Project Manual & Specifications

Slate Roof Renovations to

Union Baptist Church

1921 Main Street
Hartford, CT

Reissued for Bid
January 17, 2023

Owner:	
	By: Union Baptist Church of Hartford
Architect:	
	By: Crosskey Architects, LLC
Contractor:	
	By: _____
Bonding Company:	
	By: _____

Crosskey Architects LLC
Architecture, Preservation and Planning

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

SECTION 00 01 20

PROJECT DIRECTORY & IDENTIFICATION OF PARTIES

PROJECT:	Slate Roof Renovations to Union Baptist Church 1921 Main Street Hartford, CT 06120
OWNER:	Union Baptist Church of Hartford 1921 Main Street Hartford, CT 06120
ARCHITECT:	Crosskey Architects LLC 750 Main Street Suite 150 Hartford, CT 06103 Phone: (860) 724-3000
GENERAL CONTRACTOR:	

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END OF SECTION

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DOCUMENT 00 02 00

INVITATION TO BIDDERS

OWNER: Union Baptist Church of Hartford
1921 Main Street
Hartford, CT 06120

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 Thursday, March 2 at 5:00pm.

2. There will be a mandatory pre-bid meeting Tuesday, January 24, 2023 at 9:00am at the site. **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 the Union Baptist Church roof renovations, consisting of slate roof renovations, flashing replacement & repair, exterior carpentry restoration and associated work.

4. The Contract will include 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. Contact architect for digital copies of bid documents at: lcrosskey@crosskey.com.

7. 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.

8. 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.

9. 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.

10. 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.

11. The Contractor shall be required to make good faith efforts to place a minimum of twenty-five (25%) percent of the subcontractors awarded by the general contractor/construction manager at risk with eligible contractors holding current 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.)

12. This project will require prevailing wage rates. Refer to section 00811 of the specifications.

13. The Contractor may be required to provide product samples and mock-ups of materials for review and approval by the Architect and the State Historic Preservation Office prior to the commencement of the Work.

Crosskey Architects LLC

per:

Laura Crosskey, AIA

enc.

END OF DOCUMENT

SECTION 00 10 00

INSTRUCTIONS TO BIDDERS

1. SUMMARY

1.01 DOCUMENT INCLUDES

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  - 1. Bid Submission
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  - 3. Work Identified in the Contract Documents
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- G. Offer Acceptance/Rejection
  - 1. Duration of Offer
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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 offices of Crosskey Architects, llc, 750 Main Street, Hartford, CT no later than 5:00pm on Thursday, March 2, 2023.
- 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 selective demolition, general construction & renovation work, etc.
B. Location: 1921 Main Street, Hartford, CT.

2.04 CONTRACT TIME

A. Contractor to propose number of calendar days to complete the project. Number of calendar days cannot exceed 90. This shall not include the period of time between contract signing and construction start.
B. Provide a proposed completion schedule for the project.

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 Union Baptist Church Slate Roof Renovations, as prepared by the Architect, Crosskey Architects LLC, located at 750 Main Street, Suite 150, Hartford, CT and identified in the Project Manual.

3.03 AVAILABILITY

A. Digital Bid Documents may be obtained from the office of the Architect, Crosskey Architects LLC, located at 750 Main Street, Suite 150, Hartford, CT.
B. Contact Laura Crosskey at lcrosskey@crosskey.com.
C. 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.

3.04 EXAMINATION

A. Upon receipt of Bid Documents verify that documents are complete. Notify Architect should the documents be incomplete.
B. Immediately notify the Architect upon finding discrepancies or omissions in the Bid Documents.

3.05 QUERIES/ADDENDA

A. Direct questions in writing to Laura Crosskey, email lcrosskey@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 posted to the State of Connecticut portal no later than 4 days before date set of receipt of Bids.

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 PREBID CONFERENCE

A. A mandatory pre-bid walk-thru of the site will be conducted at 9:00am on Tuesday, October 18, 2022. 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 five percent of the Bid Price/Sum on AIA A310 Bid Bond Form.

OR

2. Certified check in the amount of five 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 00405 – 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

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SECTION 00 31 00

BID FORM

To: Union Baptist Church of Hartford
1921 Main Street
Hartford, CT 06120

Project: Slate Roof Renovation
Union Baptist Church
1921 Main Street
Hartford, CT

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.

Taxes are not included in the Bid Price, as the Owner is 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 15 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 _____ (__) calendar days from execution of contract.

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

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SECTION 00 40 00

SUPPLEMENTS TO BID FORM

To: Union Baptist Church of Hartford
1921 Main Street
Hartford, CT 06120

Project: Union Baptist Church Slate Roof Renovations
1921 Main Street
Hartford, CT 06120

Date:_____

Submitted by:
(full name)

_____
(full address)

_____

_____

In accordance with Section 00 10 00 - Instructions to Bidders and Section 00 31 00 - 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:

Section 00 40 10 - Supplement A - Unit Prices: Include a listing of unit prices specifically requested by the Contract Documents.
Section 00 40 20 - Supplement B - Alternates: Include the cost variation to the Bid Price applicable to the Work described in Section 01019.
Section 00 40 30 - Supplement C - Allowances: Include the listing of allowances specifically requested in the Contract Documents.
Section 00 40 40 - Supplement D – CHRO Form: Provide completed forms included herein.
Section 00 40 50 - 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 SECTION

DOCUMENT 00 40 10

SUPPLEMENT A - LIST OF UNIT PRICES

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

(Bidder)_____

To: Union Baptist Church of Hartford
1921 Main Street
Hartford, CT 06120

Project: Union Baptist Church Slate Roof Renovations
1921 Main Street
Hartford, CT 06120

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
Exterior Woodwork Replacement	
Furnish and install new element to replace damaged or missing:	
1. Decorative rafter tails	$_____each
Slate Roofing	
Furnish new slate to replace damaged or missing (above 30% replacement):	
2. Roofing slate	$_____/SF

END OF SECTION

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DOCUMENT 00 40 20

SUPPLEMENT B - LIST OF ALTERNATES

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

(Bidder)_____

To: Union Baptist Church of Hartford
1921 Main Street
Hartford, CT 06120

Project: Union Baptist Church Slate Roof Renovations
1921 Main Street
Hartford, CT 06120

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. Phase 2 renovations to areas S3, S4, S5, S6, S7, S8 & R1 $_____
2. Phase 3 renovations to areas S9, S10, S11, S12, & R2 $_____
3. Phase 4 renovations to areas S2, D3, & D5 $_____
4. Phase 5 renovations to areas M1, M2, M3, M4, M5, & M6 $_____

END OF SECTION

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DOCUMENT 00 40 30

SUPPLEMENT C - LIST OF ALLOWANCES

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

(Bidder)_____

To: Union Baptist Church of Hartford
1921 Main Street
Hartford, CT 06120

Project: Union Baptist Church Slate Roof Renovations
1921 Main Street
Hartford, CT 06120

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. TO BE DETERMINED	$0.00

END OF SECTION

DOCUMENT 00 40 40

SUPPLEMENT D – CHRO FORM

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

(Bidder)_____

To: Union Baptist Church of Hartford
1921 Main Street
Hartford, CT 06120

Project: Union Baptist Church Slate Roof Renovation
1921 Main Street
Hartford, CT 06120

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

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.

State law requires a minimum of twenty-five (25%) percent of the state-funded portion of the contract for award to subcontractors holding current certification from the Connecticut Department of Administrative Services ("DAS") under the provisions of CONN. GEN. STAT. § 4a-60g. (25% of the work with DAS certified Small and Minority owned businesses and 25% of that work with DAS certified Minority, Women and/or Disabled owned businesses.) The contractor must demonstrate good faith effort to meet the 25% setaside goals.

For municipal public works contracts and quasi-public agency projects, the contractor must file a written or electronic non-discrimination certification with the Commission on Human Rights and Opportunities. Forms can be found at:
http://www.ct.gov/opm/cwp/view.asp?a=2982&q=390928&opmNav_GID=1806

All bidders must complete, sign, and return the "CHRO Contract Compliance Regulations Notification to Bidders" form to the grantee at the time of bid opening. Bids not including this form will be considered incomplete and rejected.

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 (Page 4)

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)

SECTION 00 40 50

SUPPLEMENT E - BIDDER'S QUALIFICATION STATEMENT

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

(Bidder)_____

OWNER: Union Baptist Church of Hartford
1921 Main Street
Hartford, CT 06120

PROJECT: Union Baptist Church Slate Roof Renovation
1921 Main Street
Hartford, CT 06120

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

DOCUMENT 00 40 50.1
SUPPLEMENT E- BIDDER QUALIFICATION STATEMENT

UNION BAPTIST CHURCH
SLATE ROOF RENOVATIONS
HARTFORD, CT

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_____

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DOCUMENT 00 50 10

AGREEMENT - AIA

1 AGREEMENT

AIA Document A101 Standard Form of Agreement Between Owner and Contractor [2017 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

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DRAFT AIA® Document A101® – 2017

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

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

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

«Union Baptist Church of Hartford»«»
«1921 Main Street
Hartford, CT 06120
»
«»
«Fax Number: faxNumber»

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

« »« »
« »
« »
« »

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

«~~t~~Union Baptist Church Slate Roof Renovations»
«1921 Main Street
Hartford, CT 06120
»
« »

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

«Crosskey Architects, LLC»«»
«750 Main Street, Suite 150
Hartford, CT 06103»
«»
«Fax Number: faxNumber»

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.

The parties should complete A101®–2017, Exhibit A, Insurance and Bonds, contemporaneously with this Agreement. AIA Document A201®–2017, General Conditions of the Contract for Construction, is adopted in this document by reference. Do not use with other general conditions unless this document is modified.

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:
(Check one of the following boxes.)

[« »] The date of this Agreement.

[« »] A date set forth in a notice to proceed issued by the Owner.

[« »] Established as follows:
(Insert a date or a means to determine the date of commencement of the Work.)

« »

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

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

§ 3.3 Substantial Completion

§ 3.3.1 Subject to adjustments of the Contract Time as provided in the Contract Documents, the Contractor shall achieve Substantial Completion of the entire Work:
(Check one of the following boxes and complete the necessary information.)

[« »] Not later than « » (« ») calendar days from the date of commencement of the Work.

[« »] By the following date: « »

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

Portion of Work	Substantial Completion Date

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

ARTICLE 4 CONTRACT SUM

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

§ 4.2 Alternates

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

Item	Price

§ 4.2.2 Subject to the conditions noted below, the following alternates may be accepted by the Owner following execution of this Agreement. Upon acceptance, the Owner shall issue a Modification to this Agreement.
(Insert below each alternate and the conditions that must be met for the Owner to accept the alternate.)

Item	Price	Conditions for Acceptance

§ 4.3 Allowances, if any, included in the Contract Sum:
(Identify each allowance.)

Item	Price

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

Item	Units and Limitations	Price per Unit ($0.00)

§ 4.5 Liquidated damages, if any:
(Insert terms and conditions for liquidated damages, if any.)

« »

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

« »

ARTICLE 5 PAYMENTS

§ 5.1 Progress Payments

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

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

« »

§ 5.1.3 Provided that an Application for Payment is received by the Architect not later than the « » day of a month, the Owner shall make payment of the amount certified 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 of the amount certified 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 of values shall be used as a basis for reviewing the Contractor's Applications for Payment.

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

§ 5.1.6 In accordance with AIA Document A201™–2017, General Conditions of the Contract for Construction, and subject to other provisions of the Contract Documents, the amount of each progress payment shall be computed as follows:

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

.1 That portion of the Contract Sum properly allocable to completed Work;

.2 That portion of the Contract Sum properly allocable to materials and equipment delivered and 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; and

.3 That portion of Construction Change Directives that the Architect determines, in the Architect's professional judgment, to be reasonably justified.

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

.1 The aggregate of any amounts previously paid by the Owner;

.2 The amount, if any, for Work that remains uncorrected and for which the Architect has previously withheld a Certificate for Payment as provided in Article 9 of AIA Document A201–2017;

.3 Any amount for which the Contractor does not intend to pay a Subcontractor or material supplier, unless the Work has been performed by others the Contractor intends to pay;

.4 For Work performed or defects discovered since the last payment application, any amount for which the Architect may withhold payment, or nullify a Certificate of Payment in whole or in part, as provided in Article 9 of AIA Document A201–2017; and

.5 Retainage withheld pursuant to Section 5.1.7.

§ 5.1.7 Retainage

§ 5.1.7.1 For each progress payment made prior to Substantial Completion of the Work, the Owner may withhold the following amount, as retainage, from the payment otherwise due:
(Insert a percentage or amount to be withheld as retainage from each Application for Payment. The amount of retainage may be limited by governing law.)

« Five Percent (5%) »

§ 5.1.7.1.1 The following items are not subject to retainage:
(Insert any items not subject to the withholding of retainage, such as general conditions, insurance, etc.)

« Building Permit, Bonds »

§ 5.1.7.2 Reduction or limitation of retainage, if any, shall be as follows:
(If the retainage established in Section 5.1.7.1 is to be modified prior to Substantial Completion of the entire Work, including modifications for Substantial Completion of portions of the Work as provided in Section 3.3.2, insert provisions for such modifications.)

« »

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

« »

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

§ 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 Article 12 of AIA Document A201–2017, 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:

« »

§ 5.3 Interest

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

« » % « »

ARTICLE 6 DISPUTE RESOLUTION

§ 6.1 Initial Decision Maker

The Architect will serve as the Initial Decision Maker pursuant to Article 15 of AIA Document A201–2017, unless the parties appoint below another individual, not a party to this Agreement, to serve as the Initial Decision Maker.
(If the parties mutually agree, insert the name, address and other contact information of the Initial Decision Maker, if other than the Architect.)

« »
« »
« »
« »

§ 6.2 Binding Dispute Resolution

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

[« »] Arbitration pursuant to Section 15.4 of AIA Document A201–2017

[« »] Litigation in a court of competent jurisdiction

[« »] Other *(Specify)*

« »

If the Owner and Contractor do not select a method of binding dispute resolution, or do not subsequently agree in writing to a binding dispute resolution method other than litigation, Claims will be resolved by litigation in a court of competent jurisdiction.

ARTICLE 7 TERMINATION OR SUSPENSION

§ 7.1 The Contract may be terminated by the Owner or the Contractor as provided in Article 14 of AIA Document A201–2017.

§ 7.1.1 If the Contract is terminated for the Owner's convenience in accordance with Article 14 of AIA Document A201–2017, then the Owner shall pay the Contractor a termination fee as follows:
(Insert the amount of, or method for determining, the fee, if any, payable to the Contractor following a termination for the Owner's convenience.)

« »

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

ARTICLE 8 MISCELLANEOUS PROVISIONS

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

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

«»
«»
«»
«»
«»
«»

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

« »
« »
« »
« »
« »
« »

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

§ 8.5 Insurance and Bonds

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

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

§ 8.6 Notice in electronic format, pursuant to Article 1 of AIA Document A201–2017, may be given in accordance with AIA Document E203™–2013, Building Information Modeling and Digital Data Exhibit, if completed, or as otherwise set forth below:
(If other than in accordance with AIA Document E203–2013, insert requirements for delivering notice in electronic format such as name, title, and email address of the recipient and whether and how the system will be required to generate a read receipt for the transmission.)

« »

§ 8.7 Other provisions:

« »

ARTICLE 9 ENUMERATION OF CONTRACT DOCUMENTS

§ 9.1 This Agreement is comprised of the following documents:

.1 AIA Document A101™–2017, Standard Form of Agreement Between Owner and Contractor

.2 AIA Document A101™–2017, Exhibit A, Insurance and Bonds

.3 AIA Document A201™–2017, General Conditions of the Contract for Construction

.4 AIA Document E203™–2013, Building Information Modeling and Digital Data Exhibit, dated as indicated below:
(Insert the date of the E203-2013 incorporated into this Agreement.)

« »

.5 Drawings

Number	Title	Date

.6 Specifications

Section	Title	Date	Pages

.7 Addenda, if any:

Number	Date	Pages

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

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

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

« »

[« »] The Sustainability Plan:

Title	Date	Pages

[« »] Supplementary and other Conditions of the Contract:

Document	Title	Date	Pages

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

« »

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 00 60 00

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

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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)

«Union Baptist Church of Hartford»«»
«1921 Main Street
Hartford, CT 06120
»

CONSTRUCTION CONTRACT
Date: « »
Amount: $ «0.00»
Description:
(Name and location)

«Union Baptist Church Slate Roof Renovations»
«1921 Main Street
Hartford, CT 06120
»

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:)

«»
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«»

ADDITIONS AND DELETIONS: The author of this document has added information needed for its completion. The author may also have revised the text of the original AIA standard form. An *Additions and Deletions Report* that notes added information as well as revisions to the standard form text is available from the author and should be reviewed.

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.

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§ 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)

« Union Baptist Church of Hartford»«»
«1921 Main Street
Hartford, CT 06120
»

CONSTRUCTION CONTRACT
Date: « »
Amount: $ «0.00»
Description:
(Name and location)

««Union Baptist Church Slate Roof Renovations»
«1921 Main Street
Hartford, CT 06120
»

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:)*
« » « » « »	«» «» «» «» «» «»

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.

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§ 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 (2017 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® – 2017

General Conditions of the Contract for Construction

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

« Union Baptist Church Slate Roof Renovations»
« 1921 Main Street
Hartford, CT 06120
»

THE OWNER:
(Name, legal status and address)

«Union Baptist Church of Hartford»«»
«1921 Main Street
Hartford, CT 06120
»

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.

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

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

§ 1.2 Correlation and Intent of the Contract Documents

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

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

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

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

§ 1.3 Capitalization

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

§ 1.4 Interpretation

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

§ 1.5 Ownership and Use of Drawings, Specifications, and Other Instruments of Service

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

§ 1.5.2 The Contractor, Subcontractors, Sub-subcontractors, and suppliers are authorized to use and reproduce the Instruments of Service provided to them, subject to any protocols established pursuant to Sections 1.7 and 1.8, solely and exclusively for execution of the Work. All copies made under this authorization shall bear the copyright notice, if any, shown on the Instruments of Service. The Contractor, Subcontractors, Sub-subcontractors, and suppliers may not use the Instruments of Service on other projects or for additions to the Project outside the scope of the Work without the specific written consent of the Owner, Architect, and the Architect's consultants.

§ 1.6 Notice

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

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

§ 1.7 Digital Data Use and Transmission

The parties shall agree upon protocols governing the transmission and use of Instruments of Service or any other information or documentation in digital form. The parties will use AIA Document E203™–2013, Building Information Modeling and Digital Data Exhibit, to establish the protocols for the development, use, transmission, and exchange of digital data.

§ 1.8 Building Information Models Use and Reliance

Any use of, or reliance on, all or a portion of a building information model without agreement to protocols governing the use of, and reliance on, the information contained in the model and without having those protocols set forth in AIA Document E203™–2013, Building Information Modeling and Digital Data Exhibit, and the requisite AIA Document G202™–2013, Project Building Information Modeling Protocol Form, shall be at the using or

relying party's sole risk and without liability to the other party and its contractors or consultants, the authors of, or contributors to, the building information model, and each of their agents and employees.

ARTICLE 2 OWNER

§ 2.1 General

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

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

§ 2.2 Evidence of the Owner's Financial Arrangements

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

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

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

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

§ 2.3 Information and Services Required of the Owner

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

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

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

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

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

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

§ 2.4 Owner's Right to Stop the Work

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

§ 2.5 Owner's Right to Carry Out the Work

If the Contractor defaults or neglects to carry out the Work in accordance with the Contract Documents and fails within a ten-day period after receipt of notice from the Owner to commence and continue correction of such default or neglect with diligence and promptness, the Owner may, without prejudice to other remedies the Owner may have, correct such default or neglect. Such action by the Owner and amounts charged to the Contractor are both subject to prior approval of the Architect and the Architect may, pursuant to Section 9.5.1, withhold or nullify a Certificate for Payment in whole or in part, to the extent reasonably necessary to reimburse the Owner for the reasonable cost of correcting such deficiencies, including Owner's expenses and compensation for the Architect's additional services made necessary by such default, neglect, or failure. If current and future payments are not sufficient to cover such amounts, the Contractor shall pay the difference to the Owner. If the Contractor disagrees with the actions of the Owner or the Architect, or the amounts claimed as costs to the Owner, the Contractor may file a Claim pursuant to Article 15.

ARTICLE 3 CONTRACTOR

§ 3.1 General

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

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

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

§ 3.2 Review of Contract Documents and Field Conditions by Contractor

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

§ 3.2.2 Because the Contract Documents are complementary, the Contractor shall, before starting each portion of the Work, carefully study and compare the various Contract Documents relative to that portion of the Work, as well as

the information furnished by the Owner pursuant to Section 2.3.4, shall take field measurements of any existing conditions related to that portion of the Work, and shall observe any conditions at the site affecting it. These obligations are for the purpose of facilitating coordination and construction by the Contractor and are not for the purpose of discovering errors, omissions, or inconsistencies in the Contract Documents; however, the Contractor shall promptly report to the Architect any errors, inconsistencies or omissions discovered by or made known to the Contractor as a request for information in such form as the Architect may require. It is recognized that the Contractor's review is made in the Contractor's capacity as a contractor and not as a licensed design professional, unless otherwise specifically provided in the Contract Documents.

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

§ 3.2.4 If the Contractor believes that additional cost or time is involved because of clarifications or instructions the Architect issues in response to the Contractor's notices or requests for information pursuant to Sections 3.2.2 or 3.2.3, the Contractor shall submit Claims as provided in Article 15. If the Contractor fails to perform the obligations of Sections 3.2.2 or 3.2.3, the Contractor shall pay such costs and damages to the Owner, subject to Section 15.1.7, as would have been avoided if the Contractor had performed such obligations. If the Contractor performs those obligations, the Contractor shall not be liable to the Owner or Architect for damages resulting from errors, inconsistencies or omissions in the Contract Documents, for differences between field measurements or conditions and the Contract Documents, or for nonconformities of the Contract Documents to applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities.

§ 3.3 Supervision and Construction Procedures

§ 3.3.1 The Contractor shall supervise and direct the Work, using the Contractor's best skill and attention. 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. If the Contract Documents give specific instructions concerning construction means, methods, techniques, sequences, or procedures, the Contractor shall evaluate the jobsite safety thereof and shall be solely responsible for the jobsite safety of such means, methods, techniques, sequences, or procedures. If the Contractor determines that such means, methods, techniques, sequences or procedures may not be safe, the Contractor shall give timely notice to the Owner and Architect, and shall propose alternative means, methods, techniques, sequences, or procedures. The Architect shall evaluate the proposed alternative solely for conformance with the design intent for the completed construction. Unless the Architect objects to the Contractor's proposed alternative, the Contractor shall perform the Work using its alternative means, methods, techniques, sequences, or procedures.

§ 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 approved by the Architect in accordance with Section 3.12.8 or ordered by the Architect in accordance with Section 7.4, the Contractor may make substitutions only with the consent of the Owner, after evaluation by the Architect and in accordance with a Change Order or Construction Change Directive.

§ 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

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

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

§ 3.6 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 14 days after first observance of the conditions. The Architect will promptly investigate such conditions and, if the Architect determines that they differ materially and cause an increase or decrease in the Contractor's cost of, or time required for, performance of any part of the Work, will recommend that an equitable adjustment be made in the Contract Sum or Contract Time, or both. If the Architect determines that the conditions at the site are not materially different from those indicated in the Contract Documents and that no change in the terms of the Contract is justified, the Architect shall promptly notify the Owner and Contractor, stating the reasons. If either party disputes the Architect's determination or recommendation, that party may submit a Claim as provided in Article 15.

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

§ 3.8 Allowances

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

§ 3.8.2 Unless otherwise provided in the Contract Documents,

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

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

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

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

§ 3.9 Superintendent

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

§ 3.9.2 The Contractor, as soon as practicable after award of the Contract, shall notify the Owner and Architect of the name and qualifications of a proposed superintendent. Within 14 days of receipt of the information, the Architect may notify the Contractor, stating whether the Owner or the Architect (1) has reasonable objection to the proposed superintendent or (2) requires additional time for review. Failure of the Architect to provide notice within the 14-day period shall constitute notice of no reasonable objection.

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

§ 3.10 Contractor's Construction and Submittal Schedules

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

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

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

§ 3.11 Documents and Samples at the Site

The Contractor shall make available, at the Project site, the Contract Documents, including Change Orders, Construction Change Directives, and other Modifications, in good order and marked currently to indicate field changes and selections made during construction, and the approved Shop Drawings, Product Data, Samples, and

similar required submittals. These shall be in electronic form or paper copy, available to the Architect and Owner, and delivered to the Architect for submittal to the Owner upon completion of the Work as a record of the Work as constructed.

§ 3.12 Shop Drawings, Product Data and Samples

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

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

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

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

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

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

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

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

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

§ 3.12.10 The Contractor shall not be required to provide professional services that constitute the practice of architecture or engineering unless such services are specifically required by the Contract Documents for a portion of the Work or unless the Contractor needs to provide such services in order to carry out the Contractor's responsibilities for construction means, methods, techniques, sequences, and procedures. The Contractor shall not be required to provide professional services in violation of applicable law.

§ 3.12.10.1 If professional design services or certifications by a design professional related to systems, materials, or equipment are specifically required of the Contractor by the Contract Documents, the Owner and the Architect will

specify all performance and design criteria that such services must satisfy. The Contractor shall be entitled to rely upon the adequacy and accuracy of the performance and design criteria provided in the Contract Documents. The Contractor shall cause such services or certifications to be provided by an appropriately licensed design professional, whose signature and seal shall appear on all drawings, calculations, specifications, certifications, Shop Drawings, and other submittals prepared by such professional. Shop Drawings, and other submittals related to the Work, designed or certified by such professional, if prepared by others, shall bear such professional's written approval when submitted to the Architect. The Owner and the Architect shall be entitled to rely upon the adequacy and accuracy of the services, certifications, and approvals performed or provided by such design professionals, provided the Owner and Architect have specified to the Contractor the performance and design criteria that such services must satisfy. Pursuant to this Section 3.12.10, the Architect will review and approve or take other appropriate action on submittals only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents.

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

§ 3.13 Use of Site

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

§ 3.14 Cutting and Patching

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

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

§ 3.15 Cleaning Up

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

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

§ 3.16 Access to Work

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

§ 3.17 Royalties, Patents and Copyrights

The Contractor shall pay all royalties and license fees. The Contractor shall defend suits or claims for infringement of copyrights and patent rights and shall hold the Owner and Architect harmless from loss on account thereof, but shall not be responsible for 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 an infringement of a copyright or patent is discovered by, or made known to, the Contractor, the Contractor shall be responsible for the loss unless the 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 Architect is the person or entity retained by the Owner pursuant to Section 2.3.2 and identified as such in the Agreement.

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

§ 4.2 Administration of the Contract

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

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

§ 4.2.3 On the basis of the site visits, the Architect will keep the Owner reasonably informed about the progress and quality of the portion of the Work completed, and promptly report to the Owner (1) known deviations from the Contract Documents, (2) known deviations from the most recent construction schedule submitted by the Contractor, and (3) defects and deficiencies observed in the Work. The Architect will not be responsible for the Contractor's failure to perform the Work in accordance with the requirements of the Contract Documents. The Architect will not have control over or charge of, and will not be responsible for acts or omissions of, the Contractor, Subcontractors, or their agents or employees, or any other persons or entities performing portions of the Work.

§ 4.2.4 Communications

The Owner and Contractor shall include the Architect in all communications that relate to or affect the Architect's services or professional responsibilities. The Owner shall promptly notify the Architect of the substance of any direct communications between the Owner and the Contractor otherwise relating to the Project. Communications by and with the Architect's consultants shall be through the Architect. Communications by and with Subcontractors and suppliers shall be through the Contractor. Communications by and with Separate Contractors shall be through the Owner. The Contract Documents may specify other communication protocols.

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

§ 4.2.6 The Architect has authority to reject Work that does not conform to the Contract Documents. Whenever the Architect considers it necessary or advisable, the Architect will have authority to require inspection or testing of the Work in accordance with Sections 13.4.2 and 13.4.3, whether or not the Work is fabricated, installed or completed. However, neither this authority of the Architect nor a decision made in good faith either to exercise or not to exercise such authority shall give rise to a duty or responsibility of the Architect to the Contractor, Subcontractors, suppliers, their agents or employees, or other persons or entities performing portions of the Work.

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

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

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

§ 4.2.10 If the Owner and Architect agree, the Architect will provide one or more Project representatives to assist in carrying out the Architect's responsibilities at the site. The Owner shall notify the Contractor of any change in the duties, responsibilities and limitations of authority of the Project representatives.

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

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

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

§ 4.2.14 The Architect will review and respond to requests for information about the Contract Documents. The Architect's response to such requests will be made in writing within 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 the subcontractors of a Separate Contractor.

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

§ 5.2 Award of Subcontracts and Other Contracts for Portions of the Work

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

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

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

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

§ 5.3 Subcontractual Relations

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

§ 5.4 Contingent Assignment of Subcontracts

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

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

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

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

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

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

ARTICLE 6 CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS

§ 6.1 Owner's Right to Perform Construction and to Award Separate Contracts

§ 6.1.1 The term "Separate Contractor(s)" shall mean other contractors retained by the Owner under separate agreements. The Owner reserves the right to perform construction or operations related to the Project with the Owner's own forces, and with Separate Contractors retained under Conditions of the Contract substantially similar to those of this Contract, including those provisions of the Conditions of the Contract related to insurance and waiver of subrogation.

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

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

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

§ 6.2 Mutual Responsibility

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

§ 6.2.2 If part of the Contractor's Work depends for proper execution or results upon construction or operations by the Owner or a Separate Contractor, the Contractor shall, prior to proceeding with that portion of the Work, promptly notify the Architect of apparent discrepancies or defects in the construction or operations by the Owner or Separate Contractor that would render it unsuitable for proper execution and results of the Contractor's Work. Failure of the Contractor to notify the Architect of apparent discrepancies or defects prior to proceeding with the Work shall constitute an acknowledgment that the Owner's or Separate Contractor's completed or partially completed construction is fit and proper to receive the Contractor's Work. The Contractor shall not be responsible for discrepancies or defects in the construction or operations by the Owner or Separate Contractor that are not apparent.

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

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

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

§ 6.3 Owner's Right to Clean Up

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

ARTICLE 7 CHANGES IN THE WORK

§ 7.1 General

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

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

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

§ 7.2 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 7.3.4.

§ 7.3.4 If the Contractor does not respond promptly or disagrees with the method for adjustment in the Contract Sum, the Architect shall determine the adjustment on the basis of reasonable expenditures and savings of those performing the Work attributable to the change, including, in case of an increase in the Contract Sum, an amount for overhead and profit as set forth in the Agreement, or if no such amount is set forth in the Agreement, a reasonable amount. In such case, and also under Section 7.3.3.3, the Contractor shall keep and present, in such form as the Architect may prescribe, an itemized accounting together with appropriate supporting data. Unless otherwise provided in the Contract Documents, costs for the purposes of this Section 7.3.4 shall be limited to the following:

.1 Costs of labor, including applicable payroll taxes, fringe benefits required by agreement or custom, workers' compensation insurance, and other employee costs approved by the Architect;

.2 Costs of materials, supplies, and equipment, including cost of transportation, whether incorporated or consumed;
.3 Rental costs of machinery and equipment, exclusive of hand tools, whether rented from the Contractor or others;
.4 Costs of premiums for all bonds and insurance, permit fees, and sales, use, or similar taxes, directly related to the change; and
.5 Costs of supervision and field office personnel directly attributable to the change.

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

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

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

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

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

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

§ 7.4 Minor Changes in the Work

The Architect may order minor changes in the Work that are consistent with the intent of the Contract Documents and do not involve an adjustment in the Contract Sum or an extension of the Contract Time. The Architect's order for minor changes shall be in writing. If the Contractor believes that the proposed minor change in the Work will affect the Contract Sum or Contract Time, the Contractor shall notify the Architect and shall not proceed to implement the change in the Work. If the Contractor performs the Work set forth in the Architect's order for a minor change without prior notice to the Architect that such change will affect the Contract Sum or Contract Time, the Contractor waives any adjustment to the Contract Sum or extension of the Contract Time.

ARTICLE 8 TIME

§ 8.1 Definitions

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

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

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

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

§ 8.2 Progress and Completion

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

§ 8.2.2 The Contractor shall not knowingly, except by agreement or instruction of the Owner in writing, commence the Work prior to the effective date of insurance required to be furnished by the Contractor and Owner.

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

§ 8.3 Delays and Extensions of Time

§ 8.3.1 If the Contractor is delayed at any time in the commencement or progress of the Work by (1) an act or neglect of the Owner or Architect, of an employee of either, or of a Separate Contractor; (2) by changes ordered in the Work; (3) by labor disputes, fire, unusual delay in deliveries, unavoidable casualties, adverse weather conditions documented in accordance with Section 15.1.6.2, or other causes beyond the Contractor's control; (4) by delay authorized by the Owner pending mediation and binding dispute resolution; or (5) by other causes that the Contractor asserts, and the Architect determines, justify delay, then the Contract Time shall be extended for such reasonable time as the Architect may determine.

§ 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

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

§ 9.1.2 If unit prices are stated in the Contract Documents or subsequently agreed upon, and if quantities originally contemplated are materially changed so that application of such unit prices to the actual quantities causes substantial inequity to the Owner or Contractor, the applicable unit prices shall be equitably adjusted.

