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REQUEST FOR INTERPRETATION (RFI)

Project Name: _____

OHM Project Number: _____

Date: _____

RFI Number (Filled out by OHM):: _____

To: _____ From: _____

Re: _____ Contract For: _____

Specification Section: _____

Paragraph: _____

Drawing Reference: _____

Detail: _____

Request: _____

Signed by: _____ Date: _____

Response: _____

☐ Attachments

Response From: _____

Date Received: _____

Signed by: _____

To: _____

Date Returned: _____

Date: _____

Copies: ☐ Owner ☐ Consultants ☐ _____ ☐ _____ ☐ File

00 26 00 - PROCUREMENT SUBSTITUTION PROCEDURES

1.1 DEFINITIONS

- A. Procurement Substitution Requests: Requests for changes in products, materials, equipment, and methods of construction from those indicated in the Procurement and Contracting Documents, submitted prior to receipt of bids.
- B. Substitution Requests: Requests for changes in products, materials, equipment, and methods of construction from those indicated in the Contract Documents, submitted following Contract award. See Section 01 25 00 "Substitution Procedures" for conditions under which Substitution requests will be considered following Contract award.

1.2 QUALITY ASSURANCE

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

1.3 PROCUREMENT SUBSTITUTIONS

- A. Procurement Substitutions, General: By submitting a bid, the Bidder represents that its bid is based on materials and equipment described in the Procurement and Contracting Documents, including Addenda. Bidders are encouraged to request approval of qualifying substitute materials and equipment when the Specifications Sections list materials and equipment by product or manufacturer name.
- B. Procurement Substitution Requests will be received and considered by Owner when the following conditions are satisfied, as determined by Architect; otherwise requests will be returned without action:
 - 1. Extensive revisions to the Contract Documents are not required.
 - 2. Proposed changes are in keeping with the general intent of the Contract Documents, including the level of quality of the Work represented by the requirements therein.
 - 3. The request is fully documented and properly submitted.

1.4 SUBMITTALS

- A. Procurement Substitution Request: Submit to Architect. Procurement Substitution Request must be made in writing by prime contract Bidder only in compliance with the following requirements:
 - 1. Requests for substitution of materials and equipment will be considered if received no later than 10 days prior to date of bid opening.
 - 2. Procurement Substitution Request form: Use CSI Substitution Request Form 1.5C.
 - 3. Documentation: Show compliance with requirements for substitution and the following as applicable:
 - a. Identify the product or the fabrication or installation method to be replaced in each request. Include related Specifications Sections and drawing numbers.

- b. Provide complete documentation on both the product specified and the proposed substitute, including the following information as appropriate:
 - 1) Point-by-point comparison of specified and proposed substitute product data, fabrication drawings, and installation procedures.
 - 2) Copies of current, independent third-party test data of salient product or system characteristics.
 - 3) Samples where applicable or when requested by Architect.
 - 4) Detailed comparison of significant qualities of the proposed substitute with those of the Work specified. Significant qualities may include attributes such as performance, weight, size, durability, visual effect, sustainable design characteristics, warranties, and specific features and requirements indicated. Indicate deviations, if any, from the Work specified.
 - 5) Material test reports from a qualified testing agency indicating and interpreting test results for compliance with requirements indicated.
 - 6) Research reports, where applicable, evidencing compliance with building code in effect for Project.
 - 7) Coordination information, including a list of changes or modifications needed to other parts of the Work and to construction performed by Owner and separate contractors, which will become necessary to accommodate the proposed substitute.
- c. Provide certification by manufacturer that the substitute proposed is equal to or superior to that required by the Procurement and Contracting Documents, and that its in-place performance will be equal to or superior to the product or equipment specified in the application indicated.
- d. Bidder, in submitting the Procurement Substitution Request, waives the right to additional payment or an extension of Contract Time because of the failure of the substitute to perform as represented in the Procurement Substitution Request.

B. Architect's Action:

- 1. Architect may request additional information or documentation necessary for evaluation of the Procurement Substitution Request. Architect will notify all bidders of acceptance of the proposed substitute by means of an Addendum to the Procurement and Contracting Documents.

