliance with the NELAC requirements of procedures used except where indicated.

This report contains results for the parameters tested, under the sampling conditions described on the Chain Of Custody, as received by the laboratory.

All soils, solids and sludges are reported on a dry weight basis unless otherwise noted in the sample comments.

A scanned version of the COC form accompanies the analytical report and is an exact duplicate of the original.

If you have any questions concerning this testing, please do not hesitate to contact Phoenix Client Services at ext. 200.

Sincerely yours,

Phyllis Shiller

Phyllis Shiller
Laboratory Director

NELAC - #NY11301
CT Lab Registration #PH-0618
MA Lab Registration #MA-CT-007
ME Lab Registration #CT-007
NH Lab Registration #213693-A,B
NJ Lab Registration #CT-003
NY Lab Registration #11301
PA Lab Registration #68-03530
RI Lab Registration #63
VT Lab Registration #VT11301

PHOENIX

Environmental Laboratories, Inc.
587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
Tel. (860) 645-1102 Fax (860) 645-0823

Analysis Report

April 30, 2013

FOR: Attn: Karron Redfield
Fuss & O'Neill, Inc.
146 Hartford Road
Manchester, CT 06040

Sample Information		Custody Information		Date	Time
Matrix:	SOLID	Collected by:	EMM	04/24/13	0:00
Location Code:	F&O-PCB	Received by:	SW	04/24/13	14:43
Rush Request:	Standard	Analyzed by:	see "By" below		
P.O.#:	20121217A1E				

Laboratory Data

SDG ID: GBD63570
Phoenix ID: BD63570

Project ID: CROSSKEY ARCHITECTS LLC
Client ID: 0424 EMM-01A BSMT WINDOW GLAZING

Parameter	Result	RL/ PQL	Units	Date/Time	By	Reference
Percent Solid	100	1	%	04/26/13	LB	E160.3
Extraction for PCB	Completed			04/24/13	BP/K	SW3540C
PCB (Soxhlet)						
PCB-1016	ND	0.38	mg/kg	04/26/13	AW	3540C/8082
PCB-1221	ND	0.38	mg/kg	04/26/13	AW	3540C/8082
PCB-1232	ND	0.38	mg/kg	04/26/13	AW	3540C/8082
PCB-1242	ND	0.38	mg/kg	04/26/13	AW	3540C/8082
PCB-1248	ND	0.38	mg/kg	04/26/13	AW	3540C/8082
PCB-1254	ND	0.38	mg/kg	04/26/13	AW	3540C/8082
PCB-1260	ND	0.38	mg/kg	04/26/13	AW	3540C/8082
PCB-1262	ND	0.38	mg/kg	04/26/13	AW	3540C/8082
PCB-1268	ND	0.38	mg/kg	04/26/13	AW	3540C/8082
QA/QC Surrogates						
% DCBP	69		%	04/26/13	AW	30 - 150 %
% TCMX	72		%	04/26/13	AW	30 - 150 %

Project ID: CROSSKEY ARCHITECTS LLC
Client ID: 0424 EMM-01A BSMT WINDOW GLAZING

Phoenix I.D.: BD63570

Parameter	Result	RL/ PQL	Units	Date/Time	By	Reference

RL/PQL=Reporting/Practical Quantitation Level ND=Not Detected BRL=Below Reporting Level

Comments:

All soils, solids and sludges are reported on a dry weight basis unless otherwise noted in the sample comments.

If there are any questions regarding this data, please call Phoenix Client Services at extension 200.
This report must not be reproduced except in full as defined by the attached chain of custody.

Phyllis Shiller, Laboratory Director
April 30, 2013
Reviewed and Released by: Bobbi Aloisa, Vice President

PHOENIX

Environmental Laboratories, Inc.
587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
Tel. (860) 645-1102 Fax (860) 645-0823

Analysis Report

April 30, 2013

FOR: Attn: Karron Redfield
Fuss & O'Neill, Inc.
146 Hartford Road
Manchester, CT 06040

Sample Information		Custody Information		Date	Time
Matrix:	SOLID	Collected by:	EMM	04/24/13	0:00
Location Code:	F&O-PCB	Received by:	SW	04/24/13	14:43
Rush Request:	Standard	Analyzed by:	see "By" below		
P.O.#:	20121217A1E				