§ 9.2 Schedule of Values

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

§ 9.3 Applications for Payment

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

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

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

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

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

§ 9.4 Certificates for Payment

§ 9.4.1 The Architect will, within seven days after receipt of the Contractor's Application for Payment, either (1) issue to the Owner a Certificate for Payment in the full amount of the Application for Payment, with a copy to the Contractor; or (2) issue to the Owner a Certificate for Payment for such amount as the Architect determines is properly due, and notify the Contractor and Owner of the Architect's reasons for withholding certification in part as provided in Section 9.5.1; or (3) withhold certification of the entire Application for Payment, and notify the Contractor and Owner of the Architect's reason for withholding certification in whole as provided in Section 9.5.1.

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

§ 9.5 Decisions to Withhold Certification

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

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

.7 repeated failure to carry out the Work in accordance with the Contract Documents.

§ 9.5.2 When either party disputes the Architect's decision regarding a Certificate for Payment under Section 9.5.1, in whole or in part, that party may submit a Claim in accordance with Article 15.

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

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

§ 9.6 Progress Payments

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

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

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

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

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

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

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

§ 9.6.8 Provided the Owner has fulfilled its payment obligations under the Contract Documents, the Contractor shall defend and indemnify the Owner from all loss, liability, damage or expense, including reasonable attorney's fees and litigation expenses, arising out of any lien claim or other claim for payment by any Subcontractor or supplier of any tier. Upon receipt of notice of a lien claim or other claim for payment, the Owner shall notify the Contractor. If approved by the applicable court, when required, the Contractor may substitute a surety bond for the property against which the lien or other claim for payment has been asserted.

§ 9.7 Failure of Payment

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

§ 9.8 Substantial Completion

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

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

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

§ 9.9 Partial Occupancy or Use

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

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

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

§ 9.10 Final Completion and Final Payment

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

§ 9.10.2 Neither final payment nor any remaining retained percentage shall become due until the Contractor submits to the Architect (1) an affidavit that payrolls, bills for materials and equipment, and other indebtedness connected with the Work for which the Owner or the Owner's property might be responsible or encumbered (less amounts withheld by Owner) have been paid or otherwise satisfied, (2) a certificate evidencing that insurance required by the Contract Documents to remain in force after final payment is currently in effect, (3) a written statement that the Contractor knows of no reason that the insurance will not be renewable to cover the period required by the Contract Documents, (4) consent of surety, if any, to final payment, (5) documentation of any special warranties, such as manufacturers' warranties or specific Subcontractor warranties, and (6) if required by the Owner, other data establishing payment or satisfaction of obligations, such as receipts and releases and waivers of liens, claims, security interests, or encumbrances arising out of the Contract, to the extent and in such form as may be designated by the Owner. If a Subcontractor refuses to furnish a release or waiver required by the Owner, the Contractor may furnish a bond satisfactory to the Owner to indemnify the Owner against such lien, claim, security interest, or encumbrance. If a lien, claim, security interest, or encumbrance remains unsatisfied after payments are made, the Contractor shall refund to the Owner all money that the Owner may be compelled to pay in discharging the lien, claim, security interest, or encumbrance, including all costs and reasonable attorneys' fees.

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

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

.1 liens, Claims, security interests, or encumbrances arising out of the Contract and unsettled;
.2 failure of the Work to comply with the requirements of the Contract Documents;
.3 terms of special warranties required by the Contract Documents; or
.4 audits performed by the Owner, if permitted by the Contract Documents, after final payment.

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

ARTICLE 10 PROTECTION OF PERSONS AND PROPERTY

§ 10.1 Safety Precautions and Programs

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

§ 10.2 Safety of Persons and Property

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

.1 employees on the Work and other persons who may be affected thereby;

.2 the Work and materials and equipment to be incorporated therein, whether in storage on or off the site, under care, custody, or control of the Contractor, a Subcontractor, or a Sub-subcontractor; and

.3 other property at the site or adjacent thereto, such as trees, shrubs, lawns, walks, pavements, roadways, structures, and utilities not designated for removal, relocation, or replacement in the course of construction.

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

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

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

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

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

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

§ 10.2.8 Injury or Damage to Person or Property

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

§ 10.3 Hazardous Materials and Substances

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

§ 10.3.2 Upon receipt of the Contractor's notice, the Owner shall obtain the services of a licensed laboratory to verify the presence or absence of the material or substance reported by the Contractor and, in the event such material or substance is found to be present, to cause it to be rendered harmless. Unless otherwise required by the Contract Documents, the Owner shall furnish in writing to the Contractor and Architect the names and qualifications of persons or entities who are to perform tests verifying the presence or absence of the material or substance or who are to perform the task of removal or safe containment of the material or substance. The Contractor and the Architect will promptly reply to the Owner in writing stating whether or not either has reasonable objection to the persons or entities proposed by the Owner. If either the Contractor or Architect has an objection to a person or entity proposed

by the Owner, the Owner shall propose another to whom the Contractor and the Architect have no reasonable objection. When the material or substance has been rendered harmless, Work in the affected area shall resume upon written agreement of the Owner and Contractor. By Change Order, the Contract Time shall be extended appropriately and the Contract Sum shall be increased by the amount of the Contractor's reasonable additional costs of shutdown, delay, and start-up.

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

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

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

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

§ 10.4 Emergencies

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

ARTICLE 11 INSURANCE AND BONDS

§ 11.1 Contractor's Insurance and Bonds

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

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

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

§ 11.1.4 Notice of Cancellation or Expiration of Contractor's Required Insurance. Within three (3) business days of the date the Contractor becomes aware of an impending or actual cancellation or expiration of any insurance required by the Contract Documents, the Contractor shall provide notice to the Owner of such impending or actual cancellation or expiration. Upon receipt of notice from the Contractor, the Owner shall, unless the lapse in coverage arises from an act or omission of the Owner, have the right to stop the Work until the lapse in coverage has been cured by the

procurement of replacement coverage by the Contractor. The furnishing of notice by the Contractor shall not relieve the Contractor of any contractual obligation to provide any required coverage.

§ 11.2 Owner's Insurance

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

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

§ 11.2.3 Notice of Cancellation or Expiration of Owner's Required Property Insurance. Within three (3) business days of the date the Owner becomes aware of an impending or actual cancellation or expiration of any property insurance required by the Contract Documents, the Owner shall provide notice to the Contractor of such impending or actual cancellation or expiration. Unless the lapse in coverage arises from an act or omission of the Contractor: (1) the Contractor, upon receipt of notice from the Owner, shall have the right to stop the Work until the lapse in coverage has been cured by the procurement of replacement coverage by either the Owner or the Contractor; (2) the Contract Time and Contract Sum shall be equitably adjusted; and (3) the Owner waives all rights against the Contractor, Subcontractors, and Sub-subcontractors to the extent any loss to the Owner would have been covered by the insurance had it not expired or been cancelled. If the Contractor purchases replacement coverage, the cost of the insurance shall be charged to the Owner by an appropriate Change Order. The furnishing of notice by the Owner shall not relieve the Owner of any contractual obligation to provide required insurance.

§ 11.3 Waivers of Subrogation

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

§ 11.3.2 If during the Project construction period the Owner insures properties, real or personal or both, at or adjacent to the site by property insurance under policies separate from those insuring the Project, or if after final payment property insurance is to be provided on the completed Project through a policy or policies other than those insuring the Project during the construction period, to the extent permissible by such policies, the Owner waives all rights in accordance with the terms of Section 11.3.1 for damages caused by fire or other causes of loss covered by this separate property insurance.

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

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

§11.5 Adjustment and Settlement of Insured Loss

§ 11.5.1 A loss insured under the property insurance required by the Agreement shall be adjusted by the Owner as fiduciary and made payable to the Owner as fiduciary for the insureds, as their interests may appear, subject to requirements of any applicable mortgagee clause and of Section 11.5.2. The Owner shall pay the Architect and Contractor their just shares of insurance proceeds received by the Owner, and by appropriate agreements the Architect and Contractor shall make payments to their consultants and Subcontractors in similar manner.

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

ARTICLE 12 UNCOVERING AND CORRECTION OF WORK

§ 12.1 Uncovering of Work

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

§ 12.1.2 If a portion of the Work has been covered that the Architect has not specifically requested to examine prior to its being covered, the Architect may request to see such Work and it shall be uncovered by the Contractor. If such Work is in accordance with the Contract Documents, the Contractor shall be entitled to an equitable adjustment to the Contract Sum and Contract Time as may be appropriate. If such Work is not in accordance with the Contract Documents, the costs of uncovering the Work, and the cost of correction, shall be at the Contractor's expense.

§ 12.2 Correction of Work

§ 12.2.1 Before Substantial Completion

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

§ 12.2.2 After Substantial Completion

§ 12.2.2.1 In addition to the Contractor's obligations under Section 3.5, if, within one year after the date of Substantial Completion of the Work or designated portion thereof or after the date for commencement of warranties established under Section 9.9.1, or by terms of any applicable special warranty required by the Contract Documents, any of the Work is found to be not in accordance with the requirements of the Contract Documents, the Contractor shall correct it promptly after receipt of notice from the Owner to do so, unless the Owner has previously given the Contractor a written acceptance of such condition. The Owner shall give such notice promptly after discovery of the condition. During the one-year period for correction of Work, if the Owner fails to notify the Contractor and give the Contractor an opportunity to make the correction, the Owner waives the rights to require correction by the Contractor and to make a claim for breach of warranty. If the Contractor fails to correct nonconforming Work within a reasonable time during that period after receipt of notice from the Owner or Architect, the Owner may correct it in accordance with Section 2.5.

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

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

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

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

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

§ 12.3 Acceptance of Nonconforming Work

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

ARTICLE 13 MISCELLANEOUS PROVISIONS

§ 13.1 Governing Law

The Contract shall be governed by the law of the place where the Project is located, excluding that jurisdiction's choice of law rules. 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 an assignment without such consent, that party shall nevertheless remain legally responsible for all obligations under the Contract.

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

§ 13.3 Rights and Remedies

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

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

§ 13.4 Tests and Inspections

§ 13.4.1 Tests, inspections, and approvals of portions of the Work shall be made as required by the Contract Documents and by applicable laws, statutes, ordinances, codes, rules, and regulations or lawful orders of public authorities. Unless otherwise provided, the Contractor shall make arrangements for such tests, inspections, and approvals with an independent testing laboratory or entity acceptable to the Owner, or with the appropriate public authority, and shall bear all related costs of tests, inspections, and approvals. The Contractor shall give the Architect

timely notice of when and where tests and inspections are to be made so that the Architect may be present for such procedures. The Owner shall bear costs of tests, inspections, or approvals that do not become requirements until after bids are received or negotiations concluded. The Owner shall directly arrange and pay for tests, inspections, or approvals where building codes or applicable laws or regulations so require.

§ 13.4.2 If the Architect, Owner, or public authorities having jurisdiction determine that portions of the Work require additional testing, inspection, or approval not included under Section 13.4.1, the Architect will, upon written authorization from the Owner, instruct the Contractor to make arrangements for such additional testing, inspection, or approval, by an entity acceptable to the Owner, and the Contractor shall give timely notice to the Architect of when and where tests and inspections are to be made so that the Architect may be present for such procedures. Such costs, except as provided in Section 13.4.3, shall be at the Owner's expense.

§ 13.4.3 If procedures for testing, inspection, or approval under Sections 13.4.1 and 13.4.2 reveal failure of the portions of the Work to comply with requirements established by the Contract Documents, all costs made necessary by such failure, including those of repeated procedures and compensation for the Architect's services and expenses, shall be at the Contractor's expense.

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

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

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

§ 13.5 Interest

Payments due and unpaid under the Contract Documents shall bear interest from the date payment is due at the rate the parties 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.

ARTICLE 14 TERMINATION OR SUSPENSION OF THE CONTRACT

§ 14.1 Termination by the Contractor

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

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

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

.3 Because the Architect has not issued a Certificate for Payment and has not notified the Contractor 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 reasonable evidence as required by Section 2.2.

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

§ 14.1.3 If one of the reasons described in Section 14.1.1 or 14.1.2 exists, the Contractor may, upon seven days' notice to the Owner and Architect, terminate the Contract and recover from the Owner payment for Work executed, as well as reasonable overhead and profit on Work not executed, and costs incurred by reason of such termination.

§ 14.1.4 If the Work is stopped for a period of 60 consecutive days through no act or fault of the Contractor, a Subcontractor, a Sub-subcontractor, or their agents or employees or any other persons or entities performing portions of the Work 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' 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 or suppliers in accordance with the respective agreements between the Contractor and the Subcontractors or suppliers;

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

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

§ 14.2.2 When any of the reasons described in Section 14.2.1 exist, and upon certification by the Architect that sufficient cause exists to justify such action, the Owner may, without prejudice to any other rights or remedies of the Owner and after giving the Contractor and the Contractor's surety, if any, seven days' notice, terminate employment of the Contractor and may, subject to any prior rights of the surety:

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

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

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

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

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

§ 14.3 Suspension by the Owner for Convenience

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

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

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

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

§ 14.4 Termination by the Owner for Convenience

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

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

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

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

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

§ 14.4.3 In case of such termination for the Owner's convenience, the Owner shall pay the Contractor for Work

properly executed; costs incurred by reason of the termination, including costs attributable to termination of Subcontracts; and the termination fee, if any, set forth in the Agreement.

ARTICLE 15 CLAIMS AND DISPUTES

§ 15.1 Claims

§ 15.1.1 Definition

A Claim is a demand or assertion by one of the parties seeking, as a matter of right, payment of money, a change in the Contract Time, or other relief with respect to the terms of the Contract. The term "Claim" also includes other disputes and matters in question between the Owner and Contractor arising out of or relating to the Contract. The responsibility to substantiate Claims shall rest with the party making the Claim. This Section 15.1.1 does not require the Owner to file a Claim in order to impose liquidated damages in accordance with the Contract Documents.

§ 15.1.2 Time Limits on Claims

The Owner and Contractor shall commence all Claims and causes of action against the other and arising out of or related to the Contract, whether in contract, tort, breach of warranty or otherwise, in accordance with the requirements of the binding dispute resolution method selected in the Agreement and within the period specified by applicable law, but in any case not more than 10 years after the date of Substantial Completion of the Work. The Owner and Contractor waive all Claims and causes of action not commenced in accordance with this Section 15.1.2.

§ 15.1.3 Notice of Claims

§ 15.1.3.1 Claims by either the Owner or Contractor, where the condition giving rise to the Claim is first discovered prior to expiration of the period for correction of the Work set forth in Section 12.2.2, shall be initiated by 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 under this Section 15.1.3.1 shall be initiated within 21 days after occurrence of the event giving rise to such Claim or within 21 days after the claimant first recognizes the condition giving rise to the Claim, whichever is later.

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

§ 15.1.4 Continuing Contract Performance

§ 15.1.4.1 Pending final resolution of a Claim, except as otherwise agreed in writing or as provided in Section 9.7 and Article 14, the Contractor shall proceed diligently with performance of the Contract and the Owner shall continue to make payments in accordance with the Contract Documents.

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

§ 15.1.5 Claims for Additional Cost

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

§ 15.1.6 Claims for Additional Time

§ 15.1.6.1 If the Contractor wishes to make a Claim for an increase in the Contract Time, notice as provided in Section 15.1.3 shall be given. The Contractor's Claim shall include an estimate of cost and of probable effect of delay on progress of the Work. In the case of a continuing delay, only one Claim is necessary.

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

§ 15.1.7 Waiver of Claims for Consequential Damages

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

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

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

This mutual waiver is applicable, without limitation, to all consequential damages due to either party's termination in accordance with Article 14. Nothing contained in this Section 15.1.7 shall be deemed to preclude assessment of liquidated damages, when applicable, in accordance with the requirements of the Contract Documents.

§ 15.2 Initial Decision

§ 15.2.1 Claims, excluding those where the condition giving rise to the Claim is first discovered after expiration of the period for correction of the Work set forth in Section 12.2.2 or arising under Sections 10.3, 10.4, and 11.5, shall be referred to the Initial Decision Maker for initial decision. The Architect will serve as the Initial Decision Maker, unless 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. If an initial decision has not been rendered within 30 days after the Claim has been referred to the Initial Decision Maker, the party asserting the Claim may demand mediation and binding dispute resolution without a 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 the request, and shall either (1) provide a response on the requested supporting data, (2) advise the Initial Decision Maker when the response or supporting data will be furnished, or (3) advise the Initial Decision Maker that no supporting data will be furnished. Upon receipt of the response or supporting data, if any, the Initial Decision Maker will either reject or approve the Claim in whole or in part.

§ 15.2.5 The Initial Decision Maker will render an initial decision approving or rejecting the Claim, or indicating that the Initial Decision Maker is unable to resolve the Claim. This initial decision shall (1) be in writing; (2) state the reasons therefor; and (3) notify the parties and the Architect, if the Architect is not serving as the Initial Decision Maker, of any change in the Contract Sum or Contract Time or both. 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 receipt of an initial decision, demand in writing that the other party file for mediation. If such a demand is made and the party receiving the demand fails to file for mediation within 30 days after receipt thereof, 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 15.1.7, 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 Either party may, within 30 days from the date that mediation has been concluded without resolution of the dispute or 60 days after mediation has been demanded without resolution of the dispute, demand in writing that the other party file for binding dispute resolution. If such a demand is made and the party receiving the demand fails to file for binding dispute resolution within 60 days after receipt thereof, then both parties waive their rights to binding dispute resolution proceedings with respect to the initial decision.

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

§ 15.4 Arbitration

§ 15.4.1 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. The Arbitration shall be conducted in the place where the Project is located, unless another location is mutually agreed upon. 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 Subject to the rules of the American Arbitration Association or other applicable arbitration rules, either party 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 Subject to the rules of the American Arbitration Association or other applicable arbitration rules, either party 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 those of the Owner and Contractor under this Agreement.

DOCUMENT 00 81 10

SUPPLEMENTARY GENERAL CONDITIONS

SUPPLEMENTARY CONDITIONS

These Supplementary Conditions amend or supplement the General Conditions of the Contract for Construction (AIA A201 - 2017 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 2017 Edition) have the meanings assigned to them in the General Conditions.

Supplementary General Conditions in accordance with:

Prevailing Wage Rates
Project Sign Information

END OF SECTION

Prevailing Wages

The General Contractor will be required to submit monthly certified payroll records to the DECD Funding Recipient (Owner) that contain among other items, a signed statement from the employer that (a) the records are correct, (b) the employer met the prevailing wage law's requirements, and (c) the employer understands the penalties for knowingly filing false payroll records. The DECD Funding Recipient (Owner) shall keep records satisfactory to DECD and hold DECD harmless in any disputes regarding Conn. Gen. Stat. Sec. 31-53c.

Please refer to http://www.ctdol.state.ct.us/wgwkstnd/prevailwage.htm for further guidance.

The wages paid on an hourly basis to any person performing the work of any mechanic, laborer or worker on the work herein contracted to be done and the amount of payment or contribution paid or payable on behalf of each such person to any employee welfare fund, as defined in subsection (i) of section 31-53, shall be at a rate equal to the rate customary or prevailing for the same work in the same trade or occupation in the town in which such construction, remodeling, refinishing, refurbishing, rehabilitation, alteration or repair project is being undertaken. Any contractor who is not obligated by agreement to make payment or contribution on behalf of such persons to any such employee welfare fund shall pay to each mechanic, laborer or worker as part of such person's wages the amount of payment or contribution for such person's classification on each pay day.

Project: Union Baptist Church Slate Roof Renovations (Hartford, CT)

Minimum Rates and Classifications for
Building Construction

ID#: 21-26627

Connecticut Department of Labor
Wage and Workplace Standards Division

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

Project Number: Hartford
Project Town: Hartford
State#: Hartford
FAP#: Hartford

Project: Union Baptist Church Slate Roof Renovations (Hartford)

CLASSIFICATION	Hourly Rate	Benefits
1b) Asbestos/Toxic Waste Removal Laborers: Asbestos removal and encapsulation (except its removal from mechanical systems which are not to be scrapped), toxic waste removers, blasters.**See Laborers Group 7**		
1c) Asbestos Worker/Heat and Frost Insulator	43.72	30.99
2) Boilermaker	38.34	26.01
3a) Bricklayer, Cement Mason, Concrete Finisher (including caulking), Stone Masons	36.18	34.59 + a
3b) Tile Setter	34.9	25.87
3c) Terrazzo Mechanics and Marble Setters	31.69	22.35
3d) Tile, Marble & Terrazzo Finishers	26.7	21.75
3e) Plasterer	33.48	32.06
------LABORERS------		
4) Group 1: Laborers (common or general), acetylene burners, concrete specialists, wrecking laborers, fire watchers.	31.5	23.25
4a) Group 2: Mortar mixers, plaster tender, power buggy operators, powdermen, fireproofer/mixer/nozzleman (Person running mixer and spraying fireproof only).	31.75	23.25

As of: September 15, 2021

4b) Group 3: Jackhammer operators/pavement breaker, mason tender (brick), mason tender (cement/concrete), forklift operators and forklift operators (masonry).	32.0	23.25
4c) **Group 4: Pipelayers (Installation of water, storm drainage or sewage lines outside of the building line with P6, P7 license) (the pipelayer rate shall apply only to one or two employees of the total crew who primary task is to actually perform the mating of pipe sections) P6 and P7 rate is $26.80.	32.5	23.25
4d) Group 5: Air track operator, sand blaster and hydraulic drills.	32.25	23.25
4e) Group 6: Blasters, nuclear and toxic waste removal.	34.5	23.25
4f) Group 7: Asbestos/lead removal and encapsulation (except it's removal from mechanical systems which are not to be scrapped).	32.5	23.25
4g) Group 8: Bottom men on open air caisson, cylindrical work and boring crew.	29.78	23.25
4h) Group 9: Top men on open air caisson, cylindrical work and boring crew.	29.24	23.25
4i) Group 10: Traffic Control Signalman	18.0	23.25
5) Carpenter, Acoustical Ceiling Installation, Soft Floor/Carpet Laying, Metal Stud Installation, Form Work and Scaffold Building, Drywall Hanging, Modular-Furniture Systems Installers, Lathers, Piledrivers, Resilient Floor Layers.	35.57	25.65
5a) Millwrights	35.64	26.49
6) Electrical Worker (including low voltage wiring) (Trade License required: E1,2 L-5,6 C-5,6 T-1,2 L-1,2 V-1,2,7,8,9)	40.75	30.47+3% of gross wage
7a) Elevator Mechanic (Trade License required: R-1,2,5,6)	56.96	35.825+a+b
-----LINE CONSTRUCTION----		
Groundman	26.5	6.5% + 9.00
Linemen/Cable Splicer	48.19	6.5% + 22.00
8) Glazier (Trade License required: FG-1,2)	39.98	22.90 + a

9) Ironworker, Ornamental, Reinforcing, Structural, and Precast Concrete Erection	38.17	38.02 + a
----OPERATORS----		
Group 1: Crane handling or erecting structural steel or stone, hoisting engineer 2 drums or over, front end loader (7 cubic yards or over), work boat 26 ft. and over and Tunnel Boring Machines. (Trade License Required)	43.88	25.80 + a
Group 2: Cranes (100 ton rate capacity and over); Excavator over 2 cubic yards; Piledriver ($3.00 premium when operator controls hammer); Bauer Drill/Caisson. (Trade License Required)	43.53	25.80 + a
Group 3: Excavator; Backhoe/Excavator under 2 cubic yards; Cranes (under 100 ton rated capacity), Grader/Blade; Master Mechanic; Hoisting Engineer (all types of equipment where a drum and cable are used to hoist or drag material regardless of motive power of operation), Rubber Tire Excavator (Drott-1085 or similar);Grader Operator; Bulldozer Fine Grade. (slopes, shaping, laser or GPS, etc.). (Trade License Required)	42.72	25.80 + a
Group 4: Trenching Machines; Lighter Derrick; Concrete Finishing Machine; CMI Machine or Similar; Koehring Loader (Skooper).	42.3	25.80 + a
Group 5: Specialty Railroad Equipment; Asphalt Paver; Asphalt Reclaiming Machine; Line Grinder; Concrete Pumps; Drills with Self Contained Power Units; Boring Machine; Post Hole Digger; Auger; Pounder; Well Digger; Milling Machine (over 24	41.65	25.80 + a
Group 5 continued: Side Boom; Combination Hoe and Loader; Directional Driller; Pile Testing Machine.	41.65	25.80 + a
Group 6: Front End Loader (3 up to 7 cubic yards); Bulldozer (rough grade dozer).	41.31	25.80 + a
Group 7: Asphalt roller, concrete saws and cutters (ride on types), vermeer concrete cutter, Stump Grinder; Scraper; Snooper; Skidder; Milling Machine (24	40.94	25.80 + a
Group 8: Mechanic, grease truck operator, hydroblaster; barrier mover; power stone spreader; welding; work boat under 26 ft.; transfer machine.	40.51	25.80 + a
Group 9: Front end loader (under 3 cubic yards), skid steer loader regardless of attachments, (Bobcat or Similar): forklift, power chipper; landscape equipment (including Hydroseeder).	40.04	25.80 + a
Group 10: Vibratory hammer; ice machine; diesel and air, hammer, etc.	37.81	25.80 + a
Group 11: Conveyor, earth roller, power pavement breaker (whiphammer), robot demolition equipment.	37.81	25.80 + a

Group 12: Wellpoint operator.	37.74	25.80 + a
Group 13: Compressor battery operator.	37.11	25.80 + a
Group 14: Elevator operator; tow motor operator (solid tire no rough terrain).	35.87	25.80 + a
Group 15: Generator Operator; Compressor Operator; Pump Operator; Welding Machine Operator; Heater Operator.	35.43	25.80 + a
Group 16: Maintenance Engineer/Oiler.	34.72	25.80 + a
Group 17: Portable asphalt plant operator; portable crusher plant operator; portable concrete plant operator.	39.42	25.80 + a
Group 18: Power safety boat; vacuum truck; zim mixer; sweeper; (Minimum for any job requiring a CDL license).	36.77	25.80 + a
------PAINTERS (Including Drywall Finishing)------		
10a) Brush and Roller	36.42	22.90
10b) Taping Only/Drywall Finishing	37.17	22.90
10c) Paperhanger and Red Label	36.92	22.90
10e) Blast and Spray	39.42	22.90
11) Plumber (excluding HVAC pipe installation) (Trade License required: P-1,2,6,7,8,9 J-1,2,3,4 SP-1,2)	45.83	33.50
12) Well Digger, Pile Testing Machine	37.26	24.05 + a
13) Roofer (composition)	38.5	21.50
14) Roofer (slate & tile)	39.0	21.50
15) Sheetmetal Worker (Trade License required for HVAC and Ductwork: SM-1,SM-2,SM-3,SM-4,SM-5,SM-6)	40.08	41.26
16) Pipefitter (Including HVAC work) (Trade License required: S-1,2,3,4,5,6,7,8 B-1,2,3,4 D-1,2,3,4, G-1, G-2, G-8 & G-9)	45.83	33.50

Project: Windsor Locks Historic Station and Welcome Center Restoration (Windsor Locks)

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

17a) 2 Axle	30.16	27.16 + a
17b) 3 Axle, 2 Axle Ready Mix	30.27	27.16 + a
17c) 3 Axle Ready Mix	30.33	27.16 + a
17d) 4 Axle, Heavy Duty Trailer up to 40 tons	30.39	27.16 + a
17e) 4 Axle Ready Mix	30.44	27.16 + a
17f) Heavy Duty Trailer (40 Tons and Over)	30.66	27.16 + a
17g) Specialized Earth Moving Equipment (Other Than Conventional Type on-the-Road Trucks and Semi-Trailers, Including Euclids)	30.44	27.16 + a
18) Sprinkler Fitter (Trade License required: F-1,2,3,4)	47.55	26.60 + a
19) Theatrical Stage Journeyman	25.76	7.34

Welders: Rate for craft to which welding is incidental.

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

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

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

1) Crane handling or erecting structural steel or stone; hoisting engineer (2 drums or over)
2) Cranes (100 ton rate capacity and over) Bauer Drill/Caisson
3) Cranes (under 100 ton rated capacity)

Crane with 150 ft. boom (including jib) - $1.50 extra
Crane with 200 ft. boom (including jib) - $2.50 extra
Crane with 250 ft. boom (including jib) - $5.00 extra
Crane with 300 ft. boom (including jib) - $7.00 extra
Crane with 400 ft. boom (including jib) - $10.00 extra

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

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

The Prevailing wage rates applicable to this project are subject to annual adjustments each July 1st for the duration of the project.
Each contractor shall pay the annual adjusted prevailing wage rate that is in effect each July 1st, as posted by the Department of Labor.
It is the contractor's responsibility to obtain the annual adjusted prevailing wage rate increases directly from the Department of Labor's website.
The annual adjustments will be posted on the Department of Labor's Web page: www.ct.gov/dol. For those without internet access, please contact the division listed below.
The Department of Labor will continue to issue the initial prevailing wage rate schedule to the Contracting Agency for the project.
All subsequent annual adjustments will be posted on our Web Site for contractor access.
Contracting Agencies are under no obligation pursuant to State labor law to pay any increase due to the annual adjustment provision.

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

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

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

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

As of: September 15, 2021

Project: Windsor Locks Historic Station and Welcome Center Restoration (Windsor Locks)

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

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

As of: September 15, 2021

Important Information:

For use with Building, Heavy/Highway, and Residential

Welders: Rate for craft to which welding is incidental.

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

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

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

1) Crane handling or erecting structural steel or stone; hoisting engineer (2 drums or over)
2) Cranes (100 ton rate capacity and over) Bauer Drill/Caisson
3) Cranes (under 100 ton rated capacity)

Crane with boom including jib, 150 feet - $1.50 extra.

Crane with boom including jib, 200 feet - $2.50 extra.

Crane with boom including jib, 250 feet - $5.00 extra.

Crane with boom including jib, 300 feet - $7.00 extra.

Crane with boom including jib, 400 feet - $10.00 extra.

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

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

Connecticut General Statute Section 31-55a: Annual Adjustments to wage rates by contractors doing state work

- The Prevailing wage rates applicable to this project are subject to annual adjustments each July 1st for the duration of the project.
- Each contractor shall pay the annual adjusted prevailing wage rate that is in effect each July 1st, as posted by the Department of Labor.
- It is the contractor's responsibility to obtain the annual adjusted prevailing wage rate increases directly from the Department of Labor's website.
- The annual adjustments will be posted on the Department of Labor's Web page: www.ctdol.state.ct.us.
- The Department of Labor will continue to issue the initial prevailing wage rate schedule to the Contracting Agency for the project.
- All subsequent annual adjustments will be posted on our Web Site for contractor access.

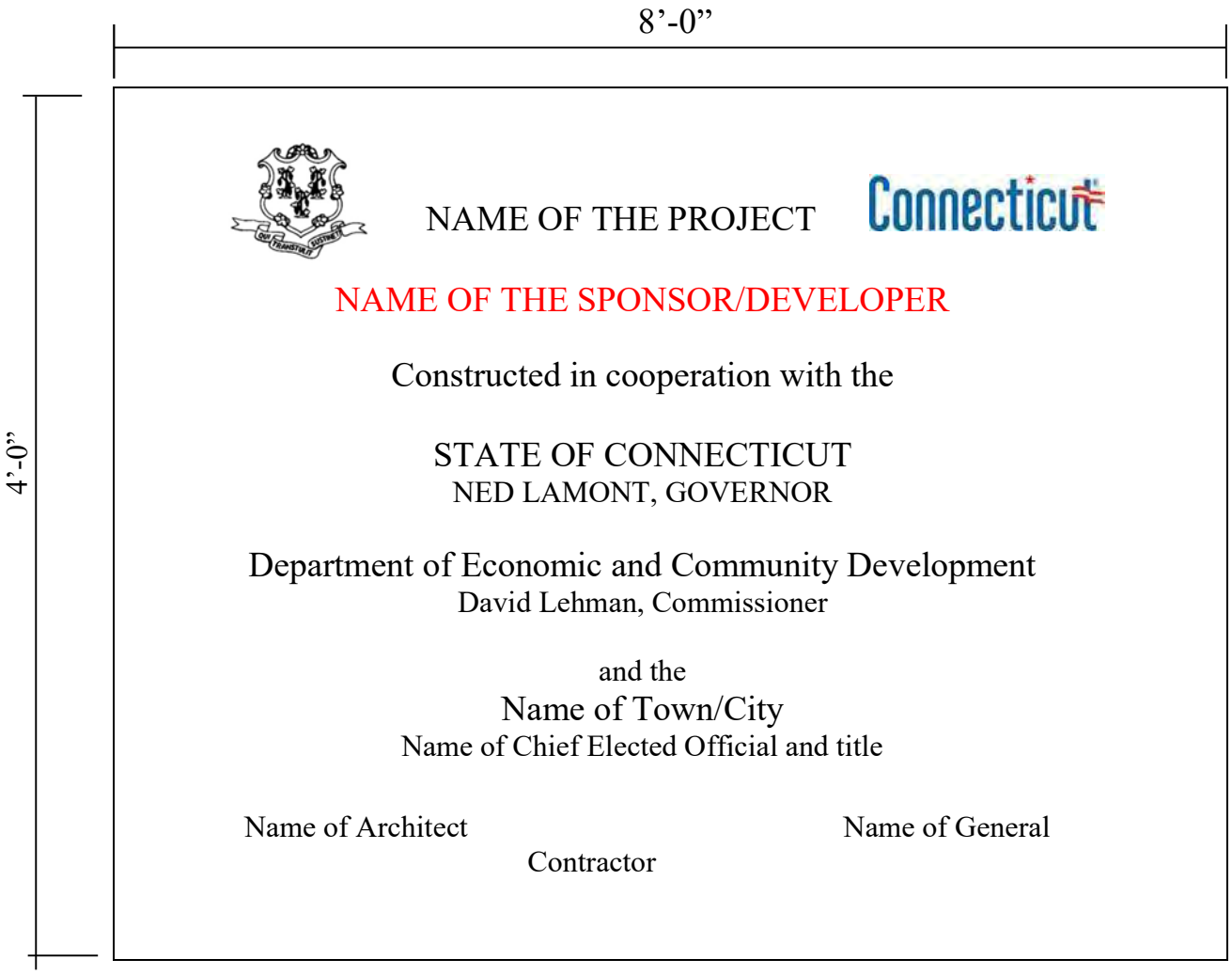
Effective October 1, 2005 - Public Act 05-50: any person performing the work of any mechanic, laborer, or worker shall be paid prevailing wage.