C. Architect's approval of a substitute during bidding does not relieve Contractor of the responsibility to submit required shop drawings and to comply with all other requirements of the Contract Documents.

END OF DOCUMENT 00 26 00



SUBSTITUTION REQUEST

(During the Bidding Phase)

Project _____ Substitution Request Number: _____

From: _____
To: _____ Date: _____

A/E Project Number: _____
Re: _____ Contract For: _____

Specification Title: _____ Description: _____
Section: _____ Page: _____ Article/Paragraph: _____

Proposed Substitution: _____
Manufacturer: _____ Address: _____ Phone: _____
Trade Name: _____ Model No.: _____

Attached data includes product description, specifications, drawings, photographs, and performance and test data adequate for evaluation of the request; applicable portions of the data are clearly identified.

Attached data also includes a description of changes to the Contract Documents that the proposed substitution will require for its proper installation.

The Undersigned certifies:

- Proposed substitution has been fully investigated and determined to be equal or superior in all respects to specified product.
- Same warranty will be furnished for proposed substitution as for specified product.
- Same maintenance service and source of replacement parts, as applicable, is available.
- Proposed substitution will have no adverse effect on other trades and will not affect or delay progress schedule.
- Proposed substitution does not affect dimensions and functional clearances.
- Payment will be made for changes to building design, including A/E design, detailing, and construction costs caused by the substitution.

Submitted by: _____
Signed by: _____
Firm: _____
Address: _____
Telephone: _____

A/E's REVIEW AND ACTION

- ☐ Substitution approved - Make submittals in accordance with Specification Section 01330.
☐ Substitution approved as noted - Make submittals in accordance with Specification Section 01330.
☐ Substitution rejected - Use specified materials.
☐ Substitution Request received too late - Use specified materials.

Signed by:

Date:

Supporting Data Attached: ☐ Drawings ☐ Product Data ☐ Samples ☐ Tests ☐ Reports ☐ _____

SECTION 003126 - EXISTING HAZARDOUS MATERIAL INFORMATION

1.1 EXISTING HAZARDOUS MATERIAL INFORMATION

- A. This Document with its referenced attachments is part of the Procurement and Contracting Requirements for Project. They provide Owner's information for Bidders' convenience and are intended to supplement rather than serve in lieu of Bidders' own investigations. They are made available for Bidders' convenience and information, but are not a warranty of existing conditions. This Document and its attachments are not part of the Contract Documents.
- B. An existing asbestos report for Project, prepared by Testing Engineers & Consultants, Inc., dated February 21, 2018, is available for viewing as appended to this Document.
- C. An existing lead report for Project, prepared by Testing Engineers & Consultants, Inc., dated February 19, 2018, is available for viewing as appended to this Document.

END OF DOCUMENT 00 31 26



Testing Engineers & Consultants, Inc.

1343 Rochester Road • PO Box 249 • Troy, Michigan 48099-0249
(248) 588-6200 or (313) T-E-S-T-I-N-G • Fax (248) 588-6232
www.testingengineers.com

TEC Report Number: 58640-01

Date Issued: February 21, 2018

Ms. Ashely Levin
Project Manager
City of Troy
Department of Public Works
4693 Rochester Road
Troy, Michigan 48085

Re: Asbestos Survey Report. Project: Barnard House located at Troy Historic Village; 60 West Wattles Road; Troy, MI 48098

Dear Ms. Levin:

Enclosed please find our report of a pre-revovation asbestos survey at the above referenced location. We hope that you find this report complete and self-explanatory.

We are pleased to provide this service. Should you have any questions regarding this report or require additional information, please contact this office at your convenience.

Respectfully Yours,

TESTING ENGINEERS & CONSULTANTS, INC.

A handwritten signature in blue ink that reads "Scott M. Chandler".

Scott M. Chandler, CIH, LEED AP
Manager, Industrial Hygiene Services
SC/drs
Enclosure

A handwritten signature in blue ink that reads "Dylan Stoddard".

Dylan Stoddard
Asbestos Inspector
(A50412)

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All services undertaken are subject to the following policy. Reports are submitted for exclusive use of the clients to whom they are addressed. Their significance is subject to the adequacy and representative character of the samples and the comprehensiveness of the tests, examinations and surveys made. No quotation from reports or use of TEC's name is permitted except as expressly authorized by TEC in writing.