Laboratory Data

SDG ID: GBD63570
Phoenix ID: BD63571

Project ID: CROSSKEY ARCHITECTS LLC
Client ID: 0424 EMM-01B BSMT WINDOW GLAZING

Parameter	Result	RL/ PQL	Units	Date/Time	By	Reference
Percent Solid	100	1	%	04/26/13	LB	E160.3
Extraction for PCB	Completed			04/24/13	BP/K	SW3540C
PCB (Soxhlet)						
PCB-1016	ND	0.34	mg/kg	04/26/13	AW	3540C/8082
PCB-1221	ND	0.34	mg/kg	04/26/13	AW	3540C/8082
PCB-1232	ND	0.34	mg/kg	04/26/13	AW	3540C/8082
PCB-1242	ND	0.34	mg/kg	04/26/13	AW	3540C/8082
PCB-1248	ND	0.34	mg/kg	04/26/13	AW	3540C/8082
PCB-1254	ND	0.34	mg/kg	04/26/13	AW	3540C/8082
PCB-1260	ND	0.34	mg/kg	04/26/13	AW	3540C/8082
PCB-1262	ND	0.34	mg/kg	04/26/13	AW	3540C/8082
PCB-1268	ND	0.34	mg/kg	04/26/13	AW	3540C/8082
QA/QC Surrogates						
% DCBP	65		%	04/26/13	AW	30 - 150 %
% TCMX	67		%	04/26/13	AW	30 - 150 %

Project ID: CROSSKEY ARCHITECTS LLC
Client ID: 0424 EMM-01B BSMT WINDOW GLAZING

Phoenix I.D.: BD63571

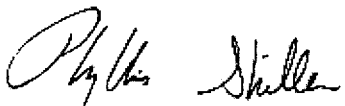
Parameter	Result	RL/ PQL	Units	Date/Time	By	Reference

RL/PQL=Reporting/Practical Quantitation Level ND=Not Detected BRL=Below Reporting Level

Comments:

All soils, solids and sludges are reported on a dry weight basis unless otherwise noted in the sample comments.

If there are any questions regarding this data, please call Phoenix Client Services at extension 200.
This report must not be reproduced except in full as defined by the attached chain of custody.



Phyllis Shiller, Laboratory Director
April 30, 2013
Reviewed and Released by: Bobbi Aloisa, Vice President

PHOENIX

Environmental Laboratories, Inc.
587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
Tel. (860) 645-1102 Fax (860) 645-0823

Analysis Report

April 30, 2013

FOR: Attn: Karron Redfield
Fuss & O'Neill, Inc.
146 Hartford Road
Manchester, CT 06040

Sample Information		Custody Information		Date	Time
Matrix:	SOLID	Collected by:	EMM	04/24/13	0:00
Location Code:	F&O-PCB	Received by:	SW	04/24/13	14:43
Rush Request:	Standard	Analyzed by:	see "By" below		
P.O.#:	20121217A1E				

Laboratory Data

SDG ID: GBD63570
Phoenix ID: BD63572

Project ID: CROSSKEY ARCHITECTS LLC
Client ID: 0424 EMM-01C BSMT WINDOW GLAZING

Parameter	Result	RL/ PQL	Units	Date/Time	By	Reference
Percent Solid	100	1	%	04/26/13	LB	E160.3
Extraction for PCB	Completed			04/24/13	BP/K	SW3540C
PCB (Soxhlet)						
PCB-1016	ND	0.75	mg/kg	04/26/13	AW	3540C/8082
PCB-1221	ND	0.75	mg/kg	04/26/13	AW	3540C/8082
PCB-1232	ND	0.75	mg/kg	04/26/13	AW	3540C/8082
PCB-1242	ND	0.75	mg/kg	04/26/13	AW	3540C/8082
PCB-1248	ND	0.75	mg/kg	04/26/13	AW	3540C/8082
PCB-1254	ND	0.75	mg/kg	04/26/13	AW	3540C/8082
PCB-1260	ND	0.75	mg/kg	04/26/13	AW	3540C/8082
PCB-1262	ND	0.75	mg/kg	04/26/13	AW	3540C/8082
PCB-1268	ND	0.75	mg/kg	04/26/13	AW	3540C/8082
QA/QC Surrogates						
% DCBP	81		%	04/26/13	AW	30 - 150 %
% TCMX	84		%	04/26/13	AW	30 - 150 %

Project ID: CROSSKEY ARCHITECTS LLC
Client ID: 0424 EMM-01C BSMT WINDOW GLAZING

Phoenix I.D.: BD63572

Parameter	Result	RL/ PQL	Units	Date/Time	By	Reference

RL/PQL=Reporting/Practical Quantitation Level ND=Not Detected BRL=Below Reporting Level

Comments:

All soils, solids and sludges are reported on a dry weight basis unless otherwise noted in the sample comments.