- All Persons who perform work ON SITE must be paid prevailing wage for the appropriate mechanic, laborer, or worker classification.
- All certified payrolls must list the hours worked and wages paid to All Persons who perform work ON SITE regardless of their ownership i.e.: (Owners, Corporate Officers, LLC Members, Independent Contractors, et. al)
- Reporting and payment of wages is required regardless of any contractual relationship alleged to exist between the contractor and such person.

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

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

DEPARTMENT OF ECONOMIC & COMMUNITY DEVELOPMENT
PROJECT SIGN



SIGN PANEL: ¾" MDO-EXT-APA PLYWOOD SUPPORTED WITH (2) 4X4 TREATED WOOD COLUMNS AND SECURED 4' INTO GRADE. TOP OF SIGN AT 8'-0" ABOVE GRADE.

COLORS: ALL LETTERS AND SYMBOLS ARE TO BE ROYAL BLUE. THE BACKGROUND WILL BE WHITE ENAMEL. BACK OF PLYWOOD AND SUPPORT STRUCTURE SHALL BE PAINTED MATTE BLACK.

TYPEFACE: HELVETICA MEDIUM

LOCATION: SIGN MUST BE LOCATED TO BE CLEARLY VISIBLE TO THE PUBLIC.

TIMING: INSTALL AT THE START OF CONSTRUCTION AND REMOVE AT CONSTRUCTION COMPLETION.

STATE SEAL & DECD LOGO: ATTACHED

STATE SEAL

DECD LOGO

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SECTION 01 01 00

SUMMARY OF WORK

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Contract Description.
B. Work Covered by Contract Documents
C. Work Sequence.

1.2 CONTRACT DESCRIPTION

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

1.3 WORK COVERED BY CONTRACT DOCUMENTS

A. The Scope of Work is defined by the Contract Documents and generally consists of the following:
1. Renovation and restoration of the existing slate roofing and flashings.
2. Replacement of low-sloped roofing membrane sections.
3. Restoration and reconstruction of the existing built-in gutters.
4. Refurbishment & replacement of trim at the eaves and gutters of slate-roofed portions of the building.

1.4 WORK SEQUENCE

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

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF SECTION

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SECTION 01 01 90

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 $0.00 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

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SECTION 01 03 90

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

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SECTION 01 12 00

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 01 03 90 - Coordination and Meetings
B. Section 01 50 00 - 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 01 50 00.

END OF SECTION

SECTION 01 21 00

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 00 40 30.

END OF SECTION

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 00 40 20. 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

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SECTION 01 27 00

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)

PART 3 - PRODUCTS

(Not Used)

END OF SECTION

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SECTION 01 30 00

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 01 40 00 - Quality Control: Manufacturers' field services and reports.
B. Section 01 70 00 - Contract Closeout: Contract closeout submittals.

1.03 REFERENCES 0

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

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SECTION 01 40 00

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 01 30 00 - Submittals: Submission of Manufacturers' Instructions and Certificates.
B. Section 01 60 00 - 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. 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.
E. 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.
F. 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.
G. 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 01 50 00

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. 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 connecting 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. Water Utility Fee Cost: By Owner
B. There are (2) existing water hook-ups that will be available for the Contractor's use.
C. Extend branch piping with outlets located so water is available by hoses with threaded connections. Provide temporary pipe insulation to prevent freezing.

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, which is intended 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 EXTERIOR ENCLOSURES

B. Provide temporary roofing as required.

1.09 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.

1.10 SECURITY

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

1.11 ACCESS ROADS

A. Provide and maintain access to fire hydrants, free of obstructions.

1.12 PARKING

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

1.13 PROGRESS CLEANING

A. Maintain areas free of waste materials, debris, and rubbish. Maintain site in a clean and orderly condition.
B. Collect and remove waste materials, debris, and rubbish from site periodically and dispose off-site.
C. Open free fall chutes are not permitted. Terminate closed chutes into appropriate containers with lids.

1.14 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 specifications for sign

template and logos.

C. No other signs are allowed without Owner permission except those required by law.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

END OF SECTION

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SECTION 01 60 00

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 01 40 00 - 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 01 70 00

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

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SECTION 02 07 20

MINOR DEMOLITION FOR REMODELING

PART 1 GENERAL

1.01 WORK INCLUDED

A. Remove all materials necessary to complete the scope of work as shown in the contract documents.

1.02 RELATED WORK

A. Section 01 12 00 - Alteration Project Procedures: Re- installation of removed materials.
B. Section 01 50 00 - Construction Facilities and Temporary Controls: Temporary barriers and enclosures.
C. Section 01 50 00 - Construction Facilities and Temporary Controls: Security.
D. Section 01 50 00 - Construction Facilities and Temporary Controls: Cleaning during construction.
E. Section 01 70 0 0 - Contract Closeout: Project record documents..

1.03 SUBMITTALS

A. Submit demolition and removal procedures and schedule under provisions of Section 01 30 00.

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.

3.02 EXECUTION

A. Demolish in an orderly and careful manner. Protect existing construction to remain.
B. Except where noted otherwise, immediately remove demolished materials from site.
C. Relics, antiques, and similar objects remain the property of the Owner. Notify Architect prior to removal and obtain acceptance regarding method of removal.
D. Remove materials to be re-installed or retained in manner to prevent damage. Store and protect under provisions of Section 01 60 00.
E. Remove and promptly dispose of contaminated, vermin infested, or dangerous materials encountered.
F. Do not burn or bury materials on site.
G. Remove demolished materials from site as work progresses. Upon completion of work, leave areas of work in clean condition.

END OF SECTION

SECTION 02 09 10

LEAD PAINT AWARENESS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. General Provisions of Contract, including General Supplementary Conditions shall apply to this Section.

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 Union Baptist Church (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.

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SECTION 04 01 20

UNIT MASONRY RESTORATION

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. Preliminary cleaning, including removing plant growth.
   6. Cleaning exposed unit masonry surfaces.

B. Related Sections:
   1. Division 1 Section "Special Procedures for Historic Treatment."
   2. Section "Unit Masonry Assemblies" for new clay masonry construction.
   3. Division 7 Section "Water Repellents" for water repellents applied to clay masonry.
   4. Division 7 Section "Sheet Metal Flashing and Trim" for metal flashing installed in or on restored clay masonry.

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 in paragraph below is also called "C/B ratio."

F. 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, 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.

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.

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.
   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.
   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.

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 below only if cleaning precedes repairs and repointing. For this, masonry and joints must be sufficiently sound to prevent water and chemicals from penetrating into building.
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. here 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. Patch holes in masonry units to comply with "Masonry Unit Patching" Article. Patch holes in mortar joints to comply with "Repointing Masonry" Article.

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. Tolerances as Fabricated: Comply with tolerance requirements in ASTM C 216, Type FBX.
   3. 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. For pointing mortar, provide sand with rounded edges.
   2. 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. 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.

B. 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: Comply with ASTM C 270, Proportion Specification, Type N unless otherwise indicated; with cementitious material limited to Portland cement and lime.

PART 3 - EXECUTION

3.1 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.

3.2 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.

3.3 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 brick in 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. When mortar is sufficiently hard to support units, remove shims and other devices interfering with pointing of joints.

3.4 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 with holes.
   2. Units with chipped edges or corners.
   3. 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.

3.5 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.

3.6 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.
      b. **Power Washers are not to be used.** Line pressure water cleaning only.
   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 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.

3.7 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.

3.8 PAINT REMOVAL

A. 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.

3.9 CLEANING BRICKWORK

A. Detergent Cleaning:
    1. 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.
    2. Rinse with cold water applied by low-pressure spray to remove detergent solution and soil.
    3. Repeat cleaning procedure above where required to produce cleaning effect established by mockup.

3.10 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 reviewed 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.

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.

3.11 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.

3.12 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

SECTION 04 01 20.55

REPOINTING MASONRY USING LIME MORTAR

PART 1---GENERAL

1.1 SUMMARY

A. This procedure includes guidance on repointing stone masonry using lime mortar.

B. Repointing is the process of removing deteriorated mortar from a masonry joint and replacing old mortar with new, sound mortar.

C. This process is sometimes referred to as "tuck pointing", though "tuck pointing", is actually a decorative treatment rather than a method of repair. True tuck pointing is the process of adding a finish layer of mortar, occasionally tinted, to the outer portion of a newly laid joint.

D. Major reasons for mortar joint failures include:
1. Weathering action,
2. Settling,
3. Temperature cycles,
4. Poor original design and materials, and
5. Lack of exterior maintenance.

E. See 01 10 07 for general project guidelines to be reviewed along with this procedure. These guidelines cover the following sections:
1. Safety Precautions
2. Historic Structures Precautions
3. Submittals
4. Quality Assurance
5. Delivery, Storage and Handling
6. Project/Site Conditions
7. Sequencing and Scheduling
8. General Protection (Surface and Surrounding)

These guidelines should be reviewed prior to performing this procedure and should be followed, when applicable, along with recommendations from the Regional Historic Preservation Officer (RHPO).

F. For guidance on preparing lime mortar, see 04100-03-S.

1.2 SUBMITTALS

A. Manufacturers' literature describing packaged items.

B. Source and screen analysis of bulk aggregate.

C. Mortar sample: Submit, for verification and approval, a sample of each type of mortar used, in form of 6" long by 1/2" wide sample strips of mortar set in aluminum or plastic channels.
   1. Provide record of mortar mix, composition and field procedures to be followed.

1.3 QUALITY ASSURANCE

A. Mock-ups: Raking and Repointing Sample Work:
   1. Test/Sample Area and RHPO Approval:
      a. Initially perform sample joint raking and repointing on each of a 100 sq. ft. test of stone, brick, and terra cotta areas as approved by RHPO.
      b. Demonstrate proficiency with joint raking tools and ability to not damage masonry units with either hand or power tools.
      c. Mix and cure test batch of repointing mortar and place in joints; repeat test mix until mortar color is approved. Test mortar should be matched, dried and approved before placing in joints.
      d. Demonstrate workmanship of repointing procedures and joint finishing.
      e. Gain written approval from RHPO for test area before proceeding with remaining work.
   2. Joint Raking Method: Rake joints by hand ONLY using special joint cleaning chisels and hammer.
   3. Repointing Method: Repoint joints by hand ONLY using approved pointing trowels. NO "BAGGING" OR CAULKING GUN POINTING METHODS APPROVED.

1.4 PROJECT/SITE CONDITIONS

A. Environmental Conditions: Perform repointing only when the temperature is between 40 degrees Fahrenheit and 80 degrees Fahrenheit. If the temperature is below 40 degrees, the mortar sets too slowly, and there is a good chance of freezing before it fully sets. If the temperature is above 80 degrees, the mortar will set too quickly, and there is a strong chance of excessive loss of water prior to adequate setting.

PART 2---PRODUCTS

2.1 MANUFACTURERS

A. Repointing Tools: Available from good hardware stores, building material suppliers or mail-order catalogues.
   1. The Stanley Gold-blatt Tool Co. http://www.goldblatttool.com/
   2. Marshalltown Trowel Co. https://marshalltown.com/

2.2 MATERIALS

A. Lime mortar (See 04100-03-S for materials and procedures in preparing lime mortar)
B. Clean, potable water

2.3 EQUIPMENT

A. Trowels: range in length from 10-12 inches

B. Chisels:
1. Joint chisels or a standard mason's chisel with a 1-1/2 in. blade and a long narrow handle
2. Floor chisels

C. Hammers:
1. 5# stone dressing hammer
2. 2# striking hammer
3. "No-Bounce" hammer
4. Full size and one-half size brick hammers

D. Joint Tools: (see 2.01 MANUFACTURERS above)
1. 3/8"-1/4" raised beaded tool
2. 3/8"-1/4" beaded striking tool
3. 1/2" raised beaded tool with offset handle
4. 1/2" flat joint iron
5. Pointing tool should be about 1/16" narrower than the joint being filled to achieve good compaction

E. Hawks: Plywood or steel hawk (mortar board)

F. Brushes:
1. Natural bristle brushes
2. Stiff bristle brushes (no wire)

G. Spray bottle

2.3 MIXES

A. See 04100-03-S for lime mortar mixes

PART 3---EXECUTION

3.1 EXAMINATION

A. Examine all existing exterior mortar joints. If the answer to any of the following questions is yes, then the building's joints are deteriorated and need repointing:
1. Are mortar joints eroded back more than 1/4" from the masonry face?
2. Are there cracks running vertically or horizontally through the mortar?
3. Are mortar bonds broken or pulled away from the masonry?
4. Has mortar fallen out of joints?
5. Is mortar excessively soft, powdery or crumbling?
6. Is pointing badly-stained?

B. Typical exterior damage due to mortar deterioration includes open joints, efflorescence, spalling and loosened masonry units.

C. Typical interior damage due to mortar deterioration includes failing plaster and stained wall paper.

D. A professional pointer experienced in old masonry is required for any of the following areas or conditions:
1. Chimneys need repointing

2. Window lintels must be rebuilt
3. Masonry is loose or missing
4. Work must be done from scaffolds or extension ladders
5. The original mortar joints were "beaded"-tooled with a raised, round-profiled joint that projects out from the wall

3.2 PREPARATION

A. Preparing the Joints:

1. Clean area of loose dirt and debris using a stiff bristle brush and remove all extraneous fastenings and devices.
2. Install necessary protection of adjacent building materials, property and persons from joint cleaning work and dirt.
3. Control dust and dirt from raking work; dampen area being worked; and use curtains to limit spread of dust from joint raking and cutting operations.

B. Joint Cutting and Raking:

1. Cut and rake old mortar from existing joints by hand using a hammer and chisel. **NOTE: POWER CHISELS AND POWER SAWS SHOULD NOT BE USED.**
2. Place the chisel in the center of the joint and pound it with a striking hammer or "No-Bounce" hammer until the mortar disintegrates.
3. Rake out the loose material to a depth of about 1 inch and never to a depth less than their width. Leave a clean, square face at the back of the joint to provide optimum contact with the new mortar. **CAUTION: AVOID OVERCUTTING ENDS OF VERTICAL JOINTS, WIDENING JOINTS OR CUTTING INTO BEDDING FACES OF MASONRY UNITS.**
4. While raking out joints, remove all metal fittings such as nails, brackets and clips on both horizontal and vertical surfaces.
5. Carefully clean out the prepared face with a soft or stiff bristle brush, or blow the joints clean with low-pressure compressed air (40-60 psi).
6. Thoroughly flush out joint with clean, clear water.

3.3 ERECTION, INSTALLATION, APPLICATION

A. Filling Joints:

1. Dampen masonry surfaces and joints to control suction and evaporation before placing repointing mortars.

   NOTE: THERE SHOULD BE NO FREE WATER PRESENT WHICH MAY CAUSE VOIDS IN THE MORTAR.

2. Using a pointing tool, push the mortar into the joint from a board and iron with the maximum possible pressure; The mortar should be applied in layers, each to a maximum thickness of 3/8".

   NOTE: THE POINTING TOOL SHOULD BE ABOUT 1/16" NARROWER THAN THE JOINT BEING FILLED TO ACHIEVE GOOD COMPACTION. IN SOME CASES, THE JOINTS WILL BE SO THIN THAT A STANDARD POINTING TOOL WILL NEED TO BE GROUND DOWN TO FIT THE JOINT.

3. Thoroughly compact each layer of mortar and allow to set until thumb-print hard before applying the next layer of mortar.

4. Fill the joints so that they are slightly recessed from the masonry face. Avoid leaving a joint which is visually wider than the actual historical appearance.
5. Continuously keep all excess and spilled mortar brushed off the faces of masonry units, ledges and other surfaces before it sets or stains the work.

B. Joint Finishing:
1. Begin when mortar attains "thumb print" hardness.
2. Tool the joint to match the old mortar.
   NOTE: IT IS IMPORTANT TO TOOL THE JOINT AT THE RIGHT STAGE; IF THE JOINT IS TOO SOFT, THE COLOR WILL BE LIGHTER THAN EXPECTED AND HAIRLIN SHRINKAGE CRACKS ARE LIKELY TO OCCUR; IF THE JOINT IS TOO HARD WHEN TOOLED, DARK STREAKS MAY APPEAR (TOOL BURNING) AND GOOD CLOSURE OF THE MORTAR AGAINST THE MASONRY WILL NOT BE ACHIEVED. EXCESSIVE TOOLING MAY BRING LIME AND FINE AGGREGATES TO THE SURFACE, CREATING A VISUAL CHANGE IN THE TEXTURE AND A SURFACE SUBJECT TO EARLY DETERIORATION.
3. To produce a roughened texture, lightly spray the mortar with water after the initial set, stipple the mortar with a stiff bristle brush or dab the mortar with coarse sacking.
4. Protect finished work from direct sun and rain until the face has dried and hardened.

3.4 ADJUSTING/CLEANING

A. Cleaning Up:
1. Use masking and drop cloths to prevent mortar stains on adjacent work and ledges.
2. Keep work areas clean and free from mortar drips, spills and residue of waste mortars or wash-off.
3. Clean off excess mortar as work proceeds using masonry brushes before mortar sets.
4. Wash completed repointing work when finished mortar joints are set with clean water and masonry brushes, scrubbing only as required to clean mortar stains off masonry without scouring the units and joint faces.
5. Do not use acid or detergent cleaning agent to aid mortar removal and clean-up without written approval from RHPO.

B. Curing:
1. Schedule work only when moderate weather is forecast.
2. Protect completed work from adverse weather, heavy rainfall, freezing, and drying by direct sunlight and winds until cured.
3. Sprinkle or mist repointed work as required to achieve cure in mortar joints for a minimum of 72 hours after completion.
4. Lime Mortar: Cures by drying and crystallization, not by hydration; and can be washed out of joints if not protected before it cures.

C. Final Cleaning:
1. After mortar has fully hardened, thoroughly clean exposed masonry surfaces of excess mortar and foreign matter using stiff nylon or bristle brushes and clean water spray applied at low pressure.
   NOTE: USE OF METAL SCRAPERS OR BRUSHES IS NOT PERMITTED. USE OF ACID OR ALKALI CLEANING AGENTS IS NOT PERMITTED.

D. Some efflorescence, called new construction "bloom," occasionally appears on the surface within the first few months following a repointing project. These deposits normally are harmless and are removed by the natural washing of the rain. If not removed by natural weathering, they can be removed with dry brushing with a bristle brush. The use of chemical cleaners to remove this type of efflorescence normally is not necessary;

AVOID USING ACIDS, PARTICULARLY MURIATIC ACID.

END OF SECTION

SECTION 04 01 40

MAINTENANCE OF STONE 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. Section includes maintenance of stone assemblies consisting of stone restoration and cleaning as follows:

1. Repairing stone masonry, including replacing units.
2. Repointing joints.
3. Cleaning exposed stone surfaces.

B. Related Sections:

1. Division 1 Section "Special Procedures for Historic Treatment."

1.3 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. Stone Terminology: ASTM C 119.
F. Face Bedding: Setting of stone with the natural bedding planes (strata) vertical and parallel to the wall plane rather than horizontal or "naturally bedded," which holds bedding planes together by gravity.

1.4 SUBMITTALS

A. Color photographs that document masonry before and after rehabilitation work shall be submitted to the Connecticut Commission on Culture & Tourism.

B. Product Data: For each type of product indicated. Include recommendations for application and use. Include test data substantiating that products comply with requirements.

C. Shop Drawings: For the following:

1. Partial replacement stone units (dutchmen).
2. Provisions for expansion joints or other sealant joints.
3. Provisions for flashing, lighting fixtures, conduits, and weep holes as required.
4. Replacement and repair anchors, including drilled-in pins. Include details of anchors within individual stone units, with locations of anchors and dimensions of holes and recesses in stone required for anchors, including direction and angle of holes for pins.

D. 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 stone 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 stone representative of the range of stone 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 stone when cured and dry.
3. Include similar Samples of accessories involving color selection.

E. Samples for Verification: For the following:
   1. Each type of replacement stone. Include sets of Samples as necessary to show full range of color, texture, grain, veining, and finish to be expected. Provide sets of at least three 12-by-12-inch Samples for each type, but no fewer than necessary to indicate full range and the proportion of variations within 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 of adhesive.
   4. Accessories: Each type of anchor, accessory, and miscellaneous support.

1.5 QUALITY ASSURANCE

A. Restoration Specialist Qualifications: Engage an experienced stone 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 or new stone masonry is not sufficient experience for stone 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 stone restoration and cleaning work is in progress. Supervisors shall not be changed during Project except for causes beyond control of restoration specialist firm.
   3. Restoration Worker Qualifications: Persons who are experienced and specialize in restoration work of types they will be performing.

B. Source Limitations: Obtain each type of material for stone restoration (stone, 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. Stone Repair: Prepare sample areas for each type of stone 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. Partial Stone Replacement: Two partial stone replacements (dutchman repairs).
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 stone 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.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver stone units to Project site strapped together in suitable packs or pallets or in heavy-duty crates.

B. Deliver each piece of granite with code mark or setting number on unexposed face, corresponding to Shop Drawings, using nonstaining paint.

C. Deliver other materials to Project site in manufacturer's original and unopened containers, labeled with manufacturer's name and type of products.

D. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.

E. 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.

F. Store lime putty covered with water in sealed containers.

G. Store sand where grading and other required characteristics can be maintained and contamination avoided.

1.7 PROJECT CONDITIONS

A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit stone restoration and cleaning work to be performed according to manufacturers' written instructions and specified requirements.

B. Repair stone 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 stone repair and mortar-joint pointing unless otherwise indicated:
   1. When air temperature is below 40 deg F, heat mortar ingredients, repair materials, and existing stone 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 stone repair and mortar-joint pointing when temperature and humidity conditions produce excessive evaporation of water from mortar and patching materials. Provide artificial shade and wind breaks and use cooled materials as required to minimize evaporation. Do not apply mortar to substrates with temperatures of 90 deg F and above unless otherwise indicated.

E. For manufactured repair materials, perform work within the environmental limits set by each manufacturer.

F. Clean stone 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.

1.8 COORDINATION

A. Coordinate stone 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.

1.9 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 Samples. Take delivery of and store at Project site a sufficient quantity to complete Project.

C. Perform stone restoration work in the following sequence:
   1. Clean stone surfaces.
   2. Where water repellents, specified in Division 7, are to be used on or near stonework, delay application of these chemicals until after pointing.
   3. Rake out mortar from joints surrounding stone to be replaced and from joints adjacent to stone repairs along joints.
   4. Repair stonework, including replacing existing stone with new stone.
   5. Rake out mortar from joints to be repointed.
   6. Point mortarjoints.
   7. After repairs and repointing have been completed and cured, perform a final cleaning to remove residues from this work.
   8. Inspect for open mortar joints and repair before cleaning to prevent the intrusion of water and other cleaning materials into the wall.
   9. Clean stone surfaces.

D. As scaffolding is removed, patch anchor holes used to attach scaffolding. Patch holes in stone to comply with "Stone Patching" Article. Patch holes in mortar joints to comply with "Repointing Stonework" Article.

PART 2 – PRODUCTS

2.1 STONE MATERIALS

A. Stone: Provide natural building stone of variety, color, texture, grain, veining, finish, size, and shape to match existing stone and with physical properties within 10 percent of those determined from preconstruction testing of selected existing stone.
   1. For existing stone that exhibits a range of colors, texture, grain, veining, finishes, sizes, or shapes, provide stone that proportionally matches that range rather than stone that matches an individual color, texture, grain, veining, finish, size, or shape within that range.

B. Quarrying New Stone: Have quarry clearly label the direction of bedding planes when rough stone is quarried, to facilitate cutting stones so that natural bedding planes will be as required in "Cutting New Stone" Paragraph.

C. Cutting New Stone: Regardless of how existing stone was cut and set, cut each new stone so that, when it is set in final position, natural bedding planes are essentially horizontal.

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 or ground marble, granite, or other sound stone 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. Stone Patching Compound: Factory-mixed cementitious product that is custom manufactured for patching stone.
   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 Restoration Mortars.
      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 stone), exhibits low shrinkage, has lower modulus of elasticity than the stone units being repaired, and develops high bond strength to all types of stone.
3. Use formulation having working qualities and retardation control to permit forming and sculpturing where necessary.
4. Formulate patching compound in colors, textures, and grain to match stone being patched. Provide not less than three colors to enable matching each piece of stone.

B. Stone-to-Stone Adhesive: 2-part polyester or epoxy-resin stone adhesive with a 15- to 45-minute cure at 70 deg F, recommended by adhesive manufacturer for type of stone repair indicated, and matching stone color.
   1. Products: Subject to compliance with requirements, provide the following available products that may be incorporated into the Work include, but are not limited to, the following:
      a. Two-Part Polyester or Epoxy-Resin Stone Adhesive:
         1) Akemi North America; Akepox.
         2) Bonstone Materials Corporation; Fast Set 41.
         3) Edison Coatings, Inc.; Flexi-Weld 520T.
      b. One-Part Cementitious Stone Adhesive:
         1) Cathedral Stone Products, Inc.; Jahn Restoration Adhesive.

2.4 CLEANING MATERIALS

A. 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.

B. Acidic Cleaner: Manufacturer's standard acidic masonry cleaner composed of hydrofluoric acid or ammonium bifluoride blended with other acids, detergents, wetting agents, and inhibitors.
   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.; 801 Heavy Duty Masonry Cleaner.
      b. Diedrich Technologies Inc.; Diedrich 101G Granite, Terra Cotta, and Brick Cleaner.
      c. Dumond Chemicals, Inc.; Safe n' Easy Ultimate Stone and Masonry Cleaner.
      d. Hydroclean, Hydrochemical Techniques, Inc.; Hydroclean Brick, Granite, Sandstone and Terra Cotta Cleaner (HT-626).
      e. PROSOCO; Enviro Klean Restoration Cleaner Sure Klean Restoration Cleaner or Sure Klean Heavy-Duty Restoration Cleaner.

2.5 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. Stone Anchors: Type and size indicated or, if not indicated, to match existing anchors in size and type. Fabricate anchors from Type 304 or Type 316 stainless steel.

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. 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.

2.6 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 Stone: 1 part white portland cement, 1 part lime, and 6 parts sand.
      a. Add mortar pigments to produce mortar colors required.
   2. Rebuilding (Setting) Mortar: Comply with ASTM C 270, Proportion Specification, Type N unless otherwise indicated, with cementitious material limited to portland cement and lime.

2.7 CHEMICAL CLEANING SOLUTIONS

A. Dilute chemical cleaners with water to produce solutions not exceeding concentration recommended by chemical-cleaner manufacturer.

B. Acidic Cleaner Solution for Unpolished Stone: Dilute with water to produce hydrofluoric acid content of 3 percent or less, but not greater than that recommended by chemical-cleaner manufacturer.
   1. Use only on unpolished granite, unpolished dolomite marble, and siliceous sandstone.

C. Acidic Cleaner for Polished Stone: Dilute with water to concentration demonstrated by testing that does not etch or otherwise damage polished surface, but not greater than that recommended by chemical-cleaner manufacturer.
   1. Use only on polished granite and polished dolomite marble.

PART 3 – EXECUTION

3.1 PROTECTION

A. Protect persons, motor vehicles, surrounding surfaces of building being restored, building site, plants, and surrounding buildings from harm resulting from stone 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. Comply with chemical-cleaner manufacturer's written instructions for protecting building and other surfaces against damage from exposure to its products. Prevent chemical cleaning solutions from coming into contact with people, motor vehicles, landscaping, buildings, and other surfaces that could be harmed by such contact.
   1. Cover adjacent surfaces with materials that are proven to resist chemical cleaners used unless chemical cleaners being used will not damage adjacent surfaces. Use materials that contain only waterproof, UV-resistant adhesives. Apply masking agents to comply with manufacturer's written instructions. Do not apply liquid masking agent to painted or porous surfaces. When no longer needed, promptly remove masking to prevent adhesive staining.
   2. Keep wall wet below area being cleaned to prevent streaking from runoff.
   3. Do not clean stone during winds of sufficient force to spread cleaning solutions to unprotected surfaces.
   4. Neutralize and collect alkaline and acid wastes for disposal off Owner's property.
   5. Dispose of runoff from cleaning operations by legal means and in a manner that prevents soil erosion, undermining of paving and foundations, damage to landscaping, and water penetration into building interiors.

C. Prevent mortar from staining face of surrounding stone 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 stone and other surfaces.
   4. Clean mortar splatters from scaffolding at end of each day.

3.2 PARTIAL STONE REPLACEMENT

A. Remove defective portion of existing stone unit (backing stone). Carefully remove defective portion of stone by making vertical and horizontal saw cuts at face of backing stone and demolishing defective material to depth required for fitting partial replacement (dutchman).
   1. Make edges of backing stone at cuts smooth and square to each other and to finished surface; essentially rectangular. Make back of removal area flat and parallel to stone face.
   2. Do not overcut at corners and intersections. Hand trim to produce clean sharp corners with no rounding and no damage to existing work to remain.
   3. If existing stone that is to remain becomes damaged, remove damaged area and enlarge partial replacement as required.

B. Remove mortar from joints that abut area of stone removal to same depth as stone was removed. Remove loose mortar particles and other debris from surfaces to be bonded and surfaces of adjacent stone units that will receive mortar by cleaning with stiff-fiber brush.

C. Cut and trim partial replacement to accurately fit area where material was removed from backing stone. Fabricate to size required to produce joints between partial replacement and backing stone of no more than 1/16 inch in width, and joints between partial replacement and other stones that match existing joints between stones. Cut partial replacement so that, when it is set in final position, natural bedding planes will match the orientation of bedding planes of the backing stone unless otherwise indicated.

D. Apply stone-to-stone adhesive to comply with adhesive manufacturer's written instructions. Coat bonding surfaces of backing stone and partial replacement, completely filling all crevices and voids.

E. Apply partial replacement while adhesive is still tacky and hold securely in place until adhesive has cured. Use shims, clamps, wedges, or other devices as necessary to align face of partial replacement with face of backing stone.

F. Clean adhesive residue from exposed surfaces and patch chipped areas as specified in "Stone Patching" Article.

3.3 CLEANING STONE, GENERAL

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 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 stone 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 stone.
      a. Equip units with pressure gages.

3. For water-spray application, use fan-shaped spray tip that disperses water at an angle of 25 to 50 degrees.
4. 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 stone surfaces.

E. Water Application Methods:
1. Water-Spray Applications: Unless otherwise indicated, hold spray nozzle at least 6 inches from surface of stone and apply water in horizontal back and forth sweeping motion, overlapping previous strokes to produce uniform coverage.

F. After cleaning is complete, remove protection no longer required. Remove tape and adhesive marks.

3.4 CLEANING STONEWORK

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 and Tourism before proceeding with this work.

B. Detergent Cleaning:
1. Wet stone with cold water applied by low-pressure spray.
2. Scrub stone 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 stone 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.

3.5 REPOINTING STONEWORK

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 and Tourism before proceeding with this work.

B. Rake out and repoint joints to the following extent:
1. Joints where mortar is missing or where they contain holes.
2. Cracked joints where cracks can be penetrated at least 1/4 inch by a knife blade 0.027 inch thick.
3. Cracked joints where cracks are 1/8 inch or more in width and of any depth.
4. Joints where they sound hollow when tapped by metal object.
5. Joints where they are worn back 1/4 inch or more from surface.
6. Joints where they are deteriorated to point that mortar can be easily removed by hand, without tools.
7. Joints where they have been filled with substances other than mortar.
8. 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 stone surfaces within raked-out joints to provide reveals with square backs and to expose stone for contact with pointing mortar. Brush, vacuum, or flush joints to remove dirt and loose debris.
   3. Do not spall edges of stone units or widen joints. Replace or patch damaged stone 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.

E. Notify Architect of unforeseen detrimental conditions including voids in mortar joints, cracks, loose stone, 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 stone has worn or rounded edges, slightly recess finished mortar surface below face of stone to avoid widened joint faces. Take care not to spread mortar beyond joint edges onto exposed stone 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 stone, allow mortar to harden at least 30 days before beginning cleaning work.

3.6 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 stone 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 nonstone 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.

END OF SECTION

SECTION 04 01 40.56

GENERAL CLEANING OF GRANITE

PART 1 – GENERAL

1.1 SUMMARY

A. This procedure includes guidance on the removal of surface dirt and environmental pollution from exterior granite.

B. See 01100-07-S for general project guidelines to be reviewed along with this procedure. These guidelines cover the following sections:

1. Safety Precautions
2. Historic Structures Precautions
3. Submittals
4. Quality Assurance
5. Delivery, Storage and Handling
6. Project/Site Conditions
7. Sequencing and Scheduling
8. General Protection (Surface and Surrounding)

These guidelines should be reviewed prior to performing this procedure and should be followed, when applicable, along with recommendations from the Regional Historic Preservation Officer (RHPO).