CONSULTING ENGINEERS & FULL-SERVICE PROFESSIONAL TESTING AND INSPECTION
OFFICES IN ANN ARBOR, DETROIT, AND TROY
FOUNDED IN 1966

Testing Engineers & Consultants, Inc.

City of Troy – Department of Public Works

Ms. Ashely Levin

February 21, 2018

TEC Report Number: 58640-01

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Testing Engineers & Consultants, Inc.

City of Troy – Department of Public Works

Ms. Ashely Levin

February 21, 2018

TEC Report Number: 58640-01

Executive Summary

Testing Engineers & Consultants, Inc. (TEC) was retained by the City of Troy: Public Works Department to perform a National Emission Standard for Hazardous Air Pollutants (NESHAP) style asbestos survey of the Barnard House located at 60 West Wattles Road: Troy, MI 48098.

The following known or assumed asbestos-containing materials were identified in the survey area:

<u>HM #</u>	<u>Homogeneous Material Description</u>	<u>F/NF</u>	<u>SM/TSI/MM</u>
10	Loose fill Vermiculite Insulation	F	MM
27	12"x12" Yellow Sticky Back Floor Tile	NF	MM

HM # Homogeneous Material Number
F/NF Friable or Non-Friable
SM Surfacing Material
TSI Thermal Systems Insulation
MM Miscellaneous Material

Testing Engineers & Consultants, Inc.

City of Troy – Department of Public Works

Ms. Ashely Levin

February 21, 2018

TEC Report Number: 58640-01

Section 1 Introduction

This report is based on requirements of the National Emission Standard for Hazardous Air Pollutants (NESHAP) for renovation and/or demolition projects. NESHAP requires that building owners conduct surveys for asbestos-containing materials (ACM) in buildings that are to be renovated or demolished. The Environmental Protection Agency defines an asbestos-containing material as one which contains greater than one percent asbestos, using standardized analytical methods (polarized light microscopy). Building materials containing greater than one percent asbestos are referred to as asbestos-containing building materials (ACBM).

This survey addresses friable and non-friable suspect asbestos-containing building materials to meet NESHAP requirements for renovation and/or demolition activities. Friable materials are those that can be crumbled, pulverized or reduced to powder by hand pressure when dry. This includes products such as spray-applied fireproofing on structural steel members, spray-applied acoustical ceiling materials, and thermal systems insulation. Because friable materials are more likely to release asbestos fibers into the air when disturbed than non-friable materials, they are considered a greater health concern.

All other materials such as floor tile, adhesives, plaster, stucco, and sheet rock mudding compounds are considered non-friable materials. Non-friable materials can become friable through various mechanical means such as crushing, sanding, sawing, and shot-blasting or by natural means such as weathering.

On January 26, 2018 and February 15th, 2018, Dylan Stoddard (A50412) a State of Michigan accredited Building Inspector from TEC, performed an asbestos survey of the building in accordance with NESHAP and project requirements.

All identified suspect asbestos-containing materials are summarized in Section 2.1. Information regarding all suspect materials including locations, recommended response actions and quantities are described in Section 2.2 through 2.4.

DISCLAIMER

This report was prepared for the express use and benefit of the Mission Point Management, LLC its agents and employees. The information in this report or portions thereof may be required to be included in notifications to residents, employees, contractors, regulators or other visitors to the building. This report is not intended to be used by the owner or its agents as a specification or work plan for any of the work suggested or recommended herein.

This report is based upon conditions observed at the property and information made available to the surveyor. This report does not intend to identify all hazards nor indicate that other hazards or unsafe practices do not exist at the premises.

Testing Engineers & Consultants, Inc.

City of Troy – Department of Public Works

Ms. Ashely Levin

February 21, 2018

TEC Report Number: 58640-01

TEC made their best effort to determine the location of inaccessible ACBM. TEC shall not be responsible for identifying all ACBM located behind walls and/or columns, beneath flooring, above solid ceilings, underground or any other inaccessible areas.