If there are any questions regarding this data, please call Phoenix Client Services at extension 200.
This report must not be reproduced except in full as defined by the attached chain of custody.

Phyllis Shiller, Laboratory Director
April 30, 2013
Reviewed and Released by: Bobbi Aloisa, Vice President

PHOENIX

Environmental Laboratories, Inc.
587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
Tel. (860) 645-1102 Fax (860) 645-0823

Analysis Report

April 30, 2013

FOR: Attn: Karron Redfield
Fuss & O'Neill, Inc.
146 Hartford Road
Manchester, CT 06040

Sample Information		Custody Information		Date	Time
Matrix:	SOLID	Collected by:	EMM	04/24/13	0:00
Location Code:	F&O-PCB	Received by:	SW	04/24/13	14:43
Rush Request:	Standard	Analyzed by:	see "By" below		
P.O.#:	20121217A1E				

Laboratory Data

SDG ID: GBD63570
Phoenix ID: BD63573

Project ID: CROSSKEY ARCHITECTS LLC
Client ID: 0424 EMM-02A WINDOW GLAZING

Parameter	Result	RL/ PQL	Units	Date/Time	By	Reference
Percent Solid	100	1	%	04/26/13	LB	E160.3
Extraction for PCB	Completed			04/24/13	BP/K	SW3540C
PCB (Soxhlet)						
PCB-1016	ND	0.32	mg/kg	04/26/13	AW	3540C/8082
PCB-1221	ND	0.32	mg/kg	04/26/13	AW	3540C/8082
PCB-1232	ND	0.32	mg/kg	04/26/13	AW	3540C/8082
PCB-1242	ND	0.32	mg/kg	04/26/13	AW	3540C/8082
PCB-1248	ND	0.32	mg/kg	04/26/13	AW	3540C/8082
PCB-1254	ND	0.32	mg/kg	04/26/13	AW	3540C/8082
PCB-1260	ND	0.32	mg/kg	04/26/13	AW	3540C/8082
PCB-1262	ND	0.32	mg/kg	04/26/13	AW	3540C/8082
PCB-1268	ND	0.32	mg/kg	04/26/13	AW	3540C/8082
QA/QC Surrogates						
% DCBP	73		%	04/26/13	AW	30 - 150 %
% TCMX	76		%	04/26/13	AW	30 - 150 %

Project ID: CROSSKEY ARCHITECTS LLC
Client ID: 0424 EMM-02A WINDOW GLAZING

Phoenix I.D.: BD63573

Parameter	Result	RL/ PQL	Units	Date/Time	By	Reference

RL/PQL=Reporting/Practical Quantitation Level ND=Not Detected BRL=Below Reporting Level

Comments:

All soils, solids and sludges are reported on a dry weight basis unless otherwise noted in the sample comments.

If there are any questions regarding this data, please call Phoenix Client Services at extension 200.
This report must not be reproduced except in full as defined by the attached chain of custody.

Phyllis Shiller, Laboratory Director
April 30, 2013
Reviewed and Released by: Bobbi Aloisa, Vice President

PHOENIX

Environmental Laboratories, Inc.
587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
Tel. (860) 645-1102 Fax (860) 645-0823

Analysis Report

April 30, 2013

FOR: Attn: Karron Redfield
Fuss & O'Neill, Inc.
146 Hartford Road
Manchester, CT 06040

Sample Information		Custody Information		Date	Time
Matrix:	SOLID	Collected by:	EMM	04/24/13	0:00
Location Code:	F&O-PCB	Received by:	SW	04/24/13	14:43
Rush Request:	Standard	Analyzed by:	see "By" below		
P.O.#:	20121217A1E				