C. For precautions relating to pressure washing, see 04510-04-S.

PART 2 – PRODUCTS

2.1 MANUFACTURER

A. Diedrich Technologies, Inc.

www.diedrichtechnologies.com

B. ProSoCo, Inc.

www.prosoco.com

2.2 MATERIALS

A. Commercial masonry cleaner with a maximum 4% acid concentration, surfactants and wetting agents such as "Sure Klean Restoration Cleaner" - undiluted (ProSoCo, Inc.), or "Diedrich 101G Granite, Terracotta and Brick Cleaner" - diluted 1:4 to achieve a maximum 4% acid concentration (Diedrich Technologies, Inc.), or approved equal.

B. Clean, potable water

2.3 EQUIPMENT

A. Pressure water rinsing equipment (measuring between 100 and 400 psi for low-pressure; between 400 and 800 psi for medium pressure).

B. Fan-type spray tips (15 degree fan spray)

C. Stiff bristle brushes (non-metallic)

D. Plastic spatula.

PART 3 – EXECUTION

3.1 ERECTION, INSTALLATION, APPLICATION

NOTE: WHEN CLEANING, AVOID OVERCLEANING. AIM FOR ACHIEVING 85% CLEAN. MOST DAMAGE OCCURS WHEN ATTEMPTING TO CLEAN THE LAST 15%.
NOTE: TEST CLEAN A SMALL AREA BEFORE ATTEMPTING TO CLEAN LARGE AREAS.

NOTE: DO NOT TREAT THE SURFACE WITH ACID CLEANER MORE THAN ONCE.

A. Saturate the granite with clean, warm water sprayed at a low pressure (between 100 and 400 psi). Remove bird excrement and debris from granite prior to the application of acidic granite cleaner (see 04510-02-R for guidance).

B. Spray-apply cleaner evenly to the stained surface at 125 psi. or as recommended by manufacturer, or brush-apply cleaner using a soft fiber bristled brush

C. Allow cleaner to stand on the surface for 3-5 minutes or as recommended by manufacturer.

D. Thoroughly rinse the surface with clean, clear water at medium pressure (between 400 and 800 psi). Nozzle should be held between 18 and 30 inches from the surface. Stone should be left clean without streaking or staining.

END OF SECTION

SECTION 04 01 40.93

POINTING GRANITE & FILLING CRACKS

PART 1 – GENERAL

1.1 SUMMARY

A. This procedure includes guidance on pointing deteriorated joints on vertical granite surfaces. The procedure described may also be used to fill minor cracks in granite.

B. This procedure should be used in conjunction with 04520- 02-R, which describes in more detail the purpose of repointing in general, the materials required and precautions that should be taken.

C. See 01 10 0-07-S for general project guidelines to be reviewed along with this procedure. These guidelines cover the following sections:

1. Safety Precautions
2. Historic Structures Precautions
3. Submittals
4. Quality Assurance
5. Delivery, Storage and Handling
6. Project/Site Conditions
7. Sequencing and Scheduling
8. General Protection (Surface and Surrounding)

These guidelines should be reviewed prior to performing this procedure and should be followed, when applicable, along with recommendations from the Regional Historic Preservation Officer (RHPO).

1.2 REFERENCES

A. American Society for Testing and Materials (ASTM), www.astm.org

1.3 QUALITY ASSURANCE

A. Certificates: Prior to delivery, submit certificates attesting to compliance with applicable specifications for grades, types and classes.

B. Joint Raking: Prior to raking out all areas, cut back joints at location selected by Contracting Officer using the methods specified. Raking will continue at no additional cost to the Government, until an acceptable sample is achieved. This area will serve as standard for joint raking for the entire job. It will be marked with masking tape and left unpointed until all other pointing is complete. Point when directed by the Contracting Officer.

C. Sample Stone Pointing: Repoint joints, using materials and methods specified at a location selected by the Contracting Officer. The samples accepted by the Contracting Officer will serve as a standard for the entire job. They will be marked with tape and left undisturbed. Pointing mortar should match historic in appearance, strength and composition.

1.4 PROJECT/SITE CONDITIONS

A. Environmental Requirements: No stone pointing or repair shall be performed when the air temperature or stone surface temperature is 40 degrees F, and falling during and for 48 hours subsequent to laying.

PART 2 – PRODUCTS

2.1 MATERIALS

A. Mortar For Granite Pointing: Follow manufacturer's printed recommendations for product use and installation.

1. Portland Cement:

2. Type:

a. ASTM C150, gray or white as required to match existing color.
b. Hydrated Masons Lime: ASTM C207, Type S.
c. Aggregate: ASTM C144; clean, sharp sand free of loam, silt soluble salts and vegetable matter. Aggregate shall conform to the following size gradations: Sieve Size Percent Passing No. 4 100 No. 8 100 No. 16 85 - 95 No. 30 40 - 60 No. 50 15 - 20 No. 100 1 - 5 4.
d. Water: Clean and free of deleterious amounts of oil, acid, alkalis and organic matter.

2.1 MIXES

A. Proportions for Granite Pointing: Mix/proportions for aggregate color and texture should closely match historic.

1. Portland Cement:

a. part by volume.
b. Lime: 1 party by volume.
c. Aggregate: 3 parts by volume.
d. Water: to form a workable consistency.

B. Mixing Procedures: (see also 04100-03-S for additional guidance)

1. Measure materials by volume or equivalent weight.
2. Do not measure by shovel. Use known measure.
3. Mix ingredients in clean mechanical batcher for 3-5 minutes.
4. Let mortar sit for 20 minutes prior to use to allow for initial shrinkage. Use mortar within 1=AB hours of initial mixing.

PART 3 – EXECUTION

3.1 ERECTION, INSTALLATION, APPLICATION

A. Rake out all stone joints in designated areas by hand using a chisel no wider that 3/4 (three fourths) joint width. Remove all un required metal fasteners from granite and granite joints.

B. Clean all mortar from surfaces within the joint or crack so that the new pointing mortar bonds to the building material, not old mortar. Do not chip or spall edges of the stone. More than one chip per square yard will be unacceptable. If work is found unacceptable, all raking will cease without additional cost to the Government until deficiencies in tools, workers or methodologies have been corrected to the Contracting Officer's satisfaction.

C. Joint depth to be at least 3/4", but in all cases rake back to expose sound mortar.

D. Brush, vacuum or flush joints to remove all dirt and loose debris.

E. Reduce initial absorption of the stone by thoroughly wetting stone surface with clean water just prior to repointing. Do not allow water to pool on surface of the stone.

F. Pack joints with mortar leaving no voids. Place mortar in layers not exceeding 1/4 inch in depth. Apply succeeding layers only after preceding layer has taken initial set.

G. Use clean tools and equipment free from hardened or partially set mortar.

H. Clean excess mortar from stone and joints, removing splashed mortar and droppings immediately

I. Do not retemper or use mortar which has partially set, is caked, or is lumpy.

J. Tool horizontal and vertical face joints flush, dense and smooth after mortar has taken initial set. Do not allow mortar to extend over the stone surface.

K. Curing: Keep joints damp (90% RH) for at least 72 hours or until surface is cured. Protect joints from rapid drying due to wind (i.e., covering tarps, enclosure on scaffolding).

3.2 ADJUSTING/CLEANING

A. At the time of pointing of the stone, immediately remove mortar, grout and sealant from the face of the masonry.

B. Use only tools and equipment which are clean and free of hardened or partially hardened material.

C. Clean stone only with fiber bristle brushes and water. Use no acids, detergents, or other cleaning agents.

END OF SECTION

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SECTION 04 05 13

MASONRY GROUT AND MORTAR

PART 1 – GENERAL

1.1 SECTION INCLUDES
A. Mortar and grout for masonry.

1.2 RELATED WORK
A. Section 04 01 20 Unit Masonry Restoration
B. Section 04 01 40.93 Pointing Granite & Filling Cracks

1.3 REFERENCES
A. ASTM C91 - Masonry Cement.
B. ASTM C94 - Ready-Mixed Concrete.
C. ASTM C144 - Aggregate for Masonry Mortar.
D. ASTM C150 - Portland Cement.
E. ASTM C207 - Hydrated Lime for Masonry Purposes.
F. ASTM C270 - Mortar for Unit Masonry.
G. ASTM C387 - Packaged, Dry, Combined Materials, for Mortar and Concrete.
H. ASTM C404 - Aggregates for Masonry Grout.
I. ASTM C476 - Grout for Masonry.
J. ASTM C595 - Blended Hydraulic Cement.
K. ASTM C780 – Pre-construction and Construction Evaluation of Mortars for Plain and Reinforced Unit Masonry.
L. ASTM C1019 - Method of Sampling and Testing Grout.
M. IMIAC - International Masonry Industry All-Weather Council: Recommended Practices and Guide Specifications for Cold Weather Masonry Construction.

1.4 SUBMITTALS
A. Samples: Submit under provisions of Sections 01 33 00.

B. Samples: Provide mortar sample as part of masonry sample panel mockup. Mortar for repointing: color to match existing.

C. Submit test reports under provisions of Section 01 40 00.

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 01 40 00 that products meet or exceed specified requirements.

I. Submit mortar manufacturer's installation instructions under provisions of Section 01 33 00.

J. Include design mix, indicate Proportion or Property method used, required environmental and conditions.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to site under provisions of Section 01 60 00.

B. Store and protect products under provisions of Section 01 60 00.

C. Maintain packaged materials clean, dry, and protected against dampness, freezing, and foreign matter.

1.6 ENVIRONMENTAL REQUIREMENTS

A. Maintain materials and surrounding air temperatures to minimum 50 degrees F (10 degrees C) prior to, during, and 48 hours after completion of masonry work. Or follow Cold Weather Requirements: IMIAC - Recommended Practices and Guide Specifications for Cold Weather Masonry Construction.

1.7 MIX TESTS

A. Test mortar and grout in accordance with Section 01 40 00.

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

2.1 MATERIALS

A. Portland Cement: ASTM C150.

B. Mortar Aggregate: ASTM C144.

C. Hydrated Lime: ASTM C207, Type S.

D. Grout Aggregate: ASTM C404.

E. Water: Clean and potable.

2.2 MORTAR COLOR

A. Mortar color for new masonry: To be selected.

2.3 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).

2.4 GROUT MIXES

A. Lintels & Miscellaneous: 3000 psi strength at 28 days; 7-8 inches slump; premixed type in accordance with ASTM C94.

2.5 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

3.1 EXAMINATION

A. Request inspection of spaces to be grouted.

3.2 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

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SECTION 06 25 00

WOOD REPAIRS

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the contract, including General and Supplementary Conditions and Division 1 Specifications, apply to this section.

1.2 WORK INCLUDED

A. Provide labor, materials and equipment necessary to complete the work of this Section including, but not limited to the following:
   1. Removal of exterior finish systems at areas of wood restoration or repair
   2. Preservation and sealing of seams and joints
   3. Removal of decayed and contaminated wood
   4. Installation of borate wood preservatives
   5. Installation of wood repair compound materials
B. Extent of wood restoration work is as indicated on the drawings and as specified herein.

1.3 SUBMITTALS

A. General Submit the following according to Conditions of Contract and Division I Specification Sections
B. Product data, installation instructions, and general recommendations from manufacturer for types of repairs required including technical data sheets defining performance properties.
C. Certification that materials comply with local VOC limitations.
D. Qualification data for firms and persons specified in the" Quality Assurance" article to demonstrate their capabilities and experience. Include a list of completed projects with project name, address, names of Architects and Owners, and information specified.
   1. Five (5) business days after bid opening, submit a written qualification and experience of all lead personnel for work on the Project. List project manager or foreman's name and experience relative to this Project.
   2. All work shall be performed by persons whose qualifications have been submitted and approved.

1.4 QUALITY ASSURANCE

A. Restorations Specialist: Work must be performed by a firm having not less than (5) years successful experience in comparable wood restoration work including work on at least three (3) buildings listed in the National Register of Historic Places under the direction of federal and state preservation agencies in the last five (5) years and employing personnel skilled in the restoration process and operations indicated.
1. Restoration Specialist firm must be acceptable to, or certified by, manufactured of primary restoration materials.
2. Work associated with work of this section, including (but limited to) paint removal and substrate preparation, is to be performed by Installer of the work.

3. Only skilled workers who are thoroughly trained and experienced in wood repairs and restoration work at areas as noted, have the skills required for the work of this section, and are completely familiar with the materials and methods specified shall be used for wood restoration work.
4. At least one skilled worker shall be present at all times during the execution of the work and shall personally direct the wood repairs and restoration work.
5. In acceptance or rejection of the wood restoration work, no allowance will be made for lack of skill on the part of the workers.

B. Field Mock-ups
   1. Wood Restoration: following the requirements of the Section, perform a mock-up of each type of wood repair system specified to demonstrate materials and methods intended to be used in the finished work.
      a. perform mock-ups in areas indicated by the Architect.
      b. obtain the Architect's written approval of each mock-up before proceeding with the work of the Section.
      c. protect the approved mock-ups until the completion of all the work.
      d. Approved mock-up shall represent the minimum acceptable standard for each type and detail of the restoration work.

C. Manufacturer: Obtain primary repair materials from a single manufacturer. Provide secondary materials as recommended by the manufacturer of the primary materials.

1.5 DELIVERY, STORAGE & HANDLING

A. Deliver all materials in original unopened containers labeled with the manufacturer's name, brand name, item name and installation instructions.
B. Store materials in compliance with the manufacturer's requirements for temperature, maximum and minimum, and other conditions. Keep all materials under cover and dry. Protect against exposure to the weather.
C. Discard and remove from the job site any materials damaged in handling or storage and any materials that have been subjected to conditions contrary to the manufacturer's recommendations or whose maximum shelf life has expired.

1.6 PROJECT CONDITIONS

A. Lead: Existing paint may contain lead. Take all necessary precautions to ensure the safety of all persons engaged in removing lead-based paint and dispose of all residues generated from lead-based paint stripping in a legal manner in accordance with all local, state and federal codes.
B. Coordination: Coordinate wood repair with paint stripping so that the effected surfaces are exposed for a minimal time to avoid further damage to bare wood. Coordinate with painting so that all restored surfaces are primed as soon as possible after repair.
C. Weather: Proceed with the work of this section only when existing and foreseen weather conditions permit the work to be performed in accordance with the manufacturer's recommendations for temperature and humidity range, minimum and maximum.
D. Substrate Conditions: Do not proceed with product applications until substrates have been inspected and are determined to be in satisfactory conditions. Substrate moisture content shall not be in excess of 18°/0 during preparation and application.
   1. Remove all decayed wood to a clean, sound, unaffected substrate
   2. Remove all built up paints, and other debris to a clean sound substrate.
   3. Remove all wood sawdust to a clean sound substrate.
E. Protection

1. Use all necessary means to protect interior of building from all damage caused by precipitation and other environmental conditions during the work of the Section
2. Protect all adjacent building surfaces from damage, staining or deterioration resulting from wood restoration work.
3. Protect the restoration work in progress to prevent further deterioration exposed wood surfaces. Protect the completed work until the time of final inspection and acceptance by the architect.

F. Safety: General Contractor shall use all means necessary to ensure that no person (whether involved in the work of the Section or not) is harmed or injured due to the work of this Section. Comply with all applicable laws codes and regulations.

G. Security: Coordinate work with the owner's project manager to ensure that the building is secured at the end of each work period. Review security procedures with the Owner prior to proceeding with the work in this Section.

PART 2 – PRODUCTS

2.1 GENERAL

A. Compatibility: provide products recommended by the manufacturers to be fully compatible with indicated substrate.

2.2 EPOXY REPAIR PRODUCTS

A. Epoxy repair materials shall consist of 2 separate systems, a 2 part low viscosity epoxy primer/coupling agent and a 2 part thixotropic paste meeting the criteria of Table A and B.

2.3 MANUFACTURER OF REPAIR PRODUCTS AND EQUIPMENT

A. Manufacturer: Subject to compliance with the requirements, provide product of the following or approved equal.
   1. Abatron, Inc.
      Kenosha, WI
   2. Advanced Repair Technology
      Cherry Valley, NY
   3. Window Care Systems
      Pembroke, MA
   4. Or approved equal

2.4 REPAIR PRODUCTS

A. Low viscosity epoxy coupling/bonding agent
B. Epoxy repair compound
C. Injectable Borate gel
D. Borate rods

PART 3 – EXECUTION

3.1 INSPECTION

A. Inspect all wood surfaces to determine the extent of restoration and methods to be used. Notify Architect of findings and recommendations.

1. The Architect's decision regarding the extent of required repair, and extent of profile replication work shall be final.
2. In wood surfaces where decay is present, determine the methods and treatment of repair.
3. Areas that do not attach existing profiles, determine the level of restoration and replication to be achieved.

B. Joints, Joinery and edges: Check wood members at joints, seams and edges for:

1. Any open seams or failed conditions.
2. Wood moisture content.
3. The presence of wood decay, by probing surfaces.

C. Trim

1. Inspect wood surfaces for natural defects (knots) cracks and checks.
2. Determine wood moisture content.
3. Probe for the presence for wood decay.

3.2 REMOVAL

A. Removal of Finishes:

1. Remove all peeling and loose paint by scraping. Taking care not to damage sound wood and profiles.
2. If raised edges still exist between painted and non-painted surface after scraping, gently sand until edges are smooth.
3. Wash all surfaces with recommended neutralizing agents to remove any foreign particle, dust and chemical residue, allow surface to thoroughly dry.
4. Dispose of all debris in accordance with approved methods in lead paint awareness

3.3 PREVENTATIVE SYSTEMS

A. Preservation and Sealing of seams and joints. Repair of wood" checking" due to weathering.

1. Open or failed seams and checks shall be dilated to a width of 3/16" and depth of 1/2"
2. Remove all decayed, soft and weathered wood.
3. Check the moisture content and hardness of wood at and around the repair, maximum allowable moisture content 18°/0.
4. Sand bare wood to remove all loose fibers, paint, compounds. Remove all sawdust and dirt.
5. Pre-treat bare and sanded wood thoroughly with low viscosity epoxy coupling/bonding agent
6. Allow coupling agent to penetrate wood surface for a minimum of 10 minutes and maximum of 30 minutes, or as recommended by the manufacturer. Avoid applying in direct sunlight
7. Remove any excess bonding agent with absorbing paper
8. Apply epoxy repair compound over epoxy bonding agent while still tacky.
9. Epoxy compound shall have optimal contact with wood
10. Avoid inclusion of air pockets during application
11. Fill joints fill, even and smooth in one application
12. Allow full cure time as specified by manufacturer before application of paint or varnish.
13. After curing, sand surface even and smooth. Transitions and irregularities between wood and epoxy shall not be visible after sanding

14. If required, smooth any remaining irregularities with an additional application of epoxy repair compound. Always sand between coats.

3.4 CURATIVE SYSTEMS

A. Preservation and Repair of Damaged/Decayed Wood:
   1. Remove all paint and other coatings from area to be repaired.
   2. Remove all decayed soft and discolored wood, to sound bright unaffected material
   3. Check area of removal to determine complete elimination of decayed material.
      a) Remaining wood should be even color without red-brown and/or grayspots.
      b) No soft wood, existing brittle compound, or other previous repair materials should remain.
   4. Check moisture content and hardness of the wood in and around the repair area
      a) Moisture content of wood to be 18°/0 or less
   5. Sand bare wood to remove all loose fibers, paint, compounds. Remove all sawdust and dirt.
   6. Drill holes in effected area to receive borate gel and rods. Follow manufacturer's dose recommendations for dimensional lumber.
   7. Inject recommended dose of borate gel. Gel should not come in contact with exposed wood surface.
   8. Install borate rod in same hole as gel. Gel should not come in contact with exposed wood surface.
   9. Pre-treat bare and sanded wood thoroughly with low viscosity epoxy coupling/bonding agent.
      a) Allow coupling/bonding agent to penetrate wood surface for a minimum of 10 minutes and maximum of 30 minutes, or as recommended by the manufacturer. Avoid applying in direct sunlight
      b) Remove any excess bonding agent with absorbing paper.
   7. Apply epoxy repair compound over the uncured epoxy coupling agent.
      a) Epoxy fill shall have optimal contact with wood
      b) Avoid inclusion of air pockets during application
      c) Fill joints fill, even and smooth in one application
      d) Allow full cure time as specified by manufacturer before preparing for finishes.
   8. After curing, sand surface even and smooth. Transitions and irregularities between wood and epoxy shall not be visible after sanding.
   9. If required, smooth any remaining irregularities with an additional application of epoxy repair compound. Always sand between coats.

3.5 ADJUSTMENTS

A. Repair or replace all defective work. Any scope alterations between outcome of inspection and bid documents shall be submitted via change order for review and approval before any such work is carried out.

END OF SECTION

SECTION 06 40 10

EXTERIOR ARCHITECTURAL WOODWORK

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 the following:
   1. Roof Eave Trim
   2. Roof Rake Trim

B. Related Sections include the following:
   1. Division 6 Section "Wood Repairs"

1.3 SUBMITTALS

A. Product Data: For each type of product and process indicated and incorporated into items of exterior architectural woodwork during fabrication, finishing, and installation.

B. Shop Drawings: Show location of each item, dimensioned plans and elevations, large-scale details, attachment devices, and other components.
   1. Show details full size.
   2. Show locations and sizes of blocking and nailers, including concealed blocking and reinforcement specified in other Sections.

C. Product Certificates: For each type of product, signed by product manufacturer.

1.4 QUALITY ASSURANCE

A. Fabricator Qualifications: Shop that employs skilled workers who custom-fabricate products similar to those required for this Project and whose products have a record of successful in-service performance.

B. Quality Standard: Unless otherwise indicated, comply with AWI's "Architectural Woodwork Quality Standards" for grades of exterior architectural woodwork indicated for construction, finishes, installation, and other requirements.
   1. Provide AWI Quality Certification Program labels indicating that woodwork, including installation, complies with requirements of grades specified.

1.5 PROJECT CONDITIONS

A. Weather Limitations: Proceed with installation of exterior woodwork only when existing and forecasted weather conditions permit work to be performed and at least one coat of specified finish to be applied without exposure to rain, snow, or dampness.

B. Field Measurements: Where woodwork is indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
   1. Locate concealed framing, blocking, and reinforcements that support woodwork by field measurements before being enclosed and indicate measurements on Shop Drawings.
   2. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabricating woodwork without field

measurements. Provide allowance for trimming at site, and coordinate construction to ensure that actual dimensions correspond to established dimensions.

1.6 COORDINATION

A. Coordinate sizes and locations of framing, blocking, reinforcements, and other related units of Work specified in other Sections to ensure that exterior architectural woodwork can be supported and installed as indicated.

PART 2 - PRODUCTS

2.1 WOODWORK FABRICATORS

A. Fabricators: Subject to compliance with requirements, provide exterior architectural woodwork by one of the following:

2.2 MATERIALS

A. General: Provide materials that comply with requirements of quality standard for each type of woodwork and quality grade specified, unless otherwise indicated.
B. New wood species shall match existing. Assume Douglas Fir for bidding purposes. Contractor shall verify species.

2.3 INSTALLATION MATERIALS

A. Fastener type shall match existing. Refer to drawings for more information.
B. Nails: stainless steel.
C. Screws: stainless steel.
   1. Provide self-drilling screws for metal framing supports, as recommended by metal-framing manufacturer.
D. Anchors: Select material, type, size, and finish required for each substrate for secure anchorage. Provide nonferrous-metal or hot-dip galvanized anchors and inserts, unless otherwise indicated. Provide toothed-steel or lead expansion sleeves for drilled-in-place anchors.

2.4 FABRICATION, GENERAL

A. Fabricate woodwork to dimensions, profiles, and details indicated. Ease edges to radius indicated for the following:
B. Complete fabrication, including assembly, finishing, and hardware application, to maximum extent possible before shipment to Project site. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.
C. Shop cut openings, to maximum extent possible, to receive hardware, electrical work, and similar items. Locate openings accurately and use templates or roughing-in diagrams to produce accurately sized and shaped openings. Smooth edges of cutouts and seal with a water-resistant coating suitable for exterior applications.

PART 3 - EXECUTION

3.1 PREPARATION

A. Before installation, condition woodwork to average prevailing humidity conditions in installation areas.
B. Deliver inserts and similar anchoring devices to be built into substrates well in advance of time substrates are to be built.

C. Before installing architectural woodwork, examine shop-fabricated work for completion and complete work as required, including removal of packing and back-priming.

3.2 INSTALLATION

A. Quality Standard: Install woodwork to comply with same grade specified in Part 2 for type of woodwork involved.

B. Install woodwork true and straight with no distortions. Shim as required with concealed shims. Install level and plumb to a tolerance of 1/8 inch in 96 inches.

C. Scribe and cut woodwork to fit adjoining work, and refinish cut surfaces or repair damaged finish at cuts.

D. Anchor woodwork to anchors or blocking built in or directly attached to substrates. Secure to grounds, stripping and blocking with countersunk concealed fasteners and blind nailing. Use fine finishing nails for exposed nailing, countersunk and filled flush with woodwork.

E. Refer to Division 9 Sections for final finishing of installed architectural woodwork.

3.3 ADJUSTING AND CLEANING

A. Repair damaged and defective woodwork, where possible, to eliminate functional and visual defects; replace woodwork where not possible to repair. Adjust joinery for uniform appearance.

B. Clean woodwork on exposed and semi-exposed surfaces. Touch up shop-applied finishes to restore damaged or soiled areas.

END OF SECTION

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SECTION 07 30 00

ROOFING UNDERLAYMENT

PART 1 – GENERAL

1.1 SUMMARY

A. This Section specifies a self-adhering sheet membrane used as underlayment for sloped roofs.
   1. Severe climate application

B. Related Sections: Refer to the following specification sections for coordination:
   1. Section 06 10 00 - Rough Carpentry.
   2. Section 07 31 13 - Asphalt Shingles.
   3. Section 07 31 29 - Wood Shingles and Shakes.
   4. Section 07 32 00 - Roof Tiles.

C. Referenced Standards: Comply with the requirements of the following standards published by ASTM International to the extent referenced in this section.
   1. ASTM D412 - Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers - Tension.
   2. ASTM D461 - Standard Test Methods for Felt.
   3. ASTM D 903 - Standard Test Method for Peel or Stripping Strength of Adhesive Bonds.
   4. ASTM D1970 - Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection.
   5. ASTM D3767 - Standard Practice for Rubber—Measurement of Dimensions.
   6. ASTM E96 - Standard Test Methods for Water Vapor Transmission of Materials.
   7. ASTM G90 – EMMAqua test.

1.2 SUBMITTALS

A. Product Data: Submit manufacturer's product data and installation instructions.

1.3 QUALITY ASSURANCE

A. Regulatory Requirements: Comply with requirements of authorities having jurisdiction and applicable codes at the location of the project.

B. Manufacturer: Minimum 10 years' experience producing roofing underlayment.

C. Installer: Minimum 2 years' experience with installation of similar underlayment.

1.4 DELIVERY, STORAGE AND HANDLING

A. Deliver materials and products in unopened factory labeled packages. Protect from damage.

B. Cover materials and store in dry condition between temperatures of 40 and 90 degrees F (5 and 32 degrees C). Use within one year of date of manufacture. Do not store at elevated temperatures as that will reduce the shelf life of the product.

PART 2 – PRODUCTS

2.1 MANUFACTURER

A. Basis of Design Manufacturer: GCP Applied Technologies, Inc, 62 Whittemore Avenue, Cambridge, MA 02140, Toll Free 866-333-3726, www.gcpat.com.

2.2 MATERIALS

A. Self-Adhering Sheet Membrane Roof Underlayment: Provide Grace Ice and Water Shield by GCP Applied Technologies, Inc. with the following characteristics:
   1. Material: Cold applied, self-adhering membrane composed of a high strength polyethylene film coated on one side with a layer of rubberized asphalt adhesive and interwound with a disposable release sheet. An embossed, slip resistant surface is provided on the polyethylene.
   2. Color: Gray-black.
   3. Membrane Thickness: 40 mil (1.02 mm) ASTM D3767 procedure A (Section 9.1).
   4. Tensile Strength, Membrane: 250 psi (1720 kN/m2) ASTM D412 (Die C modified).
   5. Elongation, Membrane: 250% ASTM D412 (Die C modified).
   6. Low Temperature Flexibility: Unaffected @ -20°F (-29°C) ASTM D1970.
   7. Adhesion to Plywood: 3.0 lbs/in. width (525 N/m) ASTM D903.
   8. Permeance (Max): 0.05 Perms (2.9 ng/m2s Pa) ASTM E96.
   9. Material Weight Installed (Max): 0.3 lb/ft2 (1.3 kg/m2) ASTM D461.
   10. Primer: Water-based Perm-A-Barrier WB Primer by GCP Applied Technologies, Inc.
   11. Code and Standards Compliance: Grace Ice and Water Shield meets the following:
      a. Underwriters Laboratories Inc. Class A fire classification under fiber-glass shingles and Class C under organic felt shingles (per ASTM E108/UL 790).
      b. Underwriters Laboratories Inc. Classified Sheathing Material Fire Resistance Classification with Roof Designs: P225, P227, P230, P237, P259, P508, P510, P512, P514, P701, P711, P717, P722, P723, P732, P734, P736, P742, P803, P814, P818, P824
      c. ICC ESR-1677 approval according to AC-48 Acceptance Criteria for Self-Adhered underlayments used as Ice Barriers.
      d. Miami-Dade County Code Report NOA 12-1115.02.
      e. Canadian Construction Materials Centre (CCMC) 13670-L
      f. City of Los Angeles RR 25330
      g. Florida State Approval Report No. FL289-R3

PART 3 – EXECUTION

3.1 EXAMINATION

A. Prior to start of installation, inspect existing conditions to ensure surfaces are suitable for installation of roofing underlayment. Verify flashing has been installed. Starting work indicates installers acceptance of existing conditions.

3.2 INSTALLATION

A. Installation: Install roofing underlayment on sloped surfaces at locations indicated on the Drawings, but not less than at hips, ridges, eaves, valleys, sidewalls and chimneys, and surfaces over interior space within 36 inches (914 mm) from the inside face of the exterior wall. Strictly comply with manufacturer's installation instructions including but not limited to the following:
   1. Schedule installation such that underlayment is covered by roofing within the published exposure limit of the underlayment.
   2. Do not install underlayment on wet or frozen substrates.

3. Install when surface temperature of substrate is a minimum of 40 degrees F (5 degrees C) and rising.
4. Remove dust, dirt, loose materials and protrusions from deck surface.
5. Install membrane on clean, dry, continuous structural deck. Fill voids and damaged or unsupported areas prior to installation.
6. Prime concrete and masonry surfaces using specified primer at a rate of 500-600 square feet per gallon (12-15 sqm/L). Priming is not required for other suitable clean and dry surfaces.
7. Install membrane such that all laps shed water. Work from the low point to the high point of the roof at all times. Apply the membrane in valleys before the membrane is applied to the eaves. Following placement along the eaves, continue application of the membrane up the roof. Membrane may be installed either vertically or horizontally after the first horizontal course.
8. Side laps minimum 3-1/2 inches (89 mm) and end laps minimum 6 inches (152 mm) following lap lines marked on underlayment.
9. Patch penetrations and damage using manufacturer's recommended methods.

3.3 CLEANING AND PROTECTION

A. Protection: Protect from damage during construction operations and installation of roofing materials. Promptly repair any damaged or deteriorated surfaces.

B. Repair minor damage to eliminate all evidence of repair. Remove and replace work which cannot be satisfactorily repaired in the opinion of the Architect.

C. Provide temporary protection to ensure work being without damage or deterioration at time of final acceptance. Remove protective film and reclean as necessary immediately before final acceptance.

END OF SECTION

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SECTION 07 31 00

SLATE ROOFING

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions, and Division 0 and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Provide all labor, equipment, materials and services required to perform the work of this Section as indicated on the Drawings and specified herein.

B. This Section includes, but is not limited to, the following:

1. Removal of existing slate shingles and installation of new slate shingles.
2. Installation of new underlayments.
3. Installation of new mitered hips.
4. Installation of new metal ridges.
5. Such other Work as specified herein or shown in the Drawings.

C. Related Sections:

1. Section 06 10 53 – Miscellaneous Rough Carpentry
2. Section 07 52 00 – Modified Bituminous Roofing
3. Section 07 62 00 – Sheet Metal Flashing and Trim

1.3 REFERENCES AND STANDARDS

A. Comply with applicable requirements of the most recent editions of the following standards and others referenced in this Section. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern.

1. National Slate Association – Slate Roofs: Design and Installation Manual, 2010 Edition.
2. ASTM C406 – Standard Specification for Roofing Slate.
3. ASTM D226 – Standard Specification for Asphalt-Saturated Organic Felt Used in roofing and waterproofing.
4. ASTM D4869 – Standard Specification for Asphalt-Saturated Organic Felt Underlayment Used in Steep Slope Roofing.
5. ASTM D1970 – Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection.

1.4 SUBMITTALS

A. Submittals shall be made in accordance with Section 01 33 00.

B. Product Data

1. Underlayment(s) and underlayment fasteners.
2. Slate shingles and slating nails.

1.5 SAMPLES

A. Samples

1. Three to five slate shingles of each color, showing the full, natural range of color variation to be expected in the finished work.
    a. For uniform slate roofs, submit sample slates of size specified herein, with nail holes punched [drilled].