The following rooms/areas were not accessible at the time of our survey:

Functional Space

Exterior

Space Description

Roof of original building and addition. Not included in scope of work

Polarized light microscopy (PLM) is not consistently reliable in detecting asbestos in a small percentage of samples that contain asbestos. Certain flooring materials (floor tile, linoleum) may contain very small asbestos fibers that are not visible by PLM. The fibers may also be bound or obscured by the organic matrix of the material. Thus, negative PLM results are not guaranteed by the laboratory. TEC recommends that any samples reported as <1% or below limit of detection should be further tested by transmission electron microscopy (TEM) to positively determine if the material is an ACM.

Standard PLM also is not consistently reliable in detecting asbestos in vermiculite insulation due to its heterogeneous nature. TEC recommends that any vermiculite insulation samples reported as below limit of detection should be further tested for asbestos using the California Air Resources Board Method 435, which includes a fine milling of the sample to create a homogeneous mixture.

Testing Engineers & Consultants, Inc.

City of Troy – Department of Public Works

Ms. Ashely Levin

February 21, 2018

TEC Report Number: 58640-01

Section 2 Summary of Findings for Suspect Materials

Section 2 consists of several tables summarizing the findings of the building survey performed by TEC. Descriptions of each table are found below.

Section 2.1 consists of a table of all suspect building materials identified by the building inspector in the survey area. The materials are listed by Homogeneous Material Number (HM#). Each suspect material is assigned a unique HM#. The table also describes the material type (surfacing material, thermal systems insulation or miscellaneous material), its friability and whether it is an ACM.

Section 2.2 is a table summarizing our recommendations for each ACM or assumed ACM identified in the survey area. **Please note that the recommendations provided are based upon the condition of the ACM identified at the time of the inspection as well as our understanding of the scope of work.**

The table in Section 2.3 describes suspect ACM found in each Functional Space Number (FS#) identified in the survey area. For survey purposes, a building is divided into smaller units called Functional Spaces. A Functional Space is defined as a room, group of rooms, or other spatially distinct building unit as designated by an accredited asbestos building inspector. Each Functional Space is assigned a number and a description is provided. During the survey, the building inspector identifies the suspect ACM that are present in the functional space or that may be impacted during renovation work, in the case of limited surveys. **All materials listed in this section were determined to be in good condition except where noted in the table.**

Section 2.4 is organized by Homogeneous Material Number (HM#) and depicts which Functional Spaces contain them. Other information, such as quantities, ACM designation, friability and material category are also included in this table.

See Appendix A for definitions of terms used in the tables throughout Section 2.

Section 2.1

Homogenous Material Listing

Barnard House at
Troy Historic Village
Troy, MI
Homogeneous Material Listing

<i>HM#</i>	<i>Homogeneous Material Description</i>	<i>ACM?</i>	<i>F/NF</i>	<i>SM/TSI/MM</i>
1	Wall Plaster with Wall Coverings	No	NF	MM
2	Ceiling Plaster with Wall Coverings	No	NF	MM
3	Farm House Wallpaper	No	NF	MM
4	Mosaic Design Wallpaper	No	NF	MM
5	14"x14" Tongue and Groove Ceiling Tile	No	F	MM
6	Glazing on Interior Windows	No	NF	MM
7	12"x12" Tongue and Groove Ceiling Tile	No	F	MM
8	Cream and Green Sheet Flooring and Adhesive	No	NF	MM
9	Drywall and Joint Compound	No	NF	MM
10	Loose fill Vermiculite Insulation	Yes (Assumed)	F	MM
11	Multi-Layer Floor	No	NF	MM
12	Deteriorated Wall paper	No	F	MM
13	White Caulk	No	NF	MM
14	White Grout	No	NF	MM
15	Floral Wallpaper	No	NF	MM
16	Wall Plaster with Wall Coverings	No	NF	MM
17	Ceiling Plaster with Wall Coverings	No	NF	MM
18	Faux Woven Rug Linoleum	No	NF	MM
19	Faux Mosaic Stone Linoleum	No	NF	MM
20	Red Squares Sheet Flooring	No	NF	MM
21	Skim Coat over Particle board	No	NF	MM
22	Wallboard	No	NF	MM
23	2'x4' Dots and Gouges Suspended Ceiling Tile	No	F	MM
24	Drywall and Joint Compound	No	NF	MM
25	Bathroom Caulk	No	NF	MM
26	12"x12" Sticky Back Faux Ceramic Tile	No	NF	MM
27	12"x12" Yellow Sticky Back Floor Tile	Yes	NF	MM
28	Window Glazing	No	NF	MM
29	Siding Sealant	No	NF	MM