Laboratory Data

SDG ID: GBD63570
Phoenix ID: BD63574

Project ID: CROSSKEY ARCHITECTS LLC
Client ID: 0424 EMM-02B WINDOW GLAZING

Parameter	Result	RL/ PQL	Units	Date/Time	By	Reference
Percent Solid	100	1	%	04/26/13	LB	E160.3
Extraction for PCB	Completed			04/24/13	BP/K	SW3540C
PCB (Soxhlet)						
PCB-1016	ND	0.32	mg/kg	04/26/13	AW	3540C/8082
PCB-1221	ND	0.32	mg/kg	04/26/13	AW	3540C/8082
PCB-1232	ND	0.32	mg/kg	04/26/13	AW	3540C/8082
PCB-1242	ND	0.32	mg/kg	04/26/13	AW	3540C/8082
PCB-1248	ND	0.32	mg/kg	04/26/13	AW	3540C/8082
PCB-1254	ND	0.32	mg/kg	04/26/13	AW	3540C/8082
PCB-1260	ND	0.32	mg/kg	04/26/13	AW	3540C/8082
PCB-1262	ND	0.32	mg/kg	04/26/13	AW	3540C/8082
PCB-1268	ND	0.32	mg/kg	04/26/13	AW	3540C/8082
QA/QC Surrogates						
% DCBP	75		%	04/26/13	AW	30 - 150 %
% TCMX	80		%	04/26/13	AW	30 - 150 %

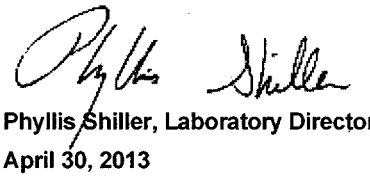
Parameter	Result	RL/ PQL	Units	Date/Time	By	Reference

RL/PQL=Reporting/Practical Quantitation Level ND=Not Detected BRL=Below Reporting Level

Comments:

All soils, solids and sludges are reported on a dry weight basis unless otherwise noted in the sample comments.

If there are any questions regarding this data, please call Phoenix Client Services at extension 200.
This report must not be reproduced except in full as defined by the attached chain of custody.



Phyllis Shiller, Laboratory Director
April 30, 2013
Reviewed and Released by: Bobbi Aloisa, Vice President

PHOENIX

Environmental Laboratories, Inc.
587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
Tel. (860) 645-1102 Fax (860) 645-0823

Analysis Report

April 30, 2013

FOR: Attn: Karron Redfield
Fuss & O'Neill, Inc.
146 Hartford Road
Manchester, CT 06040

Sample Information		Custody Information		Date	Time
Matrix:	SOLID	Collected by:	EMM	04/24/13	0:00
Location Code:	F&O-PCB	Received by:	SW	04/24/13	14:43
Rush Request:	Standard	Analyzed by:	see "By" below		
P.O.#:	20121217A1E				

Laboratory Data

SDG ID: GBD63570
Phoenix ID: BD63575

Project ID: CROSSKEY ARCHITECTS LLC
Client ID: 0424 EMM-02C WINDOW GLAZING

Parameter	Result	RL/ PQL	Units	Date/Time	By	Reference
Percent Solid	100	1	%	04/26/13	LB	E160.3
Extraction for PCB	Completed			04/24/13	BP/K	SW3540C
PCB (Soxhlet)						
PCB-1016	ND	0.31	mg/kg	04/26/13	AW	3540C/8082
PCB-1221	ND	0.31	mg/kg	04/26/13	AW	3540C/8082
PCB-1232	ND	0.31	mg/kg	04/26/13	AW	3540C/8082
PCB-1242	ND	0.31	mg/kg	04/26/13	AW	3540C/8082
PCB-1248	ND	0.31	mg/kg	04/26/13	AW	3540C/8082
PCB-1254	ND	0.31	mg/kg	04/26/13	AW	3540C/8082
PCB-1260	ND	0.31	mg/kg	04/26/13	AW	3540C/8082
PCB-1262	ND	0.31	mg/kg	04/26/13	AW	3540C/8082
PCB-1268	ND	0.31	mg/kg	04/26/13	AW	3540C/8082
QA/QC Surrogates						
% DCBP	74		%	04/26/13	AW	30 - 150 %
% TCMX	78		%	04/26/13	AW	30 - 150 %

Project ID: CROSSKEY ARCHITECTS LLC
Client ID: 0424 EMM-02C WINDOW GLAZING

Phoenix I.D.: BD63575

Parameter	Result	RL/ PQL	Units	Date/Time	By	Reference

RL/PQL=Reporting/Practical Quantitation Level ND=Not Detected BRL=Below Reporting Level

Comments:

All soils, solids and sludges are reported on a dry weight basis unless otherwise noted in the sample comments.

If there are any questions regarding this data, please call Phoenix Client Services at extension 200.
This report must not be reproduced except in full as defined by the attached chain of custody.