1.6 QUALITY ASSURANCE

A. Work of this Section shall comply with applicable standards indicated or implied.

B. Provide products from a single quarry during the course of the Work for consistency of quality and appearance.

C. Slate roofing contractor shall be a member in good standing of the National Slate Association, www.slateassociation.org.

D. Slate roofing contractor shall have at least 10-years experience in the installation of new slate roofing/repair of existing slate roofing and shall have successfully completed at least three slate roofing projects within the past five years similar in scope and scale to the Project specified herein. Foreman or superintendent shall have similar experience and shall provide full-time supervision of installers.

1.7 INSTALLATION ASSURANCE

A. Slates shall be installed by skilled and experienced roofers who will fit and fasten each slate. Each roofer proposed for the Project should be interviewed to determine that person's relevant experience.

B. The roofer shall proceed with slate shingle installation only after all penetrating work has been completed correctly, the substrate is dry, and weather conditions are favorable.

1.8 SEQUENCING/ SCHEDULING

A. Schedule and execute work to prevent leaks and excessive traffic on completed roof sections. Coordinate work of this Section with interfacing, adjoining, and related roofing work for proper sequencing of each installation.

B. Do not disrupt activities in occupied spaces.

C. When multiple trades are accessing the same work area, coordinate the work sequence so as not to hinder the project schedule or detract from the quality of the work.

1.9 WARRANTY

A. Slate Shingle Supplier Warranty: Submit slate shingle supplier warranty, signed by the supplier and covering the slate shingles described in this Section, in which the supplier agrees to replace slate shingles that fail in materials and deliver the replacement slate to the original point of destination. The duration of this warranty shall be 75 years from date of original supply.

B. Roofing Installer Warranty: Submit roofing installer warranty, signed by roofing installer and covering Work of this Section, in which the roofing installer agrees to repair or replace slate roofing that fails in materials or workmanship within the following warranty period.

1. Warranty Period: Five years from date of substantial completion.

C. Additional Roofing Installer Warranty: The roofing installer agrees to return to the job site one year from the date of substantial completion of the Work to replace any broken or missing slates created as a result of normal, installation-related, shedding.

2.1 MANUFACTURERS

A. W.R. Grace & Co. for membrane waterproofing

2.2 ROOFING MATERIAL

A. Manufacturer: Vermont Structural Slate Company (“VSS”) for roofing slates, or approved equal.
3 Prospect Street
Fair Haven, VT 05743

B. Classification: Slate shall meet the requirements of Grade S1 per ASTM C-406-06.

1. Color: Colors are be selected to best match the proportions and range of colors of the existing roof slates to be retained and reused.
2. Slate types shall match existing roofing slates to remain.
3. Size: Slate lengths and widths to match the proportions of the range sizes of existing roofing slates to remain and be reused.
4. Shape: Slate shingles shall be rectangular unless otherwise specified.
5. Exposure: To match existing.
6. Headlap: To match existing.
7. Thickness: To match existing.
8. Nail Holes: Each slate shall be machine punched or drilled for two nails located for proper headlap.

C. Physical Requirements

1. Slates with a strong grain must be produced "on the grain", that is, the direction of the grain of the stone must be parallel to the long dimension of the shingle. Slates shall be randomly selected from each shipment and tested for grain direction to ensure proper fabrication.
2. Slates with broken corners on the exposed ends shall not be installed when either the base or leg of the right triangular piece broken off is greater than 1 1/2 inches. Slates with broken corners are acceptable for cutting stock.

3. The curvature of shingles shall not exceed 1/8 inch in 12 inches. Curved slates shall be trimmed and holed to permit them to be laid with the convex side facing up.
4. "Knots" and "knurls" are rounded defects that affect the smoothness of split. They are acceptable on the exposed portion of the top face but on other parts will prevent close contact of shingles. Shingles having knots or knurls on the covered portions projecting in excess of 1/16 inch shall not be used if they prevent proper fit and contact.
5. Slates shall be free from ribbons.
6. Not more than 1% of broken slates, including those having cracks materially precluding ringing when sounded, shall be accepted.
7. Face dimensions shall not differ from those specified by more than 1/8 inch.

2.3 UNDERLAYMENTS

A. Felt: No. 30 unperforated asphalt-saturated organic felt, 36”-wide rolls complying with ASTM D226 Type II or ASTM D4869 Type IV.

B. Underlayment Accessories: Corrosion resistant, large head fasteners of sufficient length to prevent wind event blow-off, or as recommended by underlayment manufacturer.

C. Ice Dam Protection Membrane Self-Adhering Underlayment, polyethylene faced for ice dam protection at eaves and where shown in the Detail Drawings: ASTM D 1970, minimum of 30 mils thick; slip-resistant, polyethylene-film or granule surfaced laminated to SBS-modified asphalt adhesive, with release-sheet backing; cold applied.

1. Products:
   a. “Grace Ice & Water Shield HT,” GCP Applied Technologies, Inc., Cambridge, MA 02140, (617) 876-1400 or (877) 423-6491
   b. “WeatherLock G,” Owens Corning, Toledo, OH 43659, (800) 438-7465

2.4 ACCESSORIES

A. Slate hooks for slate repair work: For slates with a 3” headlap and measuring up to ¾” thick, 3” long, 10-gauge, solid copper, Type 304 stainless steel, or Type 304 stainless steel powder coated black or bronze with 3/8” hook or 3/4” hook.

1. Custom slate hooks for headlaps greater than 3” shall be same material as specified above, fabricated to required length. Consult vendors for availability.

B. Nail head covers (bibs) for slate repair work: 16 oz. or 20 oz. copper, Grade HOO (cold rolled), complying with ASTM B370, or lead coated copper complying with ASTM B101, Type 1, Class A. Bibs shall measure 3” to 4” wide by 8” long. Snip bibs along their long sides to form barbs and/or bend to a slightly concave or S-shape prior to insertion to help prevent the bibs from sliding out.

C. Cants for starter course of slate shingles: Wood cants, standard 3/16”-1/4” thick plaster lath, tapered horse feather shims, or ripped rot-resistant lumber. Fabricate to height and width required to permit first and subsequent courses of slate to lie flat atop underlying courses.

1. Where shown in the Detail Drawings, brake inverted V-shaped cants directly into metal drip edge flashings and gutter liners located at the roof eaves. Fabricate cant to height required to permit first and subsequent courses of slate to lie flat atop underlying courses.

D. Wire used for hanging slates to avoid nailing thru underlying flashings: 99.99% pure copper wire conforming to ASTM B3, 0.051” diameter, minimum.

E. Sealant adhesive for use as adhesive dabs below hip and ridge slates: Exterior, non-sag, gun grade, single-component, sealant adhesive complying with ASTM C 920, Type S, Grade NS, Class 12.5, use group NT, I, M, and O, or Design Professional approved alternate sealant adhesive. Color shall be manufacturer's standard color matching that of the slate as closely as possible.

F. Sealant for exposed nail heads (e.g., last ridge slate to be installed): Exterior, non-sag, gun grade, single-component, urethane sealant complying with ASTM C 920, Type S, Grade NS, Class 25, use group NT, M, A and O, or Design Professional approved alternate sealant. Color shall be manufacturer's standard color matching that of the slate as closely as possible.

G. Wood Nailers: See Section 061053.

2.5 CAULKING

A. The roofer shall use approved waterproof elastic slaters' cement; color to match slate.

2.6 FLASHING

A. The roofer shall use copper flashing in accordance with Section 07 60 00 Sheet Metal Flashing & Trim.

2.7 SNOW GUARDS

A. To the greatest extent possible, existing snowguards shall be removed and reinstalled. Where existing snowguards become damaged during the course of roofing removal, they shall be replaced by new snowguards to match the existing in type, material, configuration, and placement.

PART 3 – EXECUTION

3.1 GENERAL

A. Examine the roof deck and verify that it is satisfactory condition and ready to receive the new roof underlayment and slate shingle system.

1. Verify that the roof deck is well secured to the roof framing, free of warping or cupping, free of projecting fasteners, and the edges between boards are flush.

2. Verify that the roof deck is clean, dry, and free of dew, frost, or other contaminants that might interfere with the laying or long-term durability of the slate roof system.

3. Report deficiencies in the roof deck to the Design Professional prior to commencing work.

B. Slating shall begin at the roof eave and progress toward the ridge/top of the roof slope.

C. Sorting: Sort slate shingles for thickness prior to installation on the roof. Sort shingles by hand into three thicknesses as follows:

1. Thin: For use in slate courses closest to the ridge.

2. Thicker: For use in slate courses in "middle" courses.

3. Thickest: For use in the slate courses closest to the eave.

4. The goal is to create a roof of smooth, uniform appearance. Slate of different thicknesses shall not be used adjacent to each other.

5. To the extent possible, transitions between the different thicknesses of slate should occur at hips, ridges, vertical walls, and other non-conspicuous locations, rather than in the field of the roof, to preclude obvious discontinuities in thickness.

D. Blending: To help account for the natural variation in the coloration of the slate shingles, blend slates from several different pallets as it is brought to the roof surface to help provide for a more uniform overall appearance.

1. Blending may occur prior to, or in association with sorting.

E. Culling: No broken or cracked slate shall be used. Sound each slate for defects by tapping with a slate hammer or other metal object as it is being installed. Reject and dispose of all slates that do not emit a sharp, clear ring when tapped (p.16), or set aside for potential review by Supplier.

1. Cull and discard, or set aside for potential review by Supplier, warped and cupped slate shingles, those that are out of square, those with knots, knurls, or cramps on their unexposed faces, and slates with visible inclusions of iron pyrite.

2. Cull and discard, or set aside for potential review by Supplier, slates that are unusually thin or thick (i.e., slates that will be subject to breakage, cause excessive shadow lines, or cause the butt ends of overlying slates to stick up) as well as those with curvature or twist greater than 1/8" in 12" across the width of the slate.

F. Nail holes made on site in slates shall be punched or drilled from the back of the slate to produce a small recess, or countersink, on the exposed face of the slate to accept the nail head.

1. Drill nail holes in slates where a nail used to secure a clip, cleat, or lock strip associated with a flashing must pass through an underlying slate. Similarly, drill nail holes in slates that taper to a point or have a small nailing area, such as hip slates.

G. Slates cut on site shall be cut from the back of the slate to maintain a beveled edge on the exposed

H. Slate Order: As work progresses, check that the quantity of slate remaining on site is sufficient to complete the Project. Order additional quantities of slate in a timely manner, as required, so as not to delay final completion of the project and to allow proper blending of the slate.

3.2 REMOVAL OF EXISTING SLATE SHINGLES

A. Slate Roof Replacement - Salvage

1. Starting at the top of each roof slope, carefully remove all slate shingles and associated underlayments down to the roof deck and salvage slate for reinstallation.
    a. Carefully remove existing slate shingles, one at a time, without breaking or cracking to the maximum extent possible.
    b. Salvage only sound slate – slate that rings true when tapped with one's knuckles, a slate hammer, or other metal object, with nail holes intact, and possessing whole corners. Properly dispose of slate that cannot be salvaged.
    c. Stack salvaged slate at grade, on edge, and cover to protect from the weather.
    d. Pull/remove (do not drive-in) all slating nails and fasteners associated with existing underlayments.
    e. Deck irregularities: Identify broken, warped, cracked, rotted, or otherwise deteriorated or irregular roof decking and framing that would make the substrate unsuitable as a substrate for new underlayments and new slate roofing, and report to the Design Professional.

f. During the course of the work, protect from damage all roofing, flashings, rainwater conduction systems, and other building and site elements scheduled to remain. Protect interior finishes and contents from moisture damage during the course of the Work.
g. Carefully lower salvaged slates to grade to limit breakage. Lower demolition debris to grade using enclosed chutes or other means. Plan method of removal from elevated heights. Remove in a controlled manner. Do not throw demolition debris off of the roof.
h. Clean work area and surrounding areas at grade to remove all slate chips, roofing nails, and other debris on a daily basis and at the end of project. The site shall be left clean.
i. Remove no more slate than can be reinstalled or made weathertight by the end of the day.
j. Comply with the requirements of Section 024119 – Selective Demolition.

3.3 UNDERLAYMENT INSTALLATION

A. Verify that the roof deck is ready to accept the roof underlayment. Notify Design Professional in writing of any unsuitable conditions, such as voids, damage, or unsupported areas.

1. Mechanical fasteners used to secure the roof decking shall be set flush with the surface of the decking and fastened into solid blocking or framing members.
2. All surfaces shall be clean, dry, and free of oil, grease, dirt, frost, dew, and other contaminants that could cause damage to the roof underlayment.
3. Decking shall be smooth, planar, continuous, and have adjacent edges set flush.

B. Ice Dam Protection Membrane: Install ice dam protection membrane at eaves, extending up slope at least 2 feet beyond interior side of exterior wall line, measured in a horizontal plane, or as indicated in the Detail Drawings.

1. Install ice dam protection membrane full length of valleys and in crickets as shown in the Detail Drawings, lapping bottom end on top of ice dam protection membrane installed at the roof eave.
2. Install ice dam protection membrane stripping along the top edge of metal gutter liners and crickets as shown in the Detail Drawings.
3. At vertical walls, dormer cheek walls, party walls, chimneys, etc., extend ice dam protection membrane up the vertical surface 4 inches, minimum, or as shown in the Detail Drawings.
    a. See Paragraph C., below, for flashing of pipe penetrations.
4. Prior to installation of ice dam protection membrane, vacuum roof deck to remove all dust and debris. Install ice dam protection membrane directly to the roof deck in accordance with membrane manufacturer's instructions. Lap sides 3-1/2”, minimum, in direction to shed water. Lap ends 6” minimum. Roll all laps with roller.
    a. Prime roof deck as recommended by the ice dam protection membrane manufacturer if good adhesion is not obtained and when temperatures fall below 50 degrees Fahrenheit.
5. Cover ice dam protection membrane with roof underlayment as outlined below.

3.4 FELT UNDERLAYMENT

A. Install double layer of specified felt underlayment in horizontal courses in shingle fashion to shed water, beginning at eave line and covering entire roof area. Install an 18" wide starter course of underlayment at the roof eave and completely cover with full-width first course. Install the second course such that it laps the first course 20". Install succeeding courses laid 17" to the weather (lapping previous courses 19", providing for a 2" headlap). Lap ends of felt 6", minimum. Stagger end laps of each layer a minimum of 6 feet. Secure felt along laps, ends, and in field of felt with specified fasteners as necessary to properly hold the felt in place and protect the building from water infiltration until covered with slate shingles. Fasteners placed along laps shall be spaced at no more than 36" on center.

B. Felt shall lap hips and ridges 12" to form double thickness.

C. At vertical walls, extend felt underlayment up the vertical surface 4" minimum, unless otherwise shown in the Detail Drawings.

D. Flash penetrations through the roof using specified ice dam protection membrane to provide for a secure and watertight assembly. Ensure ice dam protection membrane target flashing is large enough to permit top edge of metal flashing to be installed to be stripped-in with ice dam protection membrane (i.e., stripping to be centered on top edge of metal flashing and be installed directly to the metal flashing and directly to previously installed ice dam protection membrane).

E. At roof eaves, the first layer of felt underlayment shall lap below the metal drip edge and the second layer of felt shall lap on top of the metal drip edge. At rakes, both layers of felt underlayment shall extend below metal drip edge.

F. Cover roof underlayment with slate shingles as soon as possible. Remove and replace felts that have become wrinkled or damaged, or that have been exposed on the roof for more than 30 days. Maximum length of exposure for felts shall be 30 days.

G. The roof decks shall be treated with a self-adhering membrane of rubberized asphalt integrally bonded to polyethylene sheeting. Follow manufacturer's literature for membrane application. Areas to be sheeted with membrane are hips, eaves, low slope areas, all slope changes or tie-ins and protrusions through the roof.

H. Replace damaged roof underlayments immediately. Do not install slate shingles over damaged underlayment.

I. Upon completion roof underlayment shall be smooth and free of punctures, holes, gashes, wrinkles, deep scuffs, and other defects that could compromise the underlayment's ability to serve as a temporary roof and secondary water shedding membrane.

3.5 SLATE INSTALLATION

A. Protection of Roof Surfaces

1. The roof is to be properly staged to allow safe work surfaces, such as brackets and planks, that prevent unnecessary foot traffic on the slates.

2. Where foot traffic is unavoidable, roof ladders, hook ladders, chicken ladders, foam pads, or other such devices shall be used to protect the slates.

3. Workers are to avoid walking on the slate surfaces during, and after, installation.

B. Laying Out the Roof

1. Check that the eave is straight and level, and the ridge is parallel or perpendicular to the eave.

2. Snap a line for locating the starter course equal to the vertical dimension of the starter slate minus the specified overhang (1½", or as otherwise shown on Detail Drawings). Set the starter course parallel to the eave. If the eave is not straight, make small adjustments in successive courses until the course lines are straight and parallel.
3. Chalk the line for the first course by measuring up from the eave the length of the slate, minus the specified overhang.
4. Chalk the line for the last full course at the ridge (finishing course), making sure it has the proposer exposure. Adjust the exposure of the courses approaching the ridge in small increments to obtain the required exposure of the finishing course (see subparagraph 5).
5. Snap horizontal lines based on the exposure of the slate, making small adjustments as needed so the courses end up parallel to the ridge and the exposure remains within ¼" of adjacent courses. When within 5 to 10 feet of the top of the slope, re-measure, and adjust the exposure in the remaining courses in small increments (1/8" to 1/4" per course) as needed for proper coursing. Do not reduce the headlap; always decrease the exposure so as to increase the headlap. (This same procedure applies to the laying out of courses at the bottom and top of dormers to assure that the courses line up.)
6. When laying out a roof with uniform width slates, snap two vertical lines near the center of the roof to establish the slate's bond lines. The space between the two vertical lines should be equal to one-half the width of the slate.
7. If the eave and/or ridge are not horizontal, establish a level line as a reference for snapping the course lines. Slate courses shall run horizontally.

J. Field Slates

1. Exposure and Headlap

   a. All standard field slates shall be installed with a minimum 3" headlap when the roof slope is 8:12 up to 20:12.

   b. All standard field slates shall be installed with a minimum 4" headlap when the roof slope is 4:12 up to 8:12.

   c. All standard field slates shall be installed with a minimum 2" headlap when the roof slope is greater than 20:12.

2. Offset: Slate side joints shall be positioned as near the mid-point of the underlying slates as possible, and not less than 3" from the underlying joints.
3. Joint Spacing: Slates shall be laid nearly touching side-to-side, or with a gap of approximately 1/16" between slates. Small adjustments can be made in joint spacing and/or slate width as needed when approaching rakes or walls to avoid use of excessively narrow slates; no slate shall measure less than 6" in width.
4. Fastening – Nailing and Wiring

   a. Secure each slate to the roof deck with two nails set in holes pre-punched or drilled at the quarry, or punched by hand on site.

   b. Slates measuring ¾" or more in thickness and 20-inches or more in length, shall be secured with four nails each. Place the two additional nails approximately 2" above the regular nail holes.

c. Set each nail with the head set in the countersink left by the punching of the nail hole; nails must not be over-driven, nor under-driven; nail heads shall touch the slate lightly, without producing strain on the slate and such that the slates hang from the nails.

d. Slates located adjacent to flashings shall be nailed to avoid puncturing the flashing material. Move one or both of the nails up, or closer to the center of the slate; secure the slate with a second nail placed one above the other on one side of the slate; or, secure the slate with copper wire fastened to the roof deck upslope of the top edge of the flashing.

5. Shapes: The slate shape shall be rectangular.

K. Valleys

1. Valleys shall be open.

a. Open Valleys

i. Slates at the edges of valleys shall be cut in neat and straight lines.

ii. Valley slates are to be cut from the back of the slate to maintain a beveled slate edge.

iii. Clip the upper corner of valley slates to allow the slate to lay correctly and to direct moisture toward the valley centerline.

iv. For fabrication of valley flashing, see section 076200.

v. Lay slate a minimum of 3"-4" each side of the valley centerline. Taper outward 1/16" per foot from top to bottom to allow for release of ice.

vi. When fastening slates, do not puncture valley flashing with nails. Use wider slates as needed; place two nails, one above the other along the edge of the slate farthest from the valley centerline; or, hang slates from copper wire secured above the top edge of the valley flashing.

vii. Adjust width of slates approaching a valley to avoid the need to cut slate to a point at the valley; width of the butt of the valley slate shall be 3" minimum.

L. Penetrations

1. Slate shall be neatly fitted around pipes, ventilators, and other roof penetrations.

a. Do not nail through flashings.

b. Trim slates neatly.

c. See Section 076200 for flashings.

M. Flashings

1. Integrate flashings as slates are being installed.
   a. See section 07 60 00, Sheet Metal Flashing and Trim.
   b. Flashing shall be installed where there are roof plane intersections, where the roof abuts walls, parapets, dormers and chimneys, at roof penetrations, and where shown on the Drawings.
   c. See *Slate Roofs: Design and Installation Manual*, 2010 Edition for typical flashing installations not shown in the Detail Drawings.

N. Slate repair

1. Where individual slates must be installed in the field of the roof after the installation is complete, such as where a roof bracket has been removed or where a broken slate must be

removed and replaced, such installation shall be made in accordance with the slate repair procedures specified in Paragraph 3.7, below.

O. Coordinate slate installation with the installation of snow retention devices specified in Section 07 72 53.

3.6 HIP SLATES

A. Install hip slates in a mitered hip pattern, as shown in the Detail Drawings and in accordance with approved test panels. Coordinate with installation of new copper hip flashings (see Section 07 60 00) and associated wood blocking.
   1. Ensure roof underlayment is whole and overlaps the hip a minimum of 6" to 12" in each direction.

B. Secure each hip slate with 3 or 4 nails arranged in a triangular or diamond pattern. In addition, set the bottom edge of each slate in dabs of specified adhesive.
   1. Nails holes in hip slates may be drilled, instead of punched, in order to limit breakage and loss of section around the nail holes. Nail holes through underlying slate shingles shall be drilled, not punched.

C. Snap chalk lines to provide straight hip lines. Accommodate lack of trueness in structural framing of hips by selectively trimming slates or using slightly wider slates in localized areas as required to produce a line that is straight.

3.7 SLATE SHINGLE REPAIR

A. Replacement slates shall be drawn from existing stock to match color, weathering characteristics, size and thickness (or slightly thinner), shape, and texture.

B. Where existing slates are to be removed, salvaged, and reinstalled in conjunction with flashing repair and/or replacement work, number the slates on their back sides such that they can be reinstalled in their original locations.

C. Remove existing broken slates and associated slating nails using a slate ripper. If the head of a slate cannot be removed in this manner, carefully remove adjacent slates as required to provide a fragment-free and clear space for the replacement slate.

D. Replacement slates shall be fastened using one of the following methods:

   1. Nail-and-Bib Method:

      a. Slide replacement slate into position.

      b. Punch or drill a nail-hole through the replacement slate about 1" below the butt of the slate two courses above. Locate this nail-hole in the bond line between the slates in the course immediately above.

      c. Fasten the slate with a single copper slating nail placed in the nail hole.

      d. Insert a copper sheet-metal bib under the course above to cover the head of the nail. Push the bib past the butt end of the slates in the course above such that the bottom edge of the bib is no longer exposed and the bib provides for the same headlap as the slate. Pre-bend and/or notch the edges of the bib to prevent it from sliding out.

   2. Slate Hook Method:

      a. Install the slate hook prior to sliding the replacement slate into position.

b. Drive the slate hook into the roof deck through the joint between the slates in the course below with the hook aligned with the desired position of the butt of the replacement slate.

c. Slide the replacement slate up into position, past the hook, and then pull it back down to engage the butt end in the hook.

d. Do not use slate hooks when replacing multiple adjacent slates in the same course.

e. Do not use slate hooks for slates thicker than 3/4".

f. Do not use standard slate hooks when the headlap is greater than 3" – custom slate hooks must be fabricated (see Part 2 of this Section).

3.8 CLEAN-UP AND ADJUSTMENT

A. Work areas shall be left neat and clean at the end of each work day.

B. Remove debris from gutters and downspouts (if any) at the end of each work day and upon completion of the work to ensure unrestricted flow of water from the roof.

C. Upon completion of work, remove all roofing equipment, excess material, and debris from all roof surfaces and grounds.

D. While removing equipment, material, and debris from roof surfaces, inspect all work to ensure completeness, aesthetics, and undamaged workmanship. Broom clean slate shingles as roof jacks and planks (or other means of access) are being removed from the roof.

E. Dispose of debris in accordance with all local, state, and federal regulations or in the manner as stated elsewhere in the Contract Documents.

F. Remedy any incomplete work and replace any damaged, broken, poorly lying, or otherwise offending roofing slates using the repair methods specified in Paragraph 3.7, above.

G. Upon completion of clean up and adjustments, advise the Design Professional that the work is ready for final inspection and punch listing by the Design Professional.

END OF SECTION

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Section 07 51 01

Cold-Applied Built-Up Bituminous Roofing

PART 1 GENERAL

1.1 SYSTEM DESCRIPTION

A. The following specification outlines the requirements for a cold-applied modified bitumen roofing membrane, and all other ancillary roofing and waterproofing work including but not limited to installation of drains, flashings, sealants and metal work as specified.

1.2 SECTION INCLUDES

A. Asphalt modified Bituminous Roofing.

1.3 RELATED SECTIONS

A. Section 06 25 00: Wood repairs.
B. Section 07 62 00: Sheet Metal Flashing and Trim: Metal flashing and counter flashing installation and requirements.

1.4 REFERENCES

A. Factory Mutual (FM Global) - Approval Guide.
   1. Factory Mutual Standard 4470 - Approval Standard for Class 1 Roof Covers.

B. Underwriters Laboratories (UL) - Roofing Systems and Materials Guide (TGFU R1306).

C. American Society for Testing and Materials (ASTM) - Annual Book of ASTM Standards.
   1. ASTM C 208 - Standard Specification for Cellulose Fiber Insulating Board.
   2. ASTM C 728 - Standard Specification for Perlite Thermal Insulation Board.
   3. ASTM C 1289 - Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board.
   4. ASTM C 1371 - Standard Test Method for Determination of Emittance of Materials Near Room Temperature Using Portable Emissometers.
   5. ASTM C 1549 - Standard Test Method for Determination of Solar Reflectance Near Ambient Temperature Using a Portable Solar Reflectometer.
   6. ASTM C 1371 - Standard Test Method for Determination of Emittance of Materials Near Room Temperature Using Portable Emissometers.
   7. ASTM D 41 - Standard Specification for Asphalt Primer Used in Roofing, Dampproofing and Waterproofing.
   8. ASTM D 312 - Standard Specification for Asphalt Used in Roofing.
   9. ASTM D 1863 - Standard Specification for Mineral Aggregate Used on Built-Up Roofs.
   10. ASTM D 2178 - Standard Specification for Asphalt Glass Felt Used in Roofing and Waterproofing.
   11. ASTM D 3672 - Specification for Venting Asphalt-Saturated and Coated Inorganic Felt Base Sheet Used in Roofing.
   12. ASTM D 3909 - Standard Specification for Asphalt Roll Roofing (Glass Felt) Surfaced With Mineral Granules.
   13. ASTM D 4586 - Standard Specification for Asphalt Roof Cement, Asbestos-Free.
   14. ASTM D 4601 - Standard Specification for Asphalt-Coated Glass Fiber Base Sheet

Used in Roofing.

15. ASTM D 4897 - Standard Specification for Asphalt-Coated Glass-Fiber Venting Base Sheet Used in Roofing.
16. ASTM D 6163 - Standard Specification for Styrene Butadiene Styrene (SBS) Modified Bituminous Sheet Materials Using Glass Fiber Reinforcements.
17. ASTM D 6164 - Standard Specification for Styrene Butadiene Styrene (SBS) Modified Bituminous Sheet Materials Using Polyester Reinforcements.
18. ASTM D 6222 - Standard Specification for Atactic Polypropylene (APP) Modified Bituminous Sheet Materials Using Polyester Reinforcements.
19. ASTM E 903 - Standard Test Method for Solar Absorptance, Reflectance, and Transmission of Materials Using Integrating Spheres.
20. U.S. Green Building Council (USGBC).
21. Leadership in Energy and Environmental Design (LEED).
22. California Title 24 Energy Efficient Standards.
23. ENERGYSTAR.
24. Cool Roof Rating Council (CRRC).

D. Asphalt Roofing Manufacturers Association (ARMA).

E. National Roofing Contractors Association (NRCA).

1.5 SUBMITTALS FOR REVIEW

A. Membrane System Product Data: Provide current standard printed product literature indicating characteristics of membrane materials, flashing materials, components, and accessories product specification and installation.

B. Product Samples: Submit product samples of membrane and flashing materials showing color, texture, thickness and surfacing representative of the proposed system for review and approval by the Owners Representative.

C. Submit sample copies of both the Manufacturer and Applicator warranties for the periods stipulated. Each specimen must be a preprinted representative sample of the issuing company's standard warranty for the system specified.

D. Submit copies of current Material Safety Data Sheets (MSDS) for all components of the work.

E. Membrane Shop Drawings: Submit shop drawings of cold-applied two-ply modified bitumen roofing membrane with cold fluid-applied reinforced polyurethane flashings showing all a project plan, size, flashing details, and attachment for review and approval by the Owners Representative and Membrane Manufacturer.

1.6 QUALITY ASSURANCE

A. Manufacturer: Company specializing in manufacturing the products specified in this section with five (5) years documented experience. Manufacturer shall submit the following certifications for review:
   1. Substrates and conditions are acceptable for purpose of providing specified warranty.
   2. Materials supplied shall meet the specified requirements.

B. Applicator: Company specializing in performing the work of this section with (3) years documented experience and **approved by system manufacturer for warranted membrane installation**. Applicator shall submit the following certification for review:

1. Applicator shall submit documentation from the membrane manufacturer to verify contractor's status as an approved applicator for warranted installations.

C. Substrate Moisture: For recover projects, evaluate moisture content of substrate materials. Constructor shall determine substrate moisture content by means of a nondestructive evaluation using infrared, electronic capacitance, or nuclear methods/technology. Alternatively, core cuts may be taken a minimum of one every 10 squares in the existing roof assembly down to the structural deck to confirm the existing roofing system is dry and free of trapped moisture. Record findings and report to the Owner or designated Representative, and Membrane Manufacturer.

D. Material Quantities: Monitor quantities of installed materials. Monitor application of cold adhesive, primers, resin mixture, and reinforcing fleece. Perform Work in accordance with manufacturer's instructions.

1.7 PERFORMANCE REQUIREMENTS

A. Assembly must be listed as Underwriter Laboratories Class A Exterior Fire.

1.8 REGULATORY REQUIREMENTS

A. Conform to applicable building and jurisdictional codes for roofing/waterproofing assembly and fire resistance requirements.

B. Comply with requirements of OSHA, NIOSH or local governing authority for work place safety.

C. Comply with authority or agency "Confined Space Policy" during and throughout all work to be performed.

1.9 PRE-INSTALLATION MEETING

A. Convene a pre-installation meeting at the job site (1) week before starting work of this section. Require attendance of parties directly affecting work of this section, including but not limited to, Architect, Owner's Representative, Roofing/Waterproofing Contractor, and Manufacturer's Representative. Review roofing/waterproofing preparation and installation procedures, coordination and scheduling required with related work, and condition and structural loading limitations of deck/substrate.

1.10 FIELD INSPECTION SERVICES

A. Manufacturer's technical representative shall provide the following inspections of the membrane application:
   1. Job start inspection at the beginning of each phase of the project, to review special detailing conditions and substrate preparation.
   2. Periodic in-progress inspections throughout duration of the project to evaluate membrane and flashing application.
   3. Final punch-list inspection at the completion of each phase of the project prior to installation of any surfacing or overburden materials.
   4. Warranty inspection to confirm completion of all punch list items, surfacing, and overburden application.

1.11 DELIVERY, STORAGE, AND PROTECTION

A. The Contractor together with the Owner or his designated Representative shall define a storage area for all materials. The area shall be cool, dry, out of direct sunlight, and in accordance with manufacturer's recommendations and relevant regulatory agencies.

Materials shall not be stored in quantities that will exceed design loads, damage substrate materials, hinder installation or drainage.

B. The optimum storage temperature condition is between 65 and 70˚F (18-21˚C) for all materials. Materials kept at this temperature can be mixed and applied readily.

C. Store solvent-bearing solutions, resins, additives, inhibitors or adhesives in accordance with the MSDS and/or local fire authority. After partial use of materials replace lids promptly and tightly to prevent contamination.

D. Modified bitumen membrane roll goods shall be stored vertically on end on platforms sufficiently elevated to prevent contact with water and other contaminants. DO NOT use rolls that are wet, dirty or have damaged ends.

E. Liquid-applied flashing roll goods shall be stored horizontally on platforms sufficiently elevated to prevent contact with water and other contaminants. DO NOT use rolls that are wet, dirty or have damaged ends.

F. Roofing/waterproofing materials must be kept dry at all times. If stored outside, raise materials above ground or roof level on pallets and cover with a tarpaulin or other waterproof material. Plastic wrapping installed at the factory are not acceptable as outside storage covers.

G. Follow manufacturer's directions for protection of materials prior to and during installation. Do not use materials that have been damaged to the point that they will not perform as specified. Fleece reinforcing materials must be clean, dry and free of all contaminants.