Section 2.2

Recommendations for ACM

Barnard House at
Historic Troy Village
Troy, MI
Recommendations for ACM

<i>HM#</i>	<i>Homogeneous Material Description</i>	<i>Amount</i>	<i>Units</i>	<i>EPA Category</i>	<i>Recommendation</i>
10	Loose Fill Vermiculite Insulation	Unknown		Friable ACM (RACM)	Remove if impacted by renovations
27	12"x12" Yellow Sticky Back Floor Tile	450	SF	Category I Non-Friable ACM	Remove if impacted by renovations ³

Footnotes:

1. For asbestos-containing materials which are currently in good condition and are to remain in place during demolition, they must remain non-friable during all phases of demolition when using allowable demolition techniques (bulldozers, implosion, wrecking balls, cranes or hydraulic excavators). No visible emissions allowed during any stage of demolition. Demolition debris containing Category I and II non-friable ACM does not require disposal at a facility licensed to accept asbestos waste.
2. If all ACM are removed prior to demolition, the remainder of the demolition debris may be either recycled (if appropriate) or disposed as general construction debris at a facility licensed to accept this waste.
3. Asbestos-containing materials removed in a non-friable manner and which remain non-friable during handling, transporting and disposal, can be disposed as general construction debris at a facility licensed to accept this waste. Contact disposal facility and inquire about the policies regarding acceptance of Category I and II non-friable ACM.

Section 2.3

List by Functional Space

Barnard House at
 Historic Troy Village
 Troy, MI
 List by Functional Space

<i>FS#</i>	<i>FS Description</i>	<i>Floor</i>	<i>FS Notes</i>	<i>HM#</i>	<i>Homogeneous Material Description</i>	<i>HM Notes</i>	<i>Amount</i>	<i>Units</i>	<i>ACM?</i>
1	Main Entrance/Living Room	1	Original 1837 House	1	Wall Plaster with Wall Coverings				No
1	Main Entrance/Living Room			2	Ceiling Plaster with Wall Coverings				No
1	Main Entrance/Living Room			3	Farm House Wallpaper				No
1	Main Entrance/Living Room			4	Mosaic Design Wallpaper				No
1	Main Entrance/Living Room			5	14"x14" Tongue and Groove Ceiling Tile	Stapled Up			No
1	Main Entrance/Living Room			6	Glazing on Interior Windows				No
2	First Floor Bedroom	1	Original 1837 House	1	Wall Plaster with Wall Coverings				No
2	First Floor Bedroom			2	Ceiling Plaster with Wall Coverings				No
2	First Floor Bedroom			6	Glazing on Interior Windows				No
2	First Floor Bedroom			7	12"x12" Tongue and Groove Ceiling Tile	Stapled Up			No
2	First Floor Bedroom			8	Cream and Green Sheet Flooring and Adhesive				No
3	Kitchen	1	Original 1837 House	1	Wall Plaster with Wall Coverings	Behind Drywall and Joint Compound			No
3	Kitchen			2	Ceiling Plaster with Wall Coverings	Behind Drywall and Joint Compound			No
3	Kitchen			6	Glazing on Interior Windows				No
3	Kitchen			9	Drywall and Joint Compound	Walls and Ceiling			No
3	Kitchen			9	Drywall and Joint Compound	Walls and Ceiling			No
3	Kitchen			9	Drywall and Joint Compound	Walls and Ceiling			No
3	Kitchen (Ceiling)			10	Loose Fill Vermiculite Insulation	May also be in 1837 Attic &/or Walls	Unknown		Yes (Assumed)
3	Kitchen			11	Multi-Layer Floor				No
3	Kitchen			12	Deteriorated Wall paper	Stairs going to Basement			No
3	Kitchen			13	White Caulk	Around area where old cabinets were			No
4	Bathroom and Hallway	1	Original 1837 House	1	Wall Plaster with Wall Coverings				No