Phyllis Shiller, Laboratory Director
April 30, 2013
Reviewed and Released by: Bobbi Aloisa, Vice President

PHOENIX

Environmental Laboratories, Inc.
587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
Tel. (860) 645-1102 Fax (860) 645-0823

QA/QC Report

April 30, 2013

QA/QC Data

SDG I.D.: GBD63570

Parameter	Blank	LCS %	LCSD %	LCS RPD	MS %	MSD %	MS RPD	% Rec Limits	% RPD Limits
QA/QC Batch 227754, QC Sample No: BD62469 (BD63570, BD63571, BD63572, BD63573, BD63574, BD63575)									
Polychlorinated Biphenyls - Solid									
PCB-1016	ND	85	83	2.4				40 - 140	30
PCB-1221	ND							40 - 140	30
PCB-1232	ND							40 - 140	30
PCB-1242	ND							40 - 140	30
PCB-1248	ND							40 - 140	30
PCB-1254	ND							40 - 140	30
PCB-1260	ND	84	84	0.0				40 - 140	30
PCB-1262	ND							40 - 140	30
PCB-1268	ND							40 - 140	30
% DCBP (Surrogate Rec)	91	91	92	1.1				30 - 150	30
% TCMX (Surrogate Rec)	86	86	85	1.2				30 - 150	30

Comment:

A LCS and LCS Duplicate were performed instead of a matrix spike and matrix spike duplicate.

If there are any questions regarding this data, please call Phoenix Client Services at extension 200.

RPD - Relative Percent Difference
LCS - Laboratory Control Sample
LCSD - Laboratory Control Sample Duplicate
MS - Matrix Spike
MS Dup - Matrix Spike Duplicate
NC - No Criteria
Intf - Interference

Phyllis Shiller, Laboratory Director
April 30, 2013

Tuesday, April 30, 2013

Requested Criteria: None

State: CT

Sample Criteria Exceedences Report

GBD63570 - FO-PCB

SampNo	Acode	Phoenix Analyte	Criteria	Result	RL	Criteria	RL Criteria	Analysis Units

*** No Data to Display ***

Reasonable Confidence Protocol
Laboratory Analysis QA/QC Certification Form

Laboratory Name: Phoenix Environmental Labs, Inc. **Client:** F&O-PCB

Project Location: CROSSKEY ARCHITECTS LLC **Project Number:**

Laboratory Sample ID(s): BD63570, BD63571, BD63572, BD63573, BD63574, BD63575

Sampling Date(s): 4/24/2013

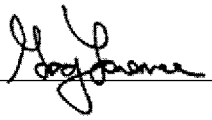
RCP Methods Used:

☐ 1311/1312	☐ 6010	☐ 7000	☐ 7196	☐ 7470/7471	☐ 8081	☐ EPH	☐ TO15
☑ 8082	☐ 8151	☐ 8260	☐ 8270	☐ ETPH	☐ 9010/9012	☐ VPH	

1.	For each analytical method referenced in this laboratory report package, were all specified QA/QC performance criteria followed, including the requirement to explain any criteria falling outside of acceptable guidelines, as specified in the CT DEP method-specific Reasonable Confidence Protocol documents?	☑ Yes ☐ No
1a.	Were the method specified preservation and holding time requirements met?	☑ Yes ☐ No
1b.	EPH and VPH methods only: Was the VPH or EPH method conducted without significant modifications (see section 11.3 of respective RCP methods)	☐ Yes ☐ No ☑ NA
2.	Were all samples received by the laboratory in a condition consistent with that described on the associated Chain-of-Custody document(s)?	☑ Yes ☐ No
3.	Were samples received at an appropriate temperature (< 6 Degrees C)?	☑ Yes ☐ No ☐ NA
4.	Were all QA/QC performance criteria specified in the Reasonable Confidence Protocol documents achieved?	☑ Yes ☐ No
5a.	Were reporting limits specified or referenced on the chain-of-custody?	☑ Yes ☐ No
5b.	Were these reporting limits met?	☑ Yes ☐ No ☐ NA
6.	For each analytical method referenced in this laboratory report package, were results reported for all constituents identified in the method-specific analyte lists presented in the Reasonable Confidence Protocol documents?	☑ Yes ☐ No ☐ NA
7.	Are project-specific matrix spikes and laboratory duplicates included in the data set?	☐ Yes ☑ No ☐ NA

Note: For all questions to which the response was "No" (with the exception of question #5a, #7), additional information must be provided in an attached narrative. If the answer to question #1, #1A or 1B is "No", the data package does not meet the requirements for "Reasonable Confidence".

I, the undersigned, attest under the pains and penalties of perjury that, to the best of my knowlegde and belief and based upon my personal inquiry of those responsible for providing the information contained in this analytical report, such information is accurate and complete.