H. Copies of all current MSDS for all components shall be kept on site. Provide any and all crew members with appropriate safety data information and training as it relates to the specific chemical compound he or she may be expected to deal with. Each crew member shall be fully aware of first-aid measures to be undertaken in case of incidents. Comply with requirements of OSHA, NIOSH or local governing authority for work place safety.

1.12 ENVIRONMENTAL REQUIREMENTS

A. Do not apply roofing/waterproofing membrane during or with the threat of inclement weather.

B. Application of cold-applied modified bitumen membrane and cold fluid-applied reinforced polyurethane flashing membrane may proceed while air temperature is between 40°F (5°C) and 85°F (30°C) providing the substrate is a minimum of 5°F above the dew point.

C. When ambient temperatures are at or expected to fall below 50°F (10°C), preheat the modified bitumen membrane rolls to approximately 80-85°F (28-30°C) just prior to unrolling for application.

D. When ambient temperatures are at or expected to fall below 50°F (10°C), or reach 85°F (30°C) or higher, follow Membrane System Manufacturer's recommendations for weather related additives for cold fluid-applied flashing resin and application procedures.

E. Ensure that substrate materials are dry and free of contaminants. DO NOT commence with the application unless substrate conditions are suitable. Contractor shall demonstrate that

substrate conditions are suitable for the application of the materials.

F. Odor control and elimination measures are not typically necessary, but where required by the Owner or his designated Representative, Contractor shall implement odor control and elimination measures prior to and during the application of the roofing/waterproofing materials. Control/elimination measures shall be field tested at off-hours and typically consists of one (1) or a multiple of the following measures:

1. Sealing of air intakes with activated carbon filters. Install filters in accordance with requirements and recommendations of the filter manufacturer. Seal filters at joints and against building exterior walls to prevent leakage of unfiltered air where required due to size of intake opening. Provide track system to secure filters.

2. Erection and use of moveable enclosure(s) sized to accommodate work area(s) and stationary enclosure for resin mixing station. Enclosure shall be field constructed or pre-manufactured of fire retardant materials in compliance with local code requirements in accordance with requirements of the Owner or his designated Representative. Equipment enclosure(s) with mechanical air intake/exhaust openings and Odor Control Air Cleaners, as required to clean enclosed air volume and to prevent odor migration outside the enclosure. Exhaust opening shall be sealed with activated carbon filter.

3. Placement of odor elimination stations inside and outside of the enclosure(s) as required by field condition, in coordination with the Owner or his designated Representative.

4. Protection of Contractor personnel and occupants of the structure and surrounding buildings as necessary to comply with requirements of OSHA, NIOSH and/or governing local authority.

G. When disposing of all refuse or unused materials, observe all EPA, OSHA or local disposal requirements.

1.13 COORDINATION & PROTECTION

A. Coordinate the work with the installation of associated metal flashings, accessories, appurtenances, etc. as the work of this section proceeds.

B. Building components shall be protected adequately (with tarp or other suitable material) from soil, stains, or spills at all hoisting points and areas of application. Contractor shall be responsible for preventing damage from any operation under its Contract. Any such damage shall be repaired at Contractor's expense to Owner's satisfaction or be restored to original condition.

C. Provide barricades, retaining ropes, safety elements (active/passive) and any appropriate signage required by OSHA, NIOSH, and NSC and/or the Owner or designated Representative.

D. Protect finished roofing/waterproofing membrane from damage by other trades. Do not allow waste products containing petroleum, grease, acid, solvents, vegetable or mineral oil, animal oil, animal fat, etc. or direct steam venting to come into direct contact with the membrane.

1.14 WARRANTY

A. Manufacturer's Material Only Warranty: Provide 10-year manufacturer's material only warranty under provisions of this section. This warranty provides for supply of membrane only, limited to amounts necessary to effect repairs necessitated solely by material defective in content and composition.

B. Applicator's Warranty: Provide 5-year "Applicator Maintenance Warranty" covering workmanship for all work of this section including installation of membrane, flashings, metal work, and roofing/waterproofing accessories.

C. Submit (2) executed copies of both the manufacturer and applicator warranties for the periods stipulated, starting from the date of substantial completion. Each warranty must be signed by an authorized representative of the issuing company.

1.15 MATERIAL SUBSTITUTIONS

A. Materials proposed for use in the performance of the work that are not specified herein must be submitted to the Owner/Owner's Representative for evaluation no later than ten days prior to bid.

PART 2 PRODUCTS

2.1 GENERAL

A. The products herein specified are totally pre-engineered products of the listed manufacturer and establish criteria for the approval of substitutions. Products must be part of a pre-engineered system, equivalent in function, quality, composition and method of application to be considered for approval as an "Approved Substitute". Substitute materials must meet or exceed the physical performance characteristics of the specified materials.

B. Acceptable Manufacturer: GAF, Commercial Roofing Products, which is located at: 1 Campus Dr.; Parsippany, NJ 07054; Toll Free Tel: 800-ROOF-411; Tel: 973-628-3000; Fax: 973-628-3451; Email:SBenoit@gaf.com; Web:www.gaf.com

C. Requests for substitutions will be considered in accordance with provisions of Section 01 60 00.

2.2 ROOFING MEMBRANE

A. Smooth surfaced modified bitumen membrane with a fiberglass reinforcing mat coated with flexible, SBS polymer-modified asphalt. Each roll contains one and one-half squares of material, approximately 39.4 inches by 50.3 feet (1 m by 15.3 m); 89 lb (40.3 kg), Ruberoid 20 base / ply sheet by GAFMC.

2.3 FLASHING MATERIALS

A. Smooth surfaced modified bitumen membrane with a fiberglass reinforcing mat coated with flexible, SBS polymer-modified asphalt. Each roll contains one and one-half squares of material, approximately 39.4 inches by 50.3 feet (1 m by 15.3 m); 89 lb (40.3 kg), Ruberoid 20 base / ply sheet by GAFMC.

2.4 BITUMEN/ ADHESIVE

A. SBS Adhesive: Conforms to ASTM D 4586, LeakBuster Matrix 102 SBS Membrane Adhesive, by GAFMC.

B. SBS Cement: Conforms to ASTM D 4586, LeakBuster Matrix 201 Premium SBS Flashing

Cement, by GAFMC.

C. SBS Cement: Conforms to ASTM D 4586, LeakBuster Matrix 202 SBS Flashing Cement, by GAFMC.

D. Roof Cement: Conforms to ASTM D 4586, LeakBuster Matrix 203 Plastic Roof Cement, by GAFMC.

E. Asphalt Primer: Conforms to ASTM D 41, LeakBuster Matrix 307 Premium Asphalt Primer, by GAFMC.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that surfaces and site conditions are ready to receive work.

B. Verify deck/substrate openings, curbs, and protrusions through deck/substrate, wood cant strips and reglets are in place and solidly set.

C. Verify deck/substrate is structurally supported, secure and sound.

3.2 PREPARATION OF SUBSTRATE

A. General: Surfaces to be prepared as a substrate for the new waterproofing system as follows:
   1. The contractor shall determine the condition of the existing structural deck/substrate. All defects in the deck or substrate shall be corrected before new waterproofing work commences. Areas of deteriorated deck/substrate, porous or other affected materials must be removed and replaced with new to match existing.
   2. Prepare flashing substrates as required for application of new waterproofing membrane flashings.
   3. Inspect substrates, and correct defects before application of new waterproofing. Fill all surface voids greater than 1/8 inch wide with an acceptable fill material.
   4. Remove all ponded water, snow, frost and/or ice from the work substrate prior to installing new waterproofing materials.
   5. The final substrate for waterproofing shall be clean, dry, free of loose, spalled or weak material including coatings, mineral aggregate, and flood coat/gravel surfacing, oil, grease, contaminants, abrupt changes in level, waterproofing agents, curing compounds, and free of projections which could damage membrane materials.

B. Existing Asphaltic Bituminous Waterproofing:
   1. Existing bituminous roofing and flashing materials shall be removed down to the structural substrate/penetration surface.

C. Wood Roof Deck:
   1. Modified Bitumen roofs to be installed over minimum ¾" plywood deck or better.
   2. Inspect wood deck for proper securement to structural joists by fastener, ensure no loose decking panels. Ensure all joints are blocked. No seams shall be unsupported.
   3. Inspect for any differential deflection at side or end laps, ensure fasteners are in place at joints.
   4. Inspect for any damaged panels and repair with similar deck material.

5. Any abandoned penetrations must be repaired with similar deck material.
6. Any suspect areas must be brought to the attention of the General Contractor or Owner's Representative and corrected prior to the start of roofing installation. Any recertification must be performed by a structural engineer, not the roofing contractor.

D. Masonry at Flashings:
   1. Walls shall be built with hard kiln dried brick or stone masonry construction.
   2. Areas of soft or scaling brick or stone, faulty mortar joints, or walls with broken, damaged or leaking coping shall be repaired in accordance with the requirements of the Owner or his designated Representative and Flashing Membrane Manufacturer.

E. Steel/Metal at Flashings:
   1. Clean and prepare metal surfaces to near white metal in accordance with SSPC - SP3 (power tool clean) or as required by membrane manufacturer. Extend preparation a minimum of three (3) inches beyond the termination of the membrane flashing materials. Notch steel surfaces to provide a rust-stop.
   2. In addition to cleaning, all metal surfaces shall be abraded to provide a rough open surface. A wire brush finish is not acceptable.

F. Wood/Plywood at Flashings:
   1. Plywood shall be identified with American Plywood Association (APA) grade trade marks and shall meet the requirements of product standard PS1. Strip plywood joints with four inch (4") wide strip of flashing membrane. Cover knot holes or cracks with strips of flashing Membrane.

G. Other Flashing Surfaces:
   1. Remove all contaminants as required by membrane manufacturer. Surface preparation shall be performed by means approved by Owner or his designated Representative.

H. Finish Leveling, Patching and Crack Preparation at Flashings:
   1. General: EP primer/sand mix is the preferred material for all concrete and masonry substrate finish leveling, crack and wall/deck preparation and patching. EP primer/sand patching mix provides a set time of approximately twelve (12) hours and does not require surface grinding. Primer/sand mix is typically applied in conjunction with general surface priming.

   2. Concrete and Masonry Substrate Leveling & Patching: Substrate conditions are to be evaluated by the Contractor, the Owner, or his designated Representative, and Membrane manufacturer. Perform leveling and patching operations as follows:
      a) Level uneven surfaces with a leveling mixture of primer and approved kiln-dried silica sand in a 1:2 primer to sand ratio by volume. Spread and plane this compound with a squeegee and trowel to achieve a flat surface.
      b) Fill cavities with a patching mixture of primer and approved kiln-dried sand in a 1:3/1:3.5 primer to sand ratio by volume.
      c) Silica sand must be kept absolutely dry during storage and handling.
      d) Any surface to be leveled or filled must first be primed with an appropriate primer.

   3. Joint and Crack Preparation: Joints, cracks and fractures in the structural deck/substrate shall be prepared as defined below prior to installation of the

waterproofing membrane. Note: Joints, cracks, and fractures may telegraph through the waterproofing membrane.

a) Non-Moving Cracks: Determine that crack is non-moving. Clean out crack by brushing and oil-free compressed air. Fill crack with polyurethane sealant. Allow for a minimum of twelve (12) hours cure or as required by sealant Manufacturer.

b) Moving Cracks: Determine that crack is moving. Clean out crack by brushing and oil-free compressed air. Fill crack with polyurethane sealant. Allow for a minimum of twelve (12) hours cure or as required by sealant Manufacturer. Apply resin and 4 inch (10 cm) wide strip of membrane (resin and fleece) in strict accordance with Membrane manufacturer's written instructions.

3.3 WOOD NAILER LOCATION AND INSTALLATION

A. Install construction grade wood nailers as specified, or as required by the Membrane manufacturer.

B. Secure Wood Nailer: Wood nailers shall be firmly fastened to the substrate. The wood nailer attachment must be able to resist a minimum force of 200 lbs. per lineal foot, in any direction. Mechanically fasten wood nailers as required to resist a force of 200 lbs per lineal foot, but with no less than 5 fasteners per 8 foot or 6 fasteners per 10 foot length of nailer. Refer to current FM Loss Prevention Bulletin 1-49 for additional attachment

3.5 INSTALLATION- GENERAL

A. Install GAFMC's Ruberoid roofing system according to all current application requirements in addition to those listed in this section.

B. When the slope of the roof is 1/2 inch (13 mm) per foot (305 mm) or greater, install all plies parallel with the slope of the roof, and install intermediate wood nailers as required for the specific roof slope. Plies shall extend over ridges and nailed on 6 inches (152 mm) centers.

C. Start the application of membrane plies at the low point of the roof or at the drains, so that the flow of water is over or parallel to, but never against the laps.

3.6 BASE SHEET INSTALLATION

A. Base Sheet:

1. Roll the base sheet out over the substrate and allow it to relax. Lap the base sheet so the flow of water is over or parallel to, but never against the laps.
2. Lap the base sheet 2 inches (51 mm), and 4 inches (102 mm) on the ends. Keeping the base sheet taut, push out all wrinkles and buckles ahead as fastening proceeds.
3. Turn base sheet up to the top of the cant.
4. Stagger adjacent end laps a minimum of 18 inches (457 mm).
5. A minimum FMRC 1-60 attachment is recommended. Refer to FMRC Approval Guide for FM Fastening patterns. Factory Mutual requires fastener density increases in perimeter and corner zones for FM 1-60 and FM 1-90 or greater. Refer to FM Loss Prevention Data Sheets 1-7, 1-28, 1-29 and 1-49.

B. Interply Sheets:

1. One-ply interply application: Install full width ply sheets, lapping 2 inches (51 mm) on the sides and 4 inches (10.2 cm) on the ends. Stagger adjacent end laps a minimum of 18 inches (457 mm) apart. Where installed over base sheet, stagger ply sheet's side

and end laps from underlying plies.

3.7 CAP SHEET INSTALLATION

A. General:

1. For slopes less than 1/2 inch per foot (40 mm per meter), membrane should be applied shingle fashion, perpendicular to the slope of the roof deck. On all slopes 1/2 inch per foot (40 mm per meter) and over, membrane should be installed parallel to the slope of the roof. In no case should the flow of water be against the laps.
2. The membrane material shall be unrolled, cut into 12 feet to 18 feet (3700 to 5500 m) lengths, placed upside down and allowed to "relax" prior to installation. Then re-roll to apply.
3. Install full width sheets, lapping minimum 3 inches (76 mm) on the sides and 6 inches (152 mm) on ends. Stagger adjacent end laps a minimum of 18 inches (450 mm) apart. Where installed over base sheet, stagger sheet's side and end laps from underlying plies.
4. Starting at the low point or the drains, apply the Matrix cold adhesive to the substrate in either method as follows:
   a) Pour the adhesive on the substrate and spread, using a serrated edged squeegee, applied at the rate of 1-1/2 gal per square (6 L/sm).
   b) Spray, using equipment that will apply the adhesive at a rate equal to 1-1/2 gal/square (6 L/sm).
5. Apply the adhesive so that the substrate is coated in a pattern slightly larger than the first sheet being applied.
6. End laps and selvage laps of the Ruberoid being lapped shall be coated with adhesive so that a visible bead of adhesive appears. Roll all laps with a steel roller to ensure proper adhesion. Alternately, the end laps and side laps may be hot-air welded. The hot-air welding method will provide a watertight lap immediately and may be preferable when inclement weather is threatening.
7. Allow 5 to 15 minutes for solvents to evaporate from the adhesive (i.e. tack time or open time) before embedding any sheets into newly applied adhesive. Tack times may vary based on ambient conditions.
8. Insure that the Ruberoid membrane lays flat in the cold adhesive. There shall be complete adhesion between the cap sheet and the cold adhesive. Brooming of the plies may be necessary under certain conditions to assure that the cap sheet adheres solidly to the cold adhesive. Apply extra pressure to avoid creating open channels where three or more membranes are lapped.
9. A minimum 3/8 inch (10 mm) and maximum 1 inch (25 mm) cold adhesive flow-out shall be obtained at all seam areas when the side laps are not heat welded. Dry laps are not acceptable. Check all seams for full and uniform adhesion.
10. All end laps shall be staggered a minimum of 18 inches (457 mm) so that no adjacent end laps coincide. If end laps fall in line or are not staggered the proper distance, a full width of Ruberoid SBS membrane shall be installed over the end laps.
11. One-ply application: Install full width ply sheets, lapping 2 inches (51 mm) on the sides and 4 inches (102 mm) on the ends. Stagger adjacent end laps a minimum of 18 inches (457 mm) apart. Where installed over base sheet, stagger ply sheet's side and end laps from underlying plies.
12. Two-ply application: Install 19-11/16 inches (500 mm) and 39-3/8 inches (1000 mm) width starter plies, and follow with a second 39-3/8 inches (1000 mm) width sheet with a maximum of 17-11/16 inches (449 mm) exposure, applied shingle style. Lap felts 20-11/16 inches (526 mm) with an 18-11/16 inches (475 mm) exposure and 6 inches (152 mm) on end laps. Stagger adjacent end laps a minimum of 18 inches (457

mm).

13. If damage by other trades or any inadvertent damage should occur to the EnergyCap product during installation, and for aesthetic purposes only, an additional fog coat of EnergyCote coating can be applied to the sheet at a rate of 1/2 to 1 gallon per 100 sq ft.

3.8 FLASHING APPLICATION

A. Bituminous Base Flashings:

1. Install base flashing over all cant strips, horizontal to vertical transitions, roof edges and roof penetrations. Flashings are to be secured in accordance with current GAF application guidelines.
2. Nailable curbs and walls shall be covered with a layer of approved GAFGLAS Base Sheet or backer ply fastened 8 inches (20.3 cm) o.c. in all directions with approved fasteners. All vertical laps shall be 4 inches (10.2 cm). Base sheet or backer ply shall extend out onto the field of the roof as shown in the applicable GAF construction detail.
3. Prime all metal and masonry surfaces with asphalt primer, and allow adequate drying time prior to adhering flashing plies.
4. Backer plies installed over masonry or other non-nailable substrates shall be cut into manageable lengths to ensure adequate adhesion to the cant strip and vertical surfaces without excessive voids. All vertical laps shall be 4 inches (10.2 cm). Backer plies shall extend onto the field of the roof as shown in the applicable GAF construction detail.
5. The finished ply of base flashing shall be run vertically to provide a selvage edge that will aid in achieving proper adhesion at the 3 inches (7.6 cm) vertical laps. If the sheet is run horizontally, the vertical laps shall be a minimum of 6 inches (15.2 cm) and the selvage edge shall be removed form the sheet or fully covered by the counterflashing. The finished flashing ply shall extend out onto the field of the roof as shown in the applicable GAF construction detail, and shall be extended a minimum of 4 inches (10.2 cm) beyond the edge of the prior flashing plies. The flashing shall be soundly adhered to the parapet, cant area and roof surface to result in a minimum void, non-bridging construction.
6. Base flashing heights shall be a minimum of 8 inches (20.3 cm) and a maximum of 24 inches (61.0 cm) above the roofline.
7. Use only trowel-grade modified adhesive. Apply using a trowel or wide-edged putty knife with a uniform 1/8 inches thickness throughout. Firmly press sheets into the adhesive, and immediately nail the top of the flashing as specified it the appropriate flashing detail.
8. Corner membrane flashings, such as bow ties for outside corners and footballs for inside corners or other membrane reinforcements are required to ensure that base flashing corners are sealed at cant areas. An alternate method of corner reinforcing is to install a smooth MB membrane reinforcement piece on the prepared corner substrate prior to final surfacing membrane. Refer to BUR Flashing Details section of the GAF Application and Specifications Manual.

3.12 TEMPORARY CLOSURES & WATERSTOPS

A. Contractor shall be responsible to ensure that moisture does not damage any completed section of the new waterproofing system. Completion of flashings, terminations, and temporary closures shall be completed as required to provide a watertight condition. All temporary closures shall be made as recommended or required by the membrane manufacturer.

3.13 PROTECTION

A. Upon completion of waterproofing and flashings (including all associated work), institute appropriate procedures for surveillance and protection of roofing during remainder of construction period. Protect all areas where membrane has been installed.

3.14 CLOSEOUT

A. Correction of Work:

1. Work that does not conform to specified requirements including tolerances, slopes, and finishes shall be corrected and/or replaced. Any deficiencies of membrane application, termination and/or protection as noted during the Membrane manufacturer's inspections shall be corrected and/or replaced at Contractor's expense.

B. Clean-Up:

1. Site clean-up, including both interior and exterior building areas that have been affected by construction, shall be restored to preconstruction condition.

END OF SECTION

SECTION 07 62 00

SHEET METAL FLASHING AND TRIM

PART 1 – GENERAL

1.1 SECTION INCLUDES

A. Flashings
B. Counterflashings over base flashings.

1.2 RELATED SECTIONS

A. Section 06 25 00 - Wood Repairs
B. Section 07 52 00 – Modified Bituminous Roofing
C. Section 09 91 00 - Painting: Prime and finish painting.

1.3 REFERENCES

A. AISI (American Iron and Steel Institute) - Stainless Steel - Uses in Architecture.
B. ASTM A167 - Stainless and Heat-Resisting Chromium-Nickel Steel Plate.
C. ASTM A525 - Steel Sheet, Zinc Coated, (Galvanized) by the Hot-Dip Process.
D. ASTM B32 - Solder Metal.
E. ASTM B209 - Aluminum and Alloy Sheet and Plate.
F. ASTM B370 - Copper Sheet and Strip for Building Construction.
G. ASTM B486 - Paste Solder.
H. ASTM D226 - Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing.
I. ASTM D4586 - Asphalt Roof Cement, Asbestos-Free.
J. CDA (Copper Development Association) - Contemporary Copper, A Handbook of Sheet Copper Fundamentals, Design, Details and Specifications.
K. CDA - Copper Roofing - A Practical Handbook.
L. FS O-F-506 - Flux, Soldering, Paste and Liquid.
M. NRCA (National Roofing Contractors Association) - Roofing Manual.
N. SMACNA - Architectural Sheet Metal Manual.

1.4 SUBMITTALS

A. Submit under provisions of Section 01 33 00.

B. Shop Drawings: Indicate material profile, jointing pattern, jointing details, fastening methods, flashings, terminations, and installation details.

C. Samples: Submit two samples, 12 x 12 inch in size illustrating typical standing seam, seam, external corner, internal corner, junction to vertical dissimilar surface, material and finish.

D. Submit two samples 12 x 12 inch in size illustrating metal finish color.

1.5 QUALITY ASSURANCE

A. Perform work in accordance with SMACNA standard details and requirements.

B. Maintain one copy of each document on site.

1.6 QUALIFICATIONS

A. Fabricator and Installer: Company specializing in sheet metal flashing work with 5 years

documented experience.

1.7 PRE-INSTALLATION CONFERENCE

A. Convene one week prior to commencing work of this section, under provisions of Section 01 31 00.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, protect and handle products to site under provisions of Section 01 60 00.

B. Stack preformed and prefinished material to prevent twisting, bending, or abrasion, and to provide ventilation. Slope metal sheets to ensure drainage.

C. Prevent contact with materials, which may cause discoloration or staining.

1.9 COORDINATION

A. Coordinate work under provisions of Section 01 31 00.

B. Coordinate with the work of Section 07 65 26 for installing flashing reglets.

PART 2 – PRODUCTS

2.1 SHEET MATERIALS

A. Copper: ASTM B370, cold rolled 20 oz/sq ft thick; natural finish.

B. Aluminum Sheet: ASTM B209, .032 inch thick; mill finish, shop pre-coated with baked on enamel coating of color to be selected.

C. Pre-Coated Galvanized Steel: ASTM A446, Grade A, G90 zinc coating; 24 gage core steel, shop pre-coated with modified silicone coating of color to be selected.

D. Lead Coated Copper: ASTM B101 Type 1, Class A, soft temper, 20 oz/sq ft.

2.2 ACCESSORIES

A. Fasteners: Same material and finish as flashing metal, with soft neoprene washers.

B. Underlayment: ASTM D226 No. 15 asphalt saturated roofing felt.

C. Ice & Watershield: Specified in Section 07 30 00.

D. Slip Sheet: Rosin sized building paper.

E. Primer: Zinc chromate type.

F. Protective Backing Paint: Zinc chromate alkyd.

G. Sealant: Specified in Section 07 92 00.

H. Bedding Compound: Rubber-asphalt.

I. Plastic Cement: ASTM D4586, Type I.

J. Reglets: Surface mounted and Recessed type, galvanized steel.

K. Insulating tape: 1/8 inch thick bituminous self adhesive for use between dissimilar metals.

2.3 FABRICATION

A. Form sections true to shape, accurate in size, square, and free from distortion or defects.

B. Fabricate cleats of type sheet metal, same material as sheet, minimum 2 inches wide, interlockable with sheet.

C. Form pieces in longest possible lengths.

D. Hem exposed edges on underside 1/2-inch miter and seam corners.

E. Form material with standing seams.

F. Pre-tin edges of copper sheet. Solder shop formed metal joints. After soldering, remove flux. Wipe and wash solder joints clean. Weather seal joints.

G. Fabricate corners from one piece with minimum 18 inch long legs; seam for rigidity, seal with sealant.

H. Fabricate vertical faces with bottom edge formed outward 1/4 inch (6 mm) and hemmed to form drip.

I. Fabricate flashings to allow toe to extend 2 inches over roofing. Return and brake edges.

2.4 FINISH

A. Prepare copper surfaces in accordance with Section 09 91 00.

B. Back paint concealed metal surfaces with protective backing paint to a minimum dry film thickness of 15 mil.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify roof openings, curbs, pipes, sleeves, ducts, or vents through roof are solidly set, reglets in place, and nailing strips located.

B. Verify roofing termination and base flashings are in place, sealed, and secure.

3.2 PREPARATION

A. Install starter and edge strips, and cleats before starting installation.

B. Install surface mounted reglets true to lines and levels. Seal top of reglets with sealant.

3.3 INSTALLATION

A. Conform to drawing details on the drawings and in the SMACNA manual.

B. Insert flashings into reglets to form tight fit. Secure in place with wedges. Pack remaining spaces with lead wool. Seal flashings into reglets with sealant.

C. Secure flashings in place using concealed fasteners. Use exposed fasteners only where

permitted.

D. Apply plastic cement compound between metal flashings and felt flashings.

E. Fit flashings tight in place. Make corners square, surfaces true and straight in planes, and lines accurate to profiles.

F. Seal metal joints watertight.

G. Solder metal joints for full metal surface contact. After soldering, wash metal clean with neutralizing solution and rinse with water.

H. Provide insulating tape where necessary to prevent contact of dissimilar metals.

3.4 FIELD QUALITY CONTROL

A. Field inspection will be performed under provisions of Section 01 40 00.

B. Inspection will involve surveillance of work during installation to ascertain compliance with specified requirements.

3.5 SCHEDULE

A. Brake metal fascia and trim: Pre-coated Aluminum. Color: To be selected. Profiles as shown on the Drawings.

B. Flashing in contact with masonry: Copper.

C. Parapet coping flashing - Copper. Color: To be selected. Profiles as shown on the Drawings.

END OF SECTION

SECTION 09 90 00

PAINTING

PART 1 GENERAL

1.01 WORK INCLUDED

A. Surface preparation & painting.

1.02 RELATED WORK

A.

1.03 REFERENCES

A. ANSI/ASTM D16 - Definitions of Terms Relating to Paint, Varnish, Laquer, and Related Products.
B. ASTM D2016 - Test Method for Moisture Content of Wood.

1.04 DEFINITIONS

A. Conform to ANSI/ASTM D16 for interpretation of terms used in this Section.

1.05 QUALITY ASSURANCE

A. Product Manufacturer: Company specializing in manufacturing quality paint and finish products with three years experience.
B. Applicator: Company specializing in commercial painting and finishing with three years documented experience.

1.06 REGULATORY REQUIREMENTS

A. Conform to applicable code for flame/fuel/smoke rating requirements for finishes.
B. Low-VOC and formaldehyde-free non-flat interior paints with a VOC content of 100g/L (max.), and flat interior paints with a VOC content of 50 g/L (max.). Low-VOC, water-based wood finishes with a maximum VOC content of 250 g/L.

1.07 SUBMITTALS

A. Submit product data under provisions of Section 01300.
B. Submit samples under provisions of Section 01300.
C. Submit Manufacturer's color charts illustrating range of colors and textures available for each surface finishing product scheduled, for selection.
D. Submit manufacturer's application instructions under provisions of Section 01300.

1.08 FIELD SAMPLES

A. Provide samples under provisions of Section 01300.
B. Provide two field sample panels, 24 inches long by 24 inches wide, illustrating coating color, texture, and finish.
C. Locate where directed.
D. Accepted sample may not remain as part of the Work.

1.09 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. Deliver products to site in sealed and labeled containers; inspect to verify acceptance.
D. Container labeling to include manufacturer's name, type of paint, brand name, brand code, coverage, surface preparation, drying time, cleanup, color designation, and instructions for mixing and reducing.
E. Store paint materials at minimum ambient temperature of 45 degrees F (7 degrees C) and a maximum of 90 degrees F (32 degrees C), in well ventilated area, unless required otherwise by manufacturer's instructions.
F. Take precautionary measures to prevent fire hazards and spontaneous combustion.

1.10 ENVIRONMENTAL REQUIREMENTS

A. Provide continuous ventilation and heating facilities to maintain surface and ambient temperatures above 45 degrees F (7 degrees C) for 24 hours before, during, and 48 hours after application of finishes, unless required otherwise by manufacturer's instructions.
B. Do not apply exterior coatings during rain or snow, or when relative humidity is above 50 percent, unless required otherwise by manufacturer's instructions.
C. Minimum Application Temperatures for Latex Paints: 45 degrees F (7 degrees C) for interiors; 50 degrees F (10 degrees C) for exterior; unless required otherwise by manufacturer's instructions.
D. Minimum Application Temperature for Varnish and Finishes: 65 degrees F (18 degrees C) for interior or exterior, unless required otherwise by manufacturer's instructions.
E. Provide lighting level of 80 ft candles (860 lx) measured mid-height at substrate surface.

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS - PAINT

A. Sherwin Williams, Product: Latex Enamel.
B. Benjamin Moore, Product: Latex Enamel.
C. Pittsburgh Paint, Product: Latex Enamel.
D. Substitutions: Under provisions of Section 01600.

2.02 ACCEPTABLE MANUFACTURERS - PRIMER-SEALERS

A. Sherwin Williams, Product: Latex Enamel.
B. Benjamin Moore, Product: Latex Enamel.
C. Pittsburgh Paint, Product: Latex Enamel.
D. Substitutions: Under provisions of Section 01600.

2.03 MATERIALS

A. Coatings: Ready mixed, except field-catalyzed coatings. Process pigments to a soft paste consistency, capable of being readily and uniformly dispersed to a homogeneous coating.
B. Coatings: Good flow and brushing properties; capable of drying or curing free of streaks or sags.
C. Accessory Materials: Linseed oil, shellac, turpentine, paint thinners and other materials not specifically indicated but required to achieve the finishes specified, of commercial quality.

2.04 FINISHES

A. Refer to schedule at end of Section for surface finish and color schedule.

PART 3 EXECUTION

3.01 INSPECTION

A. Verify that surfaces are ready to receive work as instructed by the product manufacturer.
B. Examine surfaces scheduled to be finished prior to commencement of work. Report any condition that may potentially affect proper application.
C. Measure moisture content of surfaces using an electronic moisture meter. Do not apply finishes unless moisture content of surfaces is below the following maximum:
   1. Exterior Located Wood: 19 percent, measured in accordance with ASTM D2016.
D. Beginning of installation means acceptance of existing surfaces.

3.02 PREPARATION

A. Correct minor defects and clean surfaces which affect work of this Section.
B. Shellac and seal marks which may bleed through surface finishes.
C. Impervious Surfaces: Remove mildew by scrubbing with solution of tri-sodium phosphate and bleach. Rinse with clean water and allow surface to dry.
D. Aluminum Surfaces Scheduled for Paint Finish: Remove surface contamination by steam or high pressure water. Remove oxidation with acid etch and solvent washing. Apply etching primer immediately following cleaning.
E. Galvanized Surfaces: Remove surface contamination and oils and wash with solvent. Apply coat of etching primer.
F. Uncoated Steel and Iron Surfaces: Remove grease, scale, dirt, and rust. Where heavy coatings of scale are evident, remove by wire brushing or sandblasting; clean by washing with solvent. Apply a treatment of phosphoric acid solution, ensuring weld joints, bolts, and nuts are similarly cleaned. Spot prime paint after repairs.
G. Shop Primed Steel Surfaces: Sand and scrape to remove loose primer and rust. Feather edges to make touch-up patches inconspicuous. Clean surfaces with solvent. Prime bare steel surfaces. Prime metal items including shop primed items.
H. Exterior Wood Scheduled to Receive Paint Finish: Remove dust, grit, and foreign matter. Seal knots, pitch streaks, and sappy sections. Fill nail holes with tinted exterior calking compound after prime coat has been applied. Sand between coats.
I. Masonry/Stone to receive paint finishes: Remove dust, grit, and foreign matter and loose paint. Prime entire surface and repaint.

3.03 PROTECTION

A. Protect elements surrounding the work of this Section from damage or disfiguration.
B. Repair damage to other surfaces caused by work of this Section.
C. Furnish drop cloths, shields, and protective methods to prevent spray or droppings from disfiguring other surfaces.
D. Remove empty paint containers from site.

3.04 APPLICATION

A. Apply products in accordance with manufacturer's instructions.
B. Do not apply finishes to surfaces that are not dry.
C. Apply each coat to uniform finish.
D. Apply each coat of paint slightly darker than preceding coat unless otherwise approved.
E. Sand lightly between coats to achieve required finish.
F. Allow applied coat to dry before next coat is applied.
G. Where clear finishes are required, tint fillers to match wood. Work fillers into the grain before set. Wipe excess from surface.

H. Prime back surfaces of interior and exterior woodwork with primer paint.

3.05 CLEANING

A. As Work proceeds, promptly remove paint where spilled, splashed, or spattered.
B. During progress of Work maintain premises free of unnecessary accumulation of tools, equipment, surplus materials, and debris.
C. Collect cotton waste, cloths, and material, which may constitute a fire hazard, place in closed metal containers and remove daily from site.

3.06 SCHEDULE - EXTERIOR SURFACES

A. Wood – Painted
   1. One coat latex primer sealer.
   2. Two coats latex enamel, semi-gloss.
B. Wood – Varnish
   1. Two coats, satin.
C. Steel/Iron/Metal - Unprimed
   1. One coat zinc chromate primer.
   2. Two coats latex enamel, semi- gloss.
D. Steel/Iron/Metal - Shop Primed
   1. Touch-up with zinc chromate primer.
   2. Two coats latex enamel, semi- gloss.
E. Steel - Galvanized
   1. One coat zinc chromate primer.
   2. Two coats latex enamel, semi- gloss.
F. Aluminum - Mill Finish
   1. One coat etching primer.
   2. Two coats latex enamel.

3.07 SCHEDULE - COLORS

A. <u>Exterior:</u>
   1. Exterior Woodwork & Metal: Benjamin Moore XXX

B. Final color Selections will be made by the Architect and Owner at a later date based on samples and product submissions in accordance with Section 1.08.

END OF SECTION

Exhibit A

B. Darling Roofing Report

B P D Roof Consulting Inc.
121 Hartford Avenue
East Granby, CT 06026
Phone 860-653-6779
Fax 860-653-6988

December 8, 2021

Crosskey Architects
Attn: Ms. Laura Crosskey
750 Main St. Suite 150
Hartford, CT 06103

Re: Union Baptist Church 1921 Main St. Hartford, CT

Dear Ms. Crosskey;

As requested I visited the above location on Nov. 11, 2021 to do an inspection of the slate roofing at the church. I was accompanied by a roofing technician from Eagle Rivet, and Caryn Wrona of your office. We have prepared a roof plan and labeled the various roofs as S for slate, SH for shingles, D for Dormers, and R for low slope sections. Photos were taken of various items on the roof and walls. These are labeled as an attachment and are located on the roof plan.

OBSERVATIONS

1) SLATE Sections S1 through S12.
   a) The slate on the south side were mainly purple with a band of green at the top and bottom. The north side was similar but not quite the same. The bottom band was intermittent. See photo 1, 54, and 55.
   b) Starter slate were installed vertically when normally they are horizontal. See photo 6.
   c) The slate was generally in good condition. The slate pulled at the several probes were sounded with a hammer and were found solid.
      i) Some near the south side ridge were shaling and when sounded did not ring. These have failed.
   d) Some broken and cracked slate were noted. See photo 4, 16, 21, 41,
   e) The slate was found to be 18” in length and varied in width from 8” to 12”
   f) The slate was fastened with steel nails. These were in good condition. See photo 13.
   g) The wood deck varied in its direction. Some locations decking was oriented vertically up the slope and others it was horizontal across the slope.
      i) At test cut 1 the decking had a beaded edge see photo 7; at the other 3 locations it was square edge. See photo 11, 58, and 65.
   h) Five probes were taken three on the south side and two on the north side.
      i) In all locations the underlayment felt was in poor to failed condition. See photo 7, 10, 57, and 65.

2) METAL FLASHING
   a) Most if not all the metal flashings had been coated over with roof cement in an attempt to extend their service life.
      i) Frequently aluminum was used over existing copper and has deteriorated badly. See photo 2, and 5.
   b) The ridge caps had been secured with steel nails and steel bars. See photo 14, 15, 22, and 62. Photo 44 shows that the ridge cap has been lifted from a wind event.
      i) It is likely that the wood below is in need of some repairs.
   c) Valley flashings had been coated with roof cement. The repair effort was in poor condition. See photo 22, 24, 41, and 66.
   d) Hips were mitered style with metal flashing woven into each course. The metal flashings were severely deteriorated. See photo 20, 23, and 63.
      i) The slate was frequently installed with only 1 nail so they rotate out of position.
   e) Gutters have had their bottoms and frequently front and back sides coated with roof cement. See photo 24, 36,
      i) Yankee gutters were found in two locations. See photo 66. These were built onto the roof deck not hung or built in.
   f) Lead counterflashings were noted at intersections to Stone Masonry. These were in poor condition. See photo 17, 26, 27, 28, 39,
   g) At sections S4, S6, and S8 there was a slope transition with the lower 6 courses at a 10 pitch with the upper courses at a 21 pitch. No metal flashing was used to facilitate the transition. See photo 24 and 42.
      i) The slate on the lower slope section had a lesser exposure. These slate had a 4.5" exposure which means the slate were 12" in length. See photo 43.
3) LOW SLOPE
   a) Two areas of low slope roofing were noted and have been designated R1 and R2.
      i) R1 is located between the wall of the old steeple and roof section SH3. See photo 29. This area is in poor condition.
      ii) R2 was located between S8 and S9. See photo 51 and 52.
4) MASONRY
   a) Various mortar joints between coping sections were in poor condition. See photo 45.
   b) The bed joints of many of the coping stones were in poor condition.

c) Steel bars were noted below the coping stones in several locations. See photo 25.

d) The coping stones/ parapet walls had shifted in a few locations. See photo 46, 47, and 48.

e) Mortar joints in the stone masonry were in need of pointing in some areas. See photo 18, 19, and 49.

DISCUSSION / RECOMMENDATIONS

1) The slate was in serviceable condition; however, the underlayment felts were no longer serviceable and were failing or had failed. Repairs would be difficult and you cannot tie in the new underlayment's to the existing. The slate may be removed, saved, and reinstalled with new slate to make up for losses. We assume that 30% new slate may be required. In this manner new underlayment can be provided over the entire area to provide for a long-term serviceable installation.
2) The various flashings at steps, hips, ridges, and valleys are all in poor condition and many are failed. These need to be replaced with new copper, lead coated, or zinc coated 20oz. copper.
3) The gutters are failed in many areas as noted by the covering of the metal with roof cement. These require replacement with new copper, lead coated, or zinc coated 20oz. copper. We would recommend that drip strips be placed where the water falls from the slate to increase the service life of the gutters.
4) The lead counterflashings are at the end of their service life and need to be replaced. New flashings can be placed into cut reglets. They can be new lead or lead coated or Zinc coated copper to continue the gray color.
5) The masonry is in need of cleaning and pointing in many locations above the roof line.
6) The steel bar below the coping stones needs further investigation to understand what its function is.
7) The areas where the coping stone are out of plane appears to be due to water entry into the stone wall below and freeze thaw causing the stone to jack out of place. These will require rebuilding and a new through wall flashing.
8) The low slope areas need replacement with a long-term system which could be flat seam soldered copper panels. It could also be a protect membrane system utilizing a reinforced liquid applied membrane with protection course over it.

BUDGET

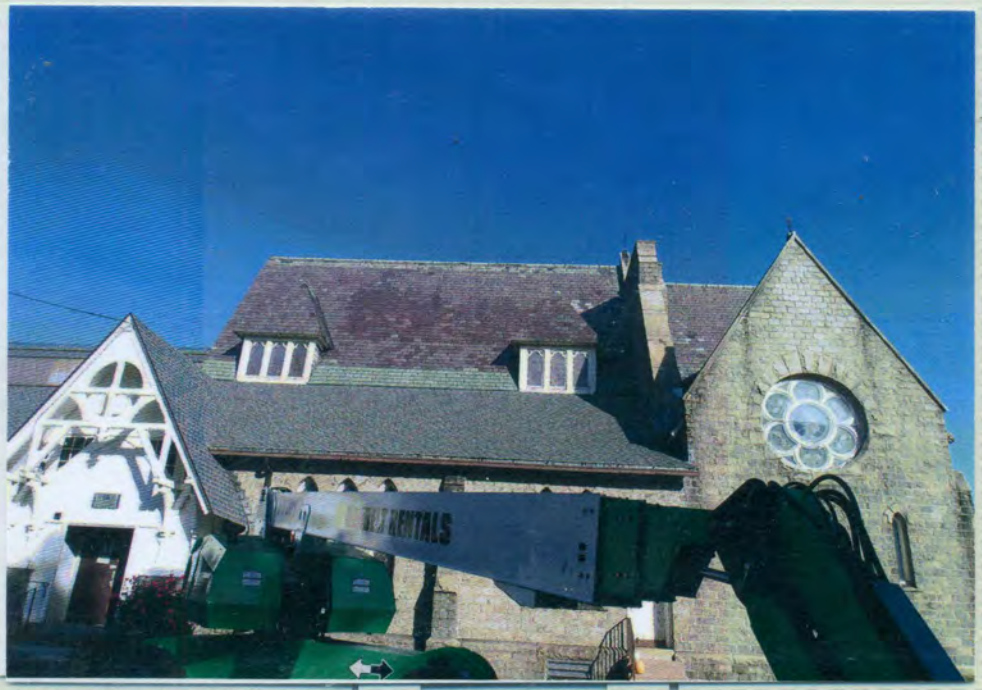
1) We estimate that the cost for the above scope of work would be approximately $350.000.
   a) The work could be broken in phases such as S1 and D1 and D2 as phase 1, then S3, S4 , R1, and S5 as phase 2, then S6, S7, and S8 as phase 3, R2, S9, S10, S11 and S12 as phase 4 then S2, D3, D5, and D5 as the final phase.

b) Masonry work could be its own phase.

If there are any questions on the above, please do not hesitate to call.

Respectfully submitted,
BPD Roof Consulting Inc.

Bruce P. Darling, RRC, RWC.
Principal



Union Baptist Church
1921 Main St.
Hartford, CT
Nov. 11, 2021

Photo 1

General view of south side. Purple slate roof and green band at bottom and top. Shingles below not included.

Photo 2

Transition of slate to shingles. Aluminum flashing in poor condition, torn and ripped with holes. Previously tarred over.

Photo 3

Flashing extends over shingles 4".

Photo 4

Broken slate needs to be replaced.

Photo 5

Probe 1. Slate pulled at transition. Old copper flashing still in place below aluminum.

Photo 6

Starter slate has close offset to first course. Also, starter laid vertical usually laid horizontal. Lath in place for proper angle.

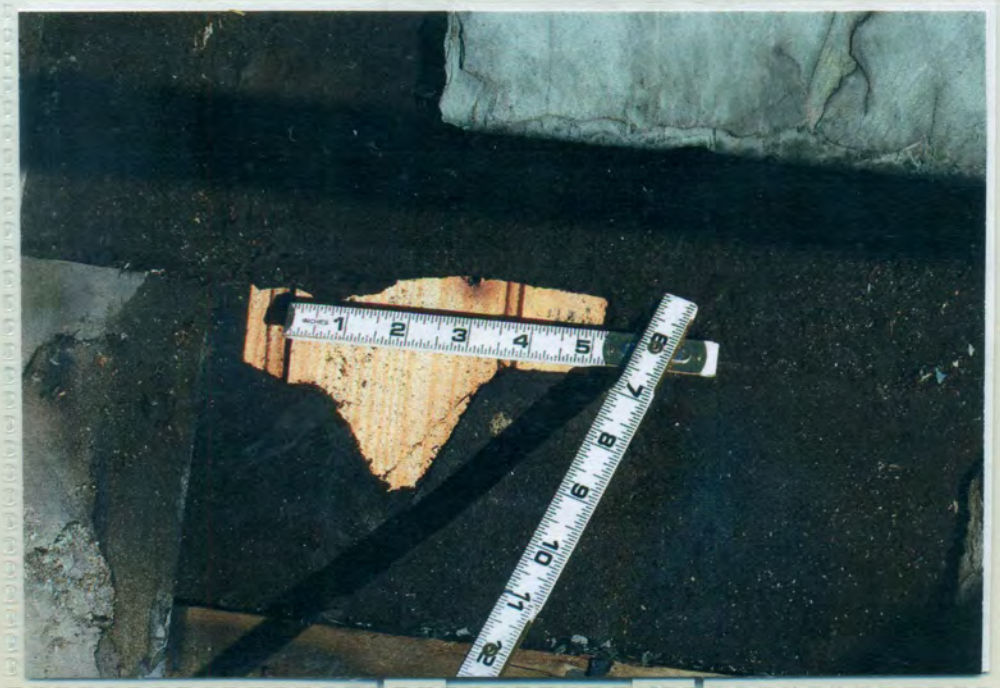


Photo 7

Underlayment felt removed. Felt was brittle and could not be bent. Decking here is 4" width and has a beaded edge.

Photo 8

Aluminum flashing deteriorated, copper below still functioning.

Photo 9

probe 2 taken in the field above the dormers between D1 and D2. Felt dusty, and mostly missing, wood decking exposed upper right of photo.

Photo 10

Piece of felt removed, and crumbled in my hand.

Photo 11

Roof deck does not have beaded edge here. Tongue and groove have shrunk apart.

Photo 12

Boards here are 9" in width

Photo 13

Steel nails used to secure slate

Photo 14

Steel bars used to hold down copper ridge cap. Steel badly rusted, noted rusted steel nails adjacent.

Photo 15

Note rusted steel nails in copper ridge cap.

Photo 16

Slate cut off and wood deck exposed between slates, near ridge.

Photo 17

Parapet between S1 and S4. Lead counterflashing with joint caulked. Counterflashing joints tarred over near bottom of photo.

Photo 18

Stone needs to be pointed and cleaned.

Photo 19

Stone needs to be pointed and cleaned.

Photo 20

Wood exposed at dormer hip. Slates not well secured.

Photo 21

Missing slate at hip, exposed wood adjacent to copper flashing.

Photo 22

Slate ridge cap at dormer fastened with now rusted steel nails., noted tarred up section at intersection to slate.

Photo 23

Flashing at hip has disintegrated. Metal crumbles easily.

Photo 24

Gutter and transition at S4 and S3.

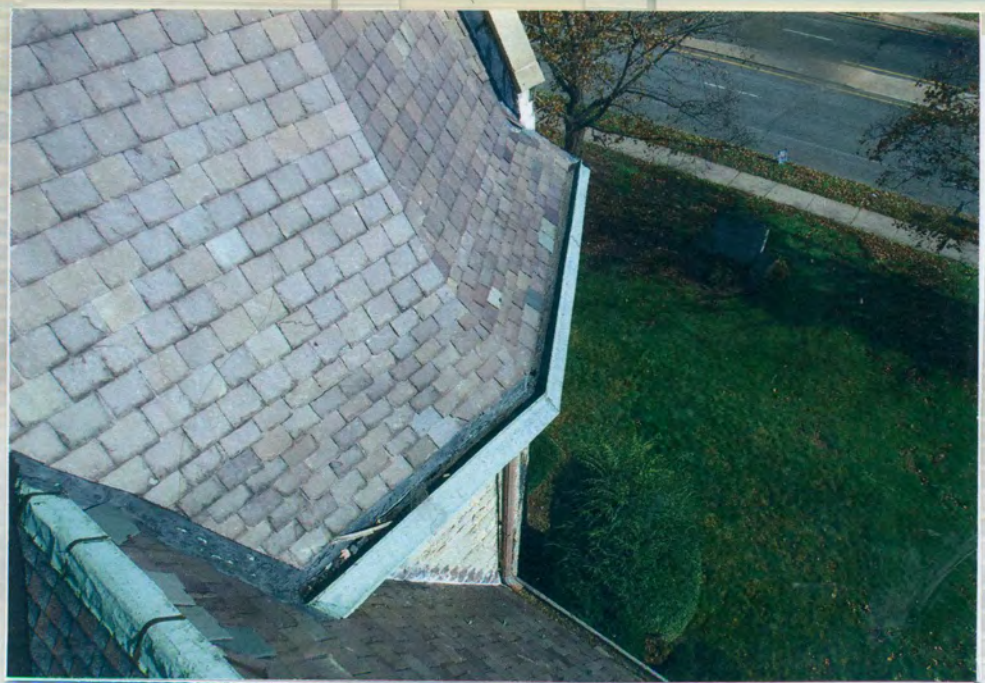


Photo 25

View of back of gable end and cricket section S7. Steel bars extend under stone coping and over lead counterflashing.

Photo 26

Slate cricket behind stone at old steeple location on S4. Metal flashing tarred over at counterflashing and valley.

Photo 27

Lead counterflashing at S4 in poor condition.

Photo 28

Lead counterflashing at S4 in poor condition.

Photo 29

Valley pocket between SH3 and old steeple wall. Note shingles this area not slate.

Photo 30

Gutter SH1 back measures 7".

Photo 31

Gutter SH1 front measures 4".

Photo 32

Gutter SH1 bottom measures 4".

Photo 33

Gutter cornice at S6 7.5".

Photo 34

Gutter front rises 1" at S6. Note gutter tarred over.

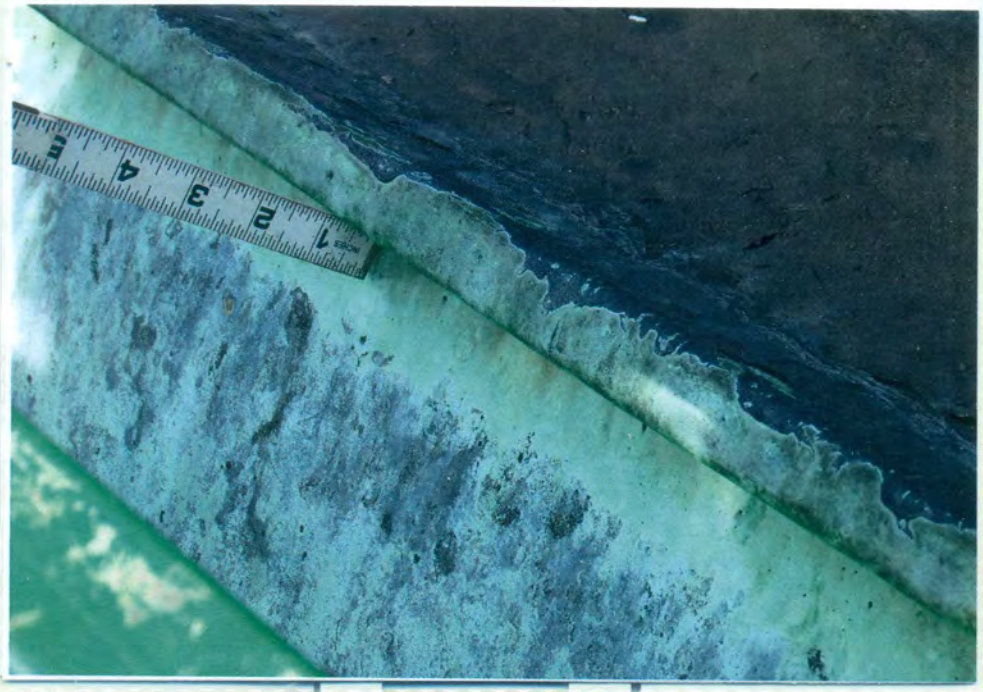


Photo 35

Gutter front width 1" at S6. Note gutter tarred over.

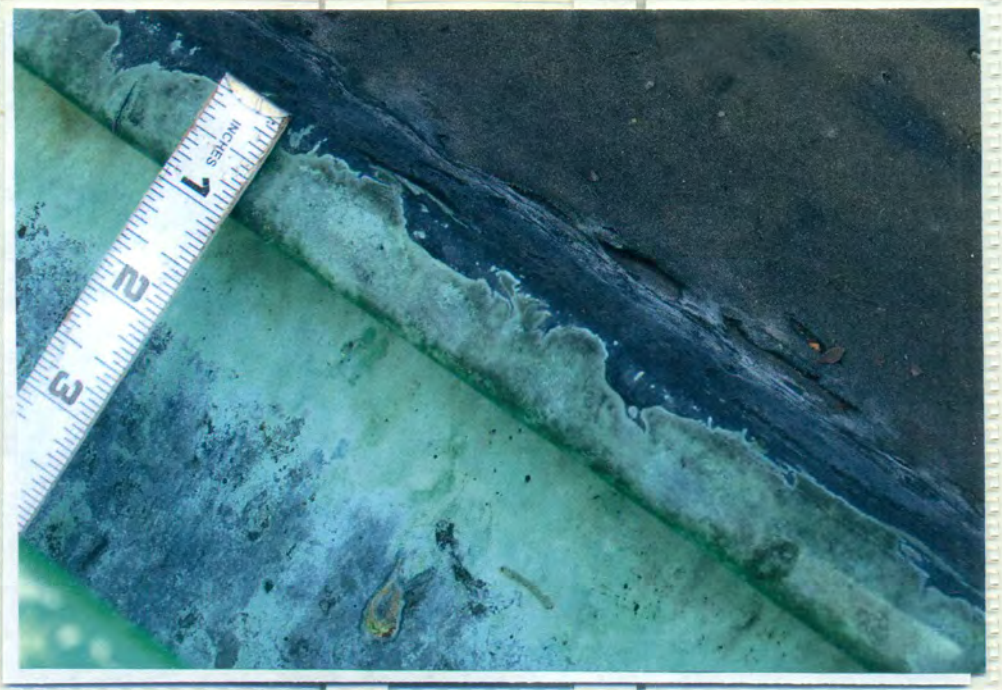


Photo 36

Gutter front 3" at S6. Note gutter tarred over.

Photo 37

Gutter bottom 5.5" at S6. Note gutter tarred over.

Photo 38

Gutter back measures 5.5" S6.

Photo 39

Slate valley tarred over S7 to cricket at gable end. counterflashing mortar joints in poor condition.

Photo 40

Close view of bad mortar joints at gable end.

Photo 41

Ridge cap missing at cricket behind gable end at S7. Top course of slate has only 1 nail per slate, not proper

Photo 42

Layup of slate at transition on section S6. Note slate spans over slope change. Normally there is a flashing here to facilitate the slope change.

Photo 43

Slate below transition is smaller 4.5" exposure

Photo 44

Ridge cap at S3 has lifted due to wind effects.

Photo 45

Mortar joints at cooping S3 in poor condition.

Photo 46

Coping stone at S10 is displaced from the adjacent one.

Photo 47

Parapet wall is tilted towards roof S11. Mortar joints in stone in poor condition and need to be rebuilt.

Photo 48

Coping stone at S11 is displaced from the adjacent one.

Photo 49

Mortar joints in poor condition gable end S11/12

Photo 50

Entry door trim rotted and in need of replacement.

Photo 51

Valley pocket between S8 and S9 in poor condition.

Photo 52

View of area of valley pocket.

Photo 53

View of Sections S10 on left and S11 on right. Valley tarred over as well as counterflashing.

Photo 54

View of north side east end. S5 with chimney, S2 roof with dormers.

Photo 55

View of north side west end. S2 roof with dormers. Note only has band at ridge not at transition to shingles.

Photo 56

Probe 4 on S2

Photo 57

Slate removed, felt in fair to poor condition. Portion at bottom left has turned to dust, other still one piece.

Photo 58

Felt removed to show roof deck.

Photo 59

Joints in coping in poor condition, counterflashing mortar joints in poor condition as well.

Photo 60

Close view of joints in coping and at counterflashing.

Photo 61

Steel bar below coping stone.

Photo 62

Dormer valley tarred over, copper ridge cap has steel bars for wind resistance.

Photo 63

Metal flashing at hips has disintegrated.

.

Photo 64

Probe 5 taken on S12

Photo 65

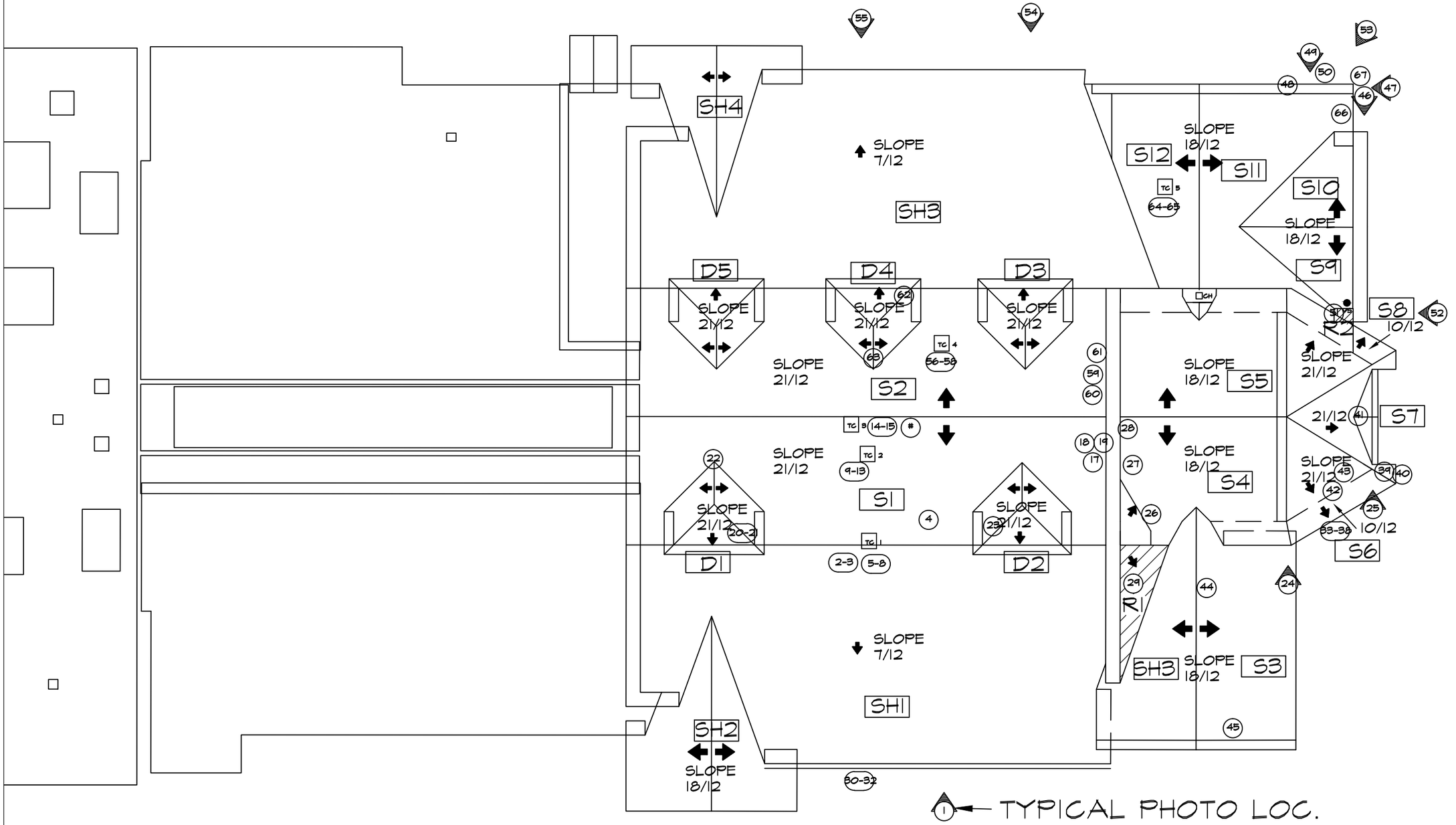
Felt cut to reveal decking, note decking goes horizontal whereas others were vertical. Felt in poor condition easily breaks when bent.

Photo 66

Newer Yankee style gutters. Note valley above is tarred over.

Photo 67

Corner stone 1871



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FAX 860-653-6988

UNION BAPTIST
1921 MAIN ST.
HARTFORD, CT

LEGEND OF SYMBOLS

NORTH

PROJ. NO.	
SCALE:	3/32"=1'-0"
DRAWN BY:	BPD
CHECKED BY:	0000
DATE:	12-7-21
REVISION:	

DRAWING: RP

Exhibit B

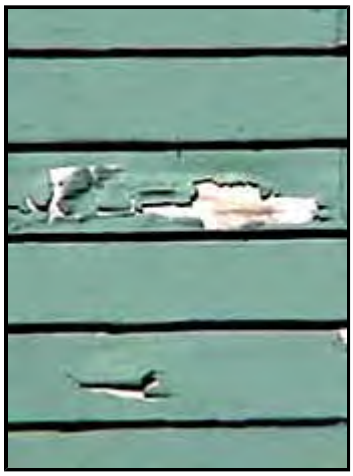
Preservation Brief 10

Exterior Paint Problems on Historic Woodwork

10 Preservation Briefs
Technical Preservation Services
National Park Service
U.S. Department of the Interior

Exterior Paint Problems on Historic Woodwork

Kay D. Weeks and David W. Look, AIA



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.

A cautionary approach to paint removal is included in the guidelines to the *Secretary of the Interior Standards for Rehabilitation.* Removing paints down to bare wood surfaces using harsh methods can permanently damage those surfaces; therefore such methods are not recommended. Also, total removal obliterates evidence of the historical paints and their sequence and architectural context.

This Brief expands on that advice for the architect, building manager, contractor, or homeowner by identifying and describing common types of paint surface conditions and failures, then recommending appropriate treatments for preparing exterior wood surfaces for repainting to assure the best adhesion and greatest durability of the new paint.

Although the Brief focuses on responsible methods of "paint removal," several paint surface conditions will be described which do not require any paint removal, and still others which can be successfully handled by limited paint removal. In all cases, the information is intended to address the concerns related to exterior wood. It will also be generally assumed that, because houses built before 1950 involve one or more layers of lead-based paint, the majority of conditions warranting paint removal will mean dealing with this toxic substance along with the dangers of the paint removal tools and chemical strippers themselves.

Purposes of Exterior Paint

The paint on this exterior decorative feature is sound. Photo: NPS files.

Paint applied to exterior wood must withstand yearly extremes of both temperature and humidity. While never expected to be more than a temporary physical shield--requiring reapplication every 5 to 8 years--its importance should not be minimized. Because one of the main causes of wood deterioration is moisture penetration, a primary purpose for painting wood is to exclude such moisture, thereby slowing deterioration not only of a building's exterior siding and decorative features but, ultimately, its underlying structural members. Another important purpose for painting wood is, of course, to define and accent architectural features and to improve appearance.

Treating Paint Problems in Historic Buildings

Exterior paint is constantly deteriorating through the processes of weathering, but in a program of regular maintenance--assuming all other building systems are functioning properly--surfaces can be cleaned, lightly scraped, and hand sanded in preparation for a new finish coat. Unfortunately, these are ideal conditions. More often, complex maintenance problems are inherited by owners of historic buildings, including areas of paint that have failed beyond the point of mere cleaning, scraping, and hand sanding (although much so-called "paint failure" is attributable to interior or exterior moisture problems or surface preparation and application mistakes with previous coats).

Although paint problems are by no means unique to historic buildings, treating multiple layers of hardened, brittle paint on complex, ornamental--and possibly fragile--exterior wood surfaces necessarily requires an extremely cautious approach. In the case of recent construction, this level of concern is not needed because the wood is generally less detailed and, in addition, retention of the sequence of paint layers as a partial record of the building's history is not an issue.

When historic buildings are involved, however, a special set of problems arises--varying in complexity depending upon their age, architectural style, historical importance, and physical soundness of the wood--which must be carefully evaluated so that decisions can be made that are sensitive to the longevity of the resource.

When the protective and decorative paint finish was removed and an inappropriate clear finish applied, the exterior character of the building was altered. Photo: NPS files.

Justification for Paint Removal

At the outset of this Brief, it must be emphasized that removing paint from historic buildings--with the exception of cleaning, light scraping, and hand sanding as part of routine maintenance--should be avoided unless absolutely essential. ***Once conditions warranting removal have been identified the general approach should be to***

remove paint to the next sound layer using the gentlest means possible, then to repaint. Practically speaking as well, paint can adhere just as effectively to existing paint as to bare wood, providing the previous coats of paint are also adhering uniformly and tightly to the wood and the surface is properly prepared for repainting-- cleaned of dirt and chalk and dulled by sanding.

But, if painted exterior wood surfaces display continuous patterns of deep cracks or if they are extensively blistering and peeling so that bare wood is visible, then the old paint should be completely removed before repainting. The only other justification for removing all previous layers of paint is if doors, shutters, or windows have literally been "painted shut," or if new wood is being pieced-in adjacent to old painted wood and a smooth transition is desired.

Paint Removal Precautions

Because paint removal is a difficult and painstaking process, a number of costly, regrettable experiences have occurred--and continue to occur--for both the historic building and the building owner. Historic buildings have been set on fire with blow torches; wood irreversibly scarred by sandblasting or by harsh mechanical devices such as rotary sanders and rotary wire strippers; and layers of historic paint inadvertently and unnecessarily removed. In addition, property owners, using techniques that substitute speed for safety, have been injured by toxic lead vapors or dust from the paint they were trying to remove or by misuse of the paint removers themselves.