Authorized Signature: 

Date: Tuesday, April 30, 2013

Printed Name: Greg Lawrence

Position: Assistant Lab Director

PHOENIX

Environmental Laboratories, Inc.
587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
Tel. (860) 645-1102 Fax (860) 645-0823

ACCREDITED IN ACCORDANCE WITH nelac NY # 11301

RCP Certification Report

April 30, 2013

SDG I.D.: GBD63570

PCB Narration

Were all QA/QC performance criteria specified in the Reasonable Confidence Protocol documents achieved? Yes.

Instrument: Au-ecd5 04/25/13-1 (BD63570, BD63571, BD63572, BD63573, BD63574, BD63575)

8082 Narration:

The initial calibration RSD for the compound list was less than 15% except for the following compounds: none

The continuing calibration standards were within acceptance criteria except for the following compounds: none

Printed Name Adam Werner
Position: Chemist
Date: 4/25/2013

Instrument: Au-ecd5 04/26/13-1 (BD63570, BD63571, BD63572, BD63573, BD63574, BD63575)

8082 Narration:

The initial calibration RSD for the compound list was less than 15% except for the following compounds: none

The continuing calibration standards were within acceptance criteria except for the following compounds: none

Printed Name Adam Werner
Position: Chemist
Date: 4/26/2013

QC Comments: QC Batch 227754 04/24/13 (BD63570, BD63571, BD63572, BD63573, BD63574, BD63575)

A LCS and LCS Duplicate were performed instead of a matrix spike and matrix spike duplicate.

QC (Batch Specific)

--------- Sample No: BD62469, QA/QC Batch: 227754 ----------

All LCS recoveries were within 40 - 140 with the following exceptions: None.

All LCSD recoveries were within 40 - 140 with the following exceptions: None.

All LCS/LCSD RPDs were less than 30% with the following exceptions: None.

Temperature Narration

The samples in this delivery group were received at 4°C.
(Note acceptance criteria is above freezing up to 6°C)

PHOENIX

Environmental Laboratories, Inc.
587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
Tel. (860) 645-1102 Fax (860) 645-0823

ACCREDITED IN ACCORDANCE WITH nelac NY # 11301

RCP Certification Report

April 30, 2013

SDG I.D.: GBD63570

4 of 4 IP

FUSS & O'NEILL ENVIROSCIENCE, LLC
Disciplines to Deliver
(860) 646-2469 • www.FandO.com

- ☑ 146 Hartford Road, Manchester, CT 06040
- ☐ 56 Quarry Road, Trumbull, CT 06611
- ☐ 1419 Richland Street, Columbia, SC 29201
- ☐ 78 Interstate Drive, West Springfield, MA 01089
- ☐ 50 Redfield Street, Suite 100, Boston, MA 02122
- ☐ 275 Promenade Street, Suite 350, Providence, RI 02908
- ☐ 80 Washington Street, Suite 301, Poughkeepsie, NY 12601

CHAIN-OF-CUSTODY RECORD 0459

- ☐ 1 Day*
- ☐ 2 Days*
- ☑ 3 Days*
- ☑ Standard (5 days)
- ☐ Other _____ (days)

*Surcharge Applies

PROJECT NAME	PROJECT LOCATION	PROJECT NUMBER	LABORATORY
Crosskey Architects, LLC	Windsor Locks Train Station Bldg.	20121217.A1E	PhoenixX

REPORT TO: Karron Redfield

INVOICE TO:

P.O. No.:

Sampler's Signature: [signature] Date: 4-24-13

Source Codes:
MW=Monitoring Well PW=Potable Water S=Soil W=Waste
SW=Surface Water T=Treatment Facility B=Sediment A=Air
X=Other Bulk

Item No.	Transfer Check 1	2	3	4	Sample Number	Source Code	Date Sampled	Time Sampled	Analysis Request: PCBs Extract/Leach	Containers: Glass Soil Container (2) oz	Comments
					04242MM						
					01A Bsmt. window glazing	Bulk	4-24-13	a.m.	✓	✓	63570
					01B	↓	↓	↓	✓	✓	63571
					01C	↓	↓	↓	✓	✓	63572
					02A window glazing	↓	↓	↓	✓	✓	63573
					02B	↓	↓	↓	✓	✓	63574
					02C	↓	↓	↓	✓	✓	63575

Transfer Number	Relinquished By	Accepted By	Date	Time
1	[signature]	[signature]	4/24/13	14:43
2				
3				
4				

Reporting and Detection Limit Requirements:

Additional Comments:
Reporting limit - less than 1 PPM