Owners of historic properties considering paint removal should also be aware of the amount of time and labor involved. While removing damaged layers of paint from a door or porch railing might be readily accomplished within a reasonable period of time by one or two people, removing paint from larger areas of a building can, without professional assistance, easily become unmanageable and produce less than satisfactory results. The amount of work involved in any paint removal project must therefore be analyzed on a case-by-case basis. Hiring qualified professionals will often be a cost-effective decision due to the expense of materials, the special equipment required, and the amount of time involved. Further, paint removal companies experienced in dealing with the inherent health and safety dangers of paint removal should have purchased such protective devices as are needed to mitigate any dangers and should also be aware of State or local environmental and/or health regulations for hazardous waste disposal.

All in all, paint removal is a messy, expensive, and potentially dangerous aspect of rehabilitating or restoring historic buildings and should not be undertaken without careful thought concerning first, its necessity, and second, which of the available recommended methods is the safest and most appropriate for the job at hand.

Re-painting Historic Buildings for Cosmetic Reasons

If existing exterior paint on wood siding, eaves, window sills, sash, and shutters, doors, and decorative features shows no evidence of paint deterioration such as chalking, blistering, peeling, or cracking, then there is no physical reason to repaint, much less remove paint! Nor is color fading, of itself, sufficient justification to repaint a historic building.

The decision to repaint may not be based altogether on paint failure. Where there is a new owner, or even where ownership has remained constant through the years, taste in colors often changes. Therefore, if repainting is primarily to alter a building's primary and accent colors, a technical factor of paint accumulation should be taken into consideration.

When the paint on the wood windows became too thick, it was removed and the window repainted. Photo: NPS files.

When paint builds up to a thickness of approximately 1/16" (approximately 16 to 30 layers), one or more extra coats of paint may be enough to trigger cracking and peeling in limited or even widespread areas of the building's surface. This results because excessively thick paint is less able to withstand the shrinkage or pull of an additional coat as it dries and is also less able to tolerate thermal stresses. Thick paint invariably fails at the weakest point of adhesion--the oldest layers next to the wood. Cracking and peeling follow. Therefore, if there are no signs of paint failure, it may be somewhat risky to add still another layer of unneeded paint simply for color's sake (extreme changes in color may also require more than one coat to provide proper hiding power and full color). When paint appears to be nearing the critical thickness, a change of accent colors (that is, just to limited portions of the trim) might be an acceptable compromise without chancing cracking and peeling of paint on wooden siding.

If the decision to repaint is nonetheless made, the "new" color or colors should, at a minimum, be appropriate to the style and setting of the building. On the other hand, where the intent is to restore or accurately reproduce the colors originally used or those from a significant period in the building's evolution, they should be based on the results of a paint analysis.

Identification of Exterior Paint Surface Conditions/Recommended Treatments

It is assumed that a preliminary check will already have been made to determine, first, that the painted exterior surfaces are indeed wood--and not stucco, metal, or other wood substitutes--and second, that the wood has not decayed so that repainting would be superfluous. For example, if any area of bare wood such as window sills has been exposed for a long period of time to standing water, wood rot is a strong possibility. Repair or replacement of deteriorated wood should take place before repainting. After these two basic issues have been resolved, the surface condition identification process may commence.

The historic building will undoubtedly exhibit a variety of exterior paint surface conditions. For example, paint on the wooden siding and doors may be adhering firmly; paint on the eaves peeling; and paint on the porch balusters and window sills cracking and alligatoring. The accurate identification of each paint problem is therefore the first step in planning an appropriate overall solution.

Paint surface conditions can be grouped according to their relative severity: CLASS I conditions include minor

blemishes or dirt collection and generally require no paint removal; CLASS II conditions include failure of the top layer or layers of paint and generally require limited paint removal; and CLASS III conditions include substantial or multiple-layer failure and generally require total paint removal. It is precisely because conditions will vary at different points on the building that a careful inspection is critical. Each item of painted exterior woodwork (i.e., siding, doors, windows, eaves, shutters, and decorative elements) should be examined early in the planning phase and surface conditions noted.

The problem evidenced here by mossy growth and deteriorated wood must be resolved and the wood allowed to dry out before the wood is repainted. Photo: NPS files.

CLASS I Exterior Surface Conditions Generally Requiring No Paint Removal

Dirt, Soot, Pollution, Cobwebs, Insect Cocoons, etc.

Cause of Condition

Environmental "grime" or organic matter that tends to cling to painted exterior surfaces and, in particular, protected surfaces such as eaves, do not constitute a paint problem unless painted over rather than removed prior to repainting. If not removed, the surface deposits can be a barrier to proper adhesion and cause peeling.

Recommended Treatment

Most surface matter can be loosened by a strong, direct stream of water from the nozzle of a garden hose. Stubborn dirt and soot will need to be scrubbed off using l/2 cup of household detergent in a gallon of water with a medium soft bristle brush. The cleaned surface should then be rinsed thoroughly, and permitted to dry before further inspection to determine if repainting is necessary. Quite often, cleaning provides a satisfactory enough result to postpone repainting.

Mildew

Cause of Condition

Mildew is caused by fungi feeding on nutrients contained in the paint film or on dirt adhering to any surface. Because moisture is the single most important factor in its growth, mildew tends to thrive in areas where dampness and lack of sunshine are problems such as window sills, under eaves, around gutters and downspouts, on the north side of buildings, or in shaded areas near shrubbery. It may sometimes be difficult to distinguish mildew from dirt, but there is a simple test to differentiate: if a drop of household bleach is placed on the suspected surface, mildew will immediately turn white whereas dirt will continue to look like dirt.

Recommended Treatment

Because mildew can only exist in shady, warm, moist areas, attention should be given to altering the environment that is conducive to fungal growth. The area in question may be shaded by trees which need to be pruned back to allow sunlight to strike the building; or may lack rain gutters or proper drainage at the base of the building. If the

shady or moist conditions can be altered, the mildew is less likely to reappear. A recommend solution for removing mildew consists of one cup non-ammoniated detergent, one quart household bleach, and one gallon water. When the surface is scrubbed with this solution using a medium soft brush, the mildew should disappear; however, for particularly stubborn spots, an additional quart of bleach may be added. After the area is mildew-free, it should then be rinsed with a direct stream of water from the nozzle of a garden hose, and permitted to dry thoroughly. When repainting, specially formulated "mildew-resistant" primer and finish coats should be used.

Excessive Chalking

Cause of Condition

Chalking--or powdering of the paint surface--is caused by the gradual disintegration of the resin in the paint film. (The amount of chalking is determined both by the formulation of the paint and the amount of ultraviolet light to which the paint is exposed.) In moderation, chalking is the ideal way for a paint to "age," because the chalk, when rinsed by rainwater, carries discoloration and dirt away with it and thus provides an ideal surface for repainting. In excess, however, it is not desirable because the chalk can wash down onto a surface of a different color beneath the painted area and cause streaking as well as rapid disintegration of the paint film itself. Also, if a paint contains too much pigment for the amount of binder (as the old white lead carbonate/oil paints often did), excessive chalking can result.

Recommended Treatment

The chalk should be cleaned off with a solution of l/2 cup household detergent to one gallon water, using a medium soft bristle brush. After scrubbing to remove the chalk, the surface should be rinsed with a direct stream of water from the nozzle of a garden hose, allowed to dry thoroughly, (but not long enough for the chalking process to recur) and repainted, using a non-chalking paint.

Staining

Cause of Condition

Staining of paint coatings usually results from excess moisture reacting with materials within the wood substrate. There are two common types of staining, neither of which requires paint removal. The most prevalent type of stain is due to the oxidation or rusting of iron nails or metal (iron, steel, or copper) anchorage devices. A second type of stain is caused by a chemical reaction between moisture and natural extractives in certain woods (red cedar or redwood) which results in a surface deposit of colored matter. This is most apt to occur in new replacement wood within the first 10-15 years.

Recommended Treatment

In both cases, the source of the stain should first be located and the moisture problem corrected.

When stains are caused by rusting of the heads of nails used to attach shingles or siding to an exterior wall or by rusting or oxidizing iron, steel, or copper anchorage devices adjacent to a painted surface, the metal objects themselves should be hand sanded and coated with a rust-inhibitive primer followed by two finish coats. (Exposed nail heads

should ideally be countersunk, spot primed, and the holes filled with a high quality wood filler except where exposure of the nail head was part of the original construction system or the wood is too fragile to withstand the countersinking procedure.)

Discoloration due to color extractives in replacement wood can usually be cleaned with a solution of equal parts denatured alcohol and water. After the affected area has been rinsed and permitted to dry, a "stainblocking primer" especially developed for preventing this type of stain should be applied (two primer coats are recommended for severe cases of bleeding prior to the finish coat). Each primer coat should be allowed to dry at least 48 hours.

CLASS II Exterior Surface Conditions Generally Requiring Limited Paint Removal

Crazing

Cause of Condition

Crazing--fine, jagged interconnected breaks in the top layer of paint--results when paint that is several layers thick becomes excessively hard and brittle with age and is consequently no longer able to expand and contract with the wood in response to changes in temperature and humidity. As the wood swells, the bond between paint layers is broken and hairline cracks appear. Although somewhat more difficult to detect as opposed to other more obvious paint problems, it is well worth the time to scrutinize all surfaces for crazing. If not corrected, exterior moisture will enter the crazed surface, resulting in further swelling of the wood and, eventually, deep cracking and alligatoring, a Class III condition which requires total paint removal.

Crazing--or surface cracking--is an exterior surface condition which can be successfully treated by sanding and painting. Photo: Courtesy, National Decorating Products Assocation.

Recommended Treatment

Crazing can be treated by hand or mechanically sanding the surface, then repainting. Although the hairline cracks may tend to show through the new paint, the surface will be protected against exterior moisture penetration.

Intercoat Peeling

Cause of Condition

Intercoat peeling can be the result of improper surface preparation prior to the last repainting. This most often occurs in protected areas such as eaves and covered porches because these surfaces do not receive a regular rinsing from rainfall, and salts from airborne pollutants thus accumulate on the surface. If not cleaned off, the new paint coat will not adhere properly and that layer will peel.

Another common cause of intercoat peeling is incompatibility between paint types. For example, if oil paint is applied over latex paint, peeling of the top coat can sometimes result since,

Here, a latex top coat was applied directly over old oil paint, resulting in intercoat peeling. The latex was unable to adhere. If latex is used over oil, an oil-base primer should be applied first. Photo: Mary L. Oehrlein, AIA.

upon aging, the oil paint becomes harder and less elastic than the latex paint. If latex paint is applied over old, chalking oil paint, peeling can also occur because the latex paint is unable to penetrate the chalky surface and adhere.

Recommended Treatment

First, where salts or impurities have caused the peeling, the affected area should be washed down thoroughly after scraping, then wiped dry. Finally, the surface should be hand or mechanically sanded, then repainted.

Where peeling was the result of using incompatible paints, the peeling top coat should be scraped and hand or mechanically sanded. Application of a high quality oil type exterior primer will provide a surface over which either an oil or a latex topcoat can be successfully used.

Solvent Blistering

Cause of Condition

Solvent blistering, the result of a less common application error, is not caused by moisture, but by the action of ambient heat on paint solvent or thinners in the paint film. If solventrich paint is applied in direct sunlight, the top surface can dry too quickly and, as a result, solvents become trapped beneath the dried paint film. When the solvent vaporizes, it forces its way through the paint film, resulting in surface blisters. This problem occurs more often with dark colored paints because darker colors absorb more heat than lighter ones. To distinguish between solvent blistering and blistering caused by moisture, a blister should be cut open. If another layer of paint is visible, then solvent blistering is likely the problem whereas if bare wood is revealed, moisture is probably to blame. Solvent blisters are generally small.

Recommended Treatment

Solvent-blistered areas can be scraped, hand or mechanically sanded to the next sound layer, then repainted. In order to prevent blistering of painted surfaces, paint should not be applied in direct sunlight.

Wrinkling

Cause of Condition

Another error in application that can easily be avoided is wrinkling. This occurs when the top layer of paint dries before the layer underneath. The top layer of paint actually moves as the paint underneath (a primer, for example) is drying. Specific causes of wrinkling include: (1) applying paint too thick; (2) applying a second coat before the first one dries; (3) inadequate brushing out; and (4) painting in temperatures higher than recommended by the manufacturer.

Recommended Treatment

Wrinkled layers can generally be removed by scraping and sanding as opposed to total paint removal. Photo: Courtesy, National Decorating Products Association.

The wrinkled layer can be removed by scraping followed by hand or mechanical sanding to provide as even a surface as possible, then repainted following manufacturer's application instructions.

CLASS III Exterior Surface Conditions Generally Requiring Total Paint Removal

If surface conditions are such that the majority of paint will have to be removed prior to repainting, it is suggested that a small sample of intact paint be left in an inconspicuous area either by covering the area with a metal plate, or by marking the area and identifying it in some way. (When repainting does take place, the sample should not be painted over). This will enable future investigators to have a record of the building's paint history.

Peeling

Cause of Condition

Extensively deteriorated paint needs to be removed to bare wood, then primed and re-painted. Photo: NPS files.

Peeling to bare wood is most often caused by excess interior or exterior moisture that collects behind the paint film, thus impairing adhesion. Generally beginning as blisters, cracking and peeling occur as moisture causes the wood to swell, breaking the adhesion of the bottom layer.

Recommended Treatment

There is no sense in repainting before dealing with the moisture problems because new paint will simply fail. Therefore, the first step in treating peeling is to locate and remove the source or sources of the moisture, not only because moisture will jeopardize the protective coating of paint but because, if left unattended, it can ultimately cause permanent damage to the wood. Excess interior moisture should be removed from the building through installation of exhaust fans and vents. Exterior moisture should be eliminated by correcting the following conditions prior to repainting: faulty flashing; leaking gutters; defective roof shingles; cracks and holes in siding and trim; deteriorated caulking in joints and seams; and shrubbery growing too close to painted wood. After the moisture problems have been solved, the wood must be permitted to dry out thoroughly. The damaged paint can then be scraped off with a putty knife, hand or mechanically sanded, primed, and repainted.

Cracking / Alligatoring

Cause of Condition

Cracking and alligatoring are advanced stages of crazing. Once the bond between layers has been broken due to intercoat paint failure, exterior moisture is able to penetrate the surface cracks, causing the wood to swell and deeper cracking to take place.

This process continues until cracking, which forms parallel to grain, extends to bare wood. Ultimately, the cracking becomes an overall pattern of horizontal and vertical breaks in the paint layers that looks like reptile skin; hence, "alligatoring." In advanced stages of cracking and alligatoring, the surfaces will also flake badly.

Recommended Treatment

If cracking and alligatoring are present only in the top layers they can probably be scraped, hand or mechanically sanded to the next sound layer, then repainted. However, if cracking and/or alligatoring have progressed to bare wood and the paint has begun to flake, it will need to be totally removed. Methods include scraping or paint removal with the electric heat plate, electric heat gun, or chemical strippers, depending on the particular area involved. Bare wood should be primed within 48 hours then repainted.

Selecting the Appropriate/Safest Method to Remove Paint

After having presented the "hierarchy" of exterior paint surface conditions--from a mild condition such as mildewing which simply requires cleaning prior to repainting to serious conditions such as peeling and alligatoring which require total paint removal--one important thought bears repeating: if a paint problem has been identified that warrants either limited or total paint removal, the gentlest method possible for the particular wooden element of the historic building should be selected from the many available methods.

The treatments recommended--based upon field testing as well as onsite monitoring of Department of Interior grant-in-aid and certification of rehabilitation projects--are therefore those which take three overriding issues into consideration (1) the continued protection and preservation of the historic exterior woodwork; (2) the retention of the sequence of historic paint layers; and (3) the health and safety of those individuals performing the paint removal. By applying these criteria, it will be seen that no paint removal method is without its drawbacks and all recommendations are qualified in varying degrees.

Methods for Removing Paint

After a particular exterior paint surface condition has been identified, the next step in planning for repainting--if paint removal is required--is selecting an appropriate method for such removal.

The method or methods selected should be suitable for the specific paint problem as well as the particular wooden element of the building. Methods for paint removal can be divided into three categories (frequently, however, a combination of the three methods is used). Each method is defined below, then discussed further and specific recommendations made:

Abrasive--"Abrading" the painted surface by manual and/or mechanical means such as scraping and sanding. Generally used for surface preparation and limited paint removal.

Thermal--Softening and raising the paint layers by applying heat followed by scraping and sanding. Generally used for total paint removal.

Chemical--Softening of the paint layers with chemical strippers followed by scraping and sanding. Generally used for total paint removal.

Abrasive Methods (Manual)

If conditions have been identified that require limited paint removal such as crazing, intercoat peeling, solvent blistering, and wrinkling, scraping and hand sanding should be the first methods employed before using mechanical means. Even in the case of more serious conditions such as peeling--where the damaged paint is weak and already sufficiently loosened from the wood surface --scraping and hand sanding may be all that is needed prior to repainting.

Recommended Abrasive Methods (Manual)

Putty Knife/Paint Scraper: Scraping is usually accomplished with either a putty knife or a paint scraper, or both. Putty knives range in width from one to six inches and have a beveled edge. A putty knife is used in a pushing motion going under the paint and working from an area of loose paint toward the edge where the paint is still firmly adhered and, in effect,"beveling" the remaining layers so that as smooth a transition as possible is made between damaged and undamaged areas.

Paint scrapers are commonly available in 1-5/16, 2-1/2, and 3-1/2 inch widths and have replaceable blades. In addition, profiled scrapers can be made specifically for use on moldings. As opposed to the putty knife, the paint scraper is used in a pulling motion and works by raking the damaged areas of paint away.

The obvious goal in using the putty knife or the paint scraper is to selectively remove the affected layer or layers of paint; however, both of these tools, particularly the paint scraper with its hooked edge, must be used with care to properly prepare the surface and to avoid gouging the wood.

Sandpaper/Sanding Block/Sanding sponge: After manually removing the damaged layer or layers by scraping, the uneven surface (due to the almost inevitable removal of varying numbers of paint layers in a given area) will need to be smoothed or "feathered out" prior to repainting. As stated before, hand sanding, as opposed to harsher mechanical sanding, is recommended if the area is relatively limited. A coarse grit, open-coat flint sandpaper--the least expensive kind--is useful for this purpose because, as the sandpaper clogs with paint it must be discarded and this process repeated until all layers adhere uniformly.

Blocks made of wood or hard rubber and covered with sandpaper are useful for handsanding flat surfaces. Sanding sponges--rectangular sponges with an abrasive aggregate on their surfaces--are also available for detail work that requires reaching into grooves because the sponge easily conforms to curves and irregular surfaces. All sanding should be done with the grain.

Summary of Abrasive Methods (Manual)

Recommended: Putty knife, paint scraper, sandpaper, sanding block, sanding sponge.

Applicable areas of building: All areas. For use on: Class I, Class II, and Class III conditions.

Health/Safety factors: Take precautions against lead dust, eye damage; dispose of lead paint residue properly.

Abrasive Methods (Mechanical)

If hand sanding for purposes of surface preparation has not been productive or if the affected area is too large to consider hand sanding by itself, mechanical abrasive methods, i.e., power-operated tools may need to be employed; however, it should be noted that the majority of tools available for paint removal can cause damage to fragile wood and must be used with great care.

Recommended Abrasive Methods (Mechanical)

Orbital sander: Designed as a finishing or smoothing tool--not for the removal of multiple layers of paint--the orbital sander is thus recommended when limited paint removal is required prior to repainting. Because it sands in a small diameter circular motion (some models can also be switched to a back-and-forth vibrating action), this tool is particularly effective for "feathering" areas where paint has first been scraped. The abrasive surface varies from about 3x7 inches to 4x9 inches and sandpaper is attached either by clamps or sliding clips. A medium grit, open-coat aluminum oxide sandpaper should be used; fine sandpaper clogs up so quickly that it is ineffective for smoothing paint.

Belt sander: A second type of power tool--the belt sander--can also be used for removing limited layers of paint but, in this case, the abrasive surface is a continuous belt of sandpaper that travels at high speeds and consequently offers much less control than the orbital sander. Because of the potential for more damage to the paint or the wood, use of the belt sander (also with a medium grit sandpaper) should be limited to flat surfaces and only skilled operators should be permitted to operate it within a historic preservation project.

Not Recommended

Rotary Drill Attachments: Rotary drill attachments such as the rotary sanding disc and the rotary wire stripper should be avoided. The disc sander--usually a disc of sandpaper about 5 inches in diameter secured to a rubber based attachment which is in turn connected to an electric drill or other motorized housing--can easily leave visible circular depressions in the wood which are difficult to hide, even with repainting. The rotary wire stripper--clusters of metals wires similarly attached to an electric drill-type unit--can actually shred a wooden surface and is thus to be used exclusively for removing corrosion and paint from metals.

Waterblasting: Waterblasting above 600 p.s.i. to remove paint is not recommended because it can force water into the woodwork rather than cleaning loose paint and grime from the surface; at worst, high pressure waterblasting causes the water to penetrate exterior sheathing and damages interior finishes. A detergent solution, a medium soft bristle brush, and a garden hose for purposes of rinsing, is the gentlest method involving water and is recommended when cleaning exterior surfaces prior to repainting.

Sandblasting: Finally--and undoubtedly most vehemently "not recommended"--sandblasting painted exterior woodwork will indeed remove paint, but at the same time can scar wooden elements beyond recognition. As with rotary wire strippers, sandblasting erodes the soft porous fibers (spring wood) faster than the hard, dense fibers (summer wood), leaving a pitted surface with ridges and valleys. Sandblasting will

also erode projecting areas of carvings and moldings before it removes paint from concave areas. Hence, this abrasive method is potentially the most damaging of all possibilities, even if a contractor promises that blast pressure can be controlled so that the paint is removed without harming the historic exterior woodwork. (For Additional Information, See Preservation Briefs 6, "Dangers of Abrasive Cleaning to Historic Buildings".)

Summary of Abrasive Methods (Mechanical)

Recommended: Orbital sander, belt sander (skilled operator only).

Applicable areas of building: Flat surfaces, i.e., siding, eaves, doors, window sills.

For use on: Class II and Class III conditions.

Health/Safety factors: Take precautions against lead dust and eye damage; dispose of lead paint residue properly.

Not Recommended: Rotary drill attachments, high pressure waterblasting, sandblasting.

Thermal Methods

Where exterior surface conditions have been identified that warrant total paint removal such as peeling, cracking, or alligatoring, two thermal devices--the electric heat plate and the electric heat gun--have proven to be quite successful for use on different wooden elements of the historic building. One thermal method--the blow torch--is not recommended because it can scorch the wood or even burn the building down!

Recommended Thermal Methods

A heat plate was used on the cornice to remove paint. Photo: NPS files.

Electric heat plate: The electric heat plate operates between 500 and 800 degrees Fahrenheit (not hot enough to vaporize lead paint), using about 15 amps of power. The plate is held close to the painted exterior surface until the layers of paint begin to soften and blister, then moved to an adjacent location on the wood while the softened paint is scraped off with a putty knife (it should be noted that the heat plate is most successful when the paint is very thick!). With practice, the operator can successfully move the heat plate evenly across a flat surface such as wooden siding or a window sill or door in a continuous motion, thus lessening the risk of scorching the wood in an attempt to reheat the edge of the paint sufficiently for effective removal. Since the electric heat plate's coil is "red hot," extreme caution should be taken to avoid igniting clothing or burning the skin. If an extension cord is used, it should be a heavy-duty cord (with 3-prong grounded plugs). A heat plate could overload a circuit or, even worse, cause an electrical fire; therefore, it is recommended that this implement be used with a single circuit and that a fire extinguisher always be kept close at hand.

Electric heat gun: The electric heat gun (electric hot-air gun) looks like a hand-held

hairdryer with a heavy-duty metal case. It has an electrical resistance coil that typically heats between 500 and 750 degrees Fahrenheit and, again, uses about 15 amps of power which requires a heavy-duty extension cord. There are some heat guns that operate at higher temperatures but they should not be purchased for removing old paint because of the danger of lead paint vapors.

The temperature is controlled by a vent on the side of the heat gun. When the vent is closed, the heat increases. A fan forces a stream of hot air against the painted woodwork, causing a blister to form. At that point, the softened paint can be peeled back with a putty knife. It can be used to best advantage when a paneled door was originally varnished, then painted a number of times. In this case, the paint will come off quite easily, often leaving an almost pristine varnished surface behind. Like the heat plate, the heat gun works best on a heavy paint buildup. (It is, however, not very successful on only one or two layers of paint or on surfaces that have only been varnished. The varnish simply becomes sticky and the wood scorches.)

The nozzle on the electric heat gun permits hot air to be aimed into cavities on solid decorative surfaces, such as this carriage house door. After the paint has been sufficiently softened, it can be carefully removed with a scraper. Photo: NPS files.

Although the heat gun is heavier and more tiring to use than the heat plate, it is particularly effective for removing paint from detail work because the nozzle can be directed at curved and intricate surfaces. Its use is thus more limited than the heat plate, and most successfully used in conjunction with the heat plate. For example, it takes about two to three hours to strip a paneled door with a heat gun, but if used in combination with a heat plate for the large, flat area, the time can usually be cut in half. Although a heat gun seldom scorches wood, it can cause fires (like the blow torch) if aimed at the dusty cavity between the exterior sheathing and siding and interior lath and plaster. A fire may smolder for hours before flames break through to the surface. Therefore, this thermal device is best suited for use on solid decorative elements, such as molding, balusters, fretwork, or "gingerbread."

Not Recommended

Blow Torch: Blow torches, such as hand-held propane or butane torches, were widely used in the past for paint removal because other thermal devices were not available. With this technique, the flame is directed toward the paint until it begins to bubble and loosen from the surface. Then the paint is scraped off with a putty knife. Although this is a relatively fast process, at temperatures between 3200 and 3800 degrees Fahrenheit the open flame is not only capable of burning a careless operator and causing severe damage to eyes or skin, it can easily scorch or ignite the wood. The other fire hazard is more insidious. Most frame buildings have an air space between the exterior sheathing and siding and interior lath and plaster. This cavity usually has an accumulation of dust which is also easily ignited by the open flame of a blow torch. Finally, leadbase paints will vaporize at high temperatures, releasing toxic fumes that can be unknowingly inhaled. Therefore, because both the heat plate and the heat gun are generally safer to use--that is, the risks are much more controllable--the blow torch should definitely be avoided!

Summary of Thermal Methods

Recommended: Electric heat plate, electric heat gun.

Applicable areas of building: Electric heat plate--flat surfaces such as siding, eaves, sash, sills, doors. Electric heat gun--solid decorative molding, balusters, fretwork, or "gingerbread."

For use on: Class III conditions.

Health/Safety factors: Take precautions against eye damage and fire. Dispose of lead paint residue properly.

Not Recommended: Blow torch.

Chemical Methods

With the availability of effective thermal methods for total paint removal, the need for chemical methods--in the context of preparing historic exterior woodwork for repainting--becomes quite limited. Solvent-base or caustic strippers may, however, play a supplemental role in a number of situations, including:

- Removing paint residue from intricate decorative features, or in cracks or hard to reach areas if a heat gun has not been completely effective;
- Removing paint on window muntins because heat devices can easily break the glass;
- Removing varnish on exterior doors after all layers of paint have been removed by a heat plate/heat gun if the original varnish finish is being restored;
- Removing paint from detachable wooden elements such as exterior shutters, balusters, columns, and doors by dip stripping when other methods are too laborious.

Recommended Chemical Methods

(Use With Extreme Caution)

Because all chemical paint removers can involve potential health and safety hazards, no wholehearted recommendations can be made from that standpoint. Commonly known as "paint removers" or "strippers," both solvent-base or caustic products are commercially available that, when poured, brushed, or sprayed on painted exterior woodwork are capable of softening several layers of paint at a time so that the resulting "sludge"--which should be remembered is nothing less than the sequence of historic paint layers--can be removed with a putty knife. Detachable wood elements such as exterior shutters can also be "dip-stripped."

Solvent-base Strippers: The formulas tend to vary, but generally consist of combinations of organic solvents such as methylene chloride, isopropanol, toluol, xylol, and methanol; thickeners such as methyl cellulose; and various additives such as paraffin wax used to prevent the volatile solvents from evaporating before they have time to soak through multiple layers of paint. Thus, while some solvent-base strippers are quite thin and therefore unsuitable for use on vertical surfaces, others, called "semi-paste" strippers, are formulated for use on vertical surfaces or the underside of horizontal surfaces.

However, whether liquid or semi-paste, there are two important points to stress when using any solvent-base stripper: First, the vapors from the organic chemicals can be highly toxic if inhaled; skin contact is equally dangerous because the solvents can be absorbed; second, many solvent-base strippers are flammable. Even though application out-of-doors may somewhat mitigate health and safety hazards, a respirator with special filters for organic solvents is recommended and, of course, solvent-base strippers should never be used around open flames, lighted cigarettes, or with steel wool around electrical outlets.

Although appearing to be the simplest for exterior use, a particular type of solvent-base stripper needs to be mentioned here because it can actually cause the most problems. Known as "water-rinsable," such products have a high proportion of methylene chloride together with emulsifiers. Although the dissolved paint can be rinsed off with water with a minimum of scraping, this ultimately creates more of a problem in cleaning up and properly disposing of the sludge. In addition, these strippers can leave a gummy residue on the wood that requires removal with solvents. Finally, water-rinsable strippers tend to raise the grain of the wood more than regular strippers.

On balance, then, the regular strippers would seem to work just as well for exterior purposes and are perhaps even better from the standpoint of proper lead sludge disposal because they must be hand 'scraped as opposed to rinsed off (a coffee-can with a wire stretched across the top is one effective way to collect the sludge; when the putty knife is run across the wire, the sludge simply falls into the can. Then, when the can is filled, the wire is removed, the can capped, and the lead paint sludge disposed of according to local health regulations).

Caustic strippers: Until the advent of solvent-base strippers, caustic strippers were used exclusively when a chemical method was deemed appropriate for total paint removal prior to repainting or refinishing. Now, it is more difficult to find commercially prepared caustic solutions in hardware and paint stores for homeowner use with the exception of lye (caustic soda) because solvent-base strippers packaged in small quantities tend to dominate the market.

Most commercial dip stripping companies, however, continue to use variations of the caustic bath process because it is still the cheapest method available for removing paint. Generally, dip stripping should be left to professional companies because caustic solutions can dissolve skin and permanently damage eyes as well as present serious disposal problems in large quantities.

If exterior shutters or other detachable elements are being sent out for stripping in a caustic solution, it is wise to see samples of the company's finished work. While some companies do a first-rate job, others can leave a residue of paint in carvings and grooves. Wooden elements may also be soaked too long so that the wood grain is raised and roughened, requiring extensive hand sanding later. In addition, assurances should be given by these companies that caustic paint removers will be neutralized with a mild acid solution or at least thoroughly rinsed with water after dipping (a caustic residue makes the wood feel slippery). If this is not done, the lye residue will cause new paint to fail.

Summary of Chemical Methods

Recommended, with extreme caution: Solvent-base strippers, caustic strippers.

Applicable areas of buildings: decorative features, window muntins, doors, exterior

shutters, columns, balusters, and railings.

For use on: Class III Conditions.

Health/Safety factors: Take precautions against inhaling toxic vapors; fire; eye damage; and chemical poisoning from skin contact. Dispose of lead residue properly

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General Paint Type Recommendations

Decorative features were painted with a traditional oil-based paint as a part of the rehabilitation. Photo: NPS files.

Based on the assumption that the exterior wood has been painted with oil paint many times in the past and the existing top coat is therefore also an oil paint, it is recommended that for CLASS I and CLASS II paint surface conditions, a top coat of high quality oil paint be applied when repainting. The reason for recommending oil rather than latex paints is that a coat of latex paint applied directly over old oil paint is more apt to fail. The considerations are twofold. First, because oil paints continue to harden with age, the old surface is sensitive to the added stress of shrinkage which occurs as a new coat of paint dries. Oil paints shrink less upon drying than latex paints and thus do not have as great a tendency to pull the old paint loose. Second, when exterior oil paints age, the binder releases pigment particles, causing a chalky surface. Although for best results, the chalk (or dirt, etc.) should always be cleaned off prior to repainting, a coat of new oil paint is more able to penetrate a chalky residue and adhere than is latex paint. Therefore, unless it is possible to thoroughly clean a heavily chalked surface, oil paints--on balance--give better adhesion.

If however, a latex top coat is going to be applied over several layers of old oil paint, an oil primer should be applied first (the oil primer creates a flat, porous surface to which the latex can adhere). After the primer has thoroughly dried, a latex top coat may be applied. In the long run, changing paint types is more time consuming and expensive. An application of a new oil-type top coat on the old oil paint is, thus, the preferred course of action.

If CLASS III conditions have necessitated total paint removal, there are two options, both of which assure protection of the exterior wood: (1) an oil primer may be applied followed by an oil-type top coat, preferably by the same manufacturer; or (2) an oil primer may be applied followed by a latex top coat, again using the same brand of paint. It should also be noted that primers were never intended to withstand the effects of weathering; therefore, the top coat should be applied as soon as possible after the primer has dried.

CONCLUSION

The recommendations outlined in this Brief are cautious because at present there is no

completely safe and effective method of removing old paint from exterior woodwork. This has necessarily eliminated descriptions of several methods still in a developmental or experimental stage, which can therefore neither be recommended nor precluded from future recommendation. With the ever-increasing number of buildings being rehabilitated, however, paint removal technology should be stimulated and, in consequence, existing methods refined and new methods developed which will respect both the historic wood and the health and safety of the operator.

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Washington, D.C. September, 1982

Home page logo: Peeling paint on historic wood siding. Photo: ©John Leeke, 2002.

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

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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.

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