<i>FS#</i>	<i>FS Description</i>	<i>Floor</i>	<i>FS Notes</i>	<i>HM#</i>	<i>Homogeneous Material Description</i>	<i>HM Notes</i>	<i>Amount</i>	<i>Units</i>	<i>ACM?</i>
4	Bathroom and Hallway			7	12"x12" Tongue and Groove Ceiling Tile	Stapled Up			No
4	Bathroom and Hallway			11	Multi-Layer Floor				No
4	Bathroom and Hallway			14	White Grout				No
4	Bathroom and Hallway			15	Floral Wallpaper				No
5	Men's Front Entrance	1	Addition Section of House	5	14"x14" Tongue and Groove Ceiling Tile	Stapled Up			No
5	Men's Front Entrance			6	Glazing on Interior Windows				No
5	Men's Front Entrance			16	Wall Plaster with Wall Coverings				No
5	Men's Front Entrance			17	Ceiling Plaster with Wall Coverings				No
6	Center Room	1	Addition Section of House	5	14"x14" Tongue and Groove Ceiling Tile	Stapled Up			No
6	Center Room			6	Glazing on Interior Windows				No
6	Center Room			16	Wall Plaster with Wall Coverings				No
6	Center Room			17	Ceiling Plaster with Wall Coverings				No
7	Rear Entry Room	1	Addition Section of House	6	Glazing on Interior Windows				No
7	Rear Entry Room			16	Wall Plaster with Wall Coverings				No
7	Rear Entry Room			17	Ceiling Plaster with Wall Coverings				No
7	Rear Entry Room			18	Faux Woven Rug Linoleum				No
7	Rear Entry Room			19	Faux Mosaic Stone Linoleum				No
7	Rear Entry Room			20	Red Squares Sheet Flooring				No
8	Women's Front Entrance	1	Addition Section of House	5	14"x14" Tongue and Groove Ceiling Tile	Stapled Up			No
8	Women's Front Entrance			6	Glazing on Interior Windows				No
8	Women's Front Entrance			16	Wall Plaster with Wall Coverings				No
8	Women's Front Entrance			17	Ceiling Plaster with Wall Coverings				No

<i>FS#</i>	<i>FS Description</i>	<i>Floor</i>	<i>FS Notes</i>	<i>HM#</i>	<i>Homogeneous Material Description</i>	<i>HM Notes</i>	<i>Amount</i>	<i>Units</i>	<i>ACM?</i>
8	Women's Front Entrance			21	Skim Coat over Particle board				No
9	All original Room Top of Stair:	2	Addition Section of House	6	Glazing on Interior Windows				No
9	All original Room Top of Stairs			16	Wall Plaster with Wall Coverings				No
9	All original Room Top of Stairs			17	Ceiling Plaster with Wall Coverings				No
10	Adjacent Original Room	2	Addition Section of House	6	Glazing on Interior Windows				No
10	Adjacent Original Room			16	Wall Plaster with Wall Coverings				No
10	Adjacent Original Room			17	Ceiling Plaster with Wall Coverings				No
11	Large Center Room	2	Addition Section of House	6	Glazing on Interior Windows				No
11	Large Center Room			16	Wall Plaster with Wall Coverings				No
11	Large Center Room			17	Ceiling Plaster with Wall Coverings				No
11	Large Center Room			22	Wallboard				No
11	Large Center Room			23	2'x4' Dots and Gouges Suspended Ceiling Tile				No
11	Large Center Room			24	Drywall and Joint Compound				No
12	Restroom and Hall	2	Addition Section of House	1	Wall Plaster with Wall Coverings				No
12	Restroom and Hall			2	Ceiling Plaster with Wall Coverings				No
12	Restroom and Hall			6	Glazing on Interior Windows				No
12	Restroom and Hall			7	12"x12" Tongue and Groove Ceiling Tile	Stapled Up			No
12	Restroom and Hall			14	White Grout				No
12	Restroom and Hall			24	Drywall and Joint Compound				No
12	Restroom and Hall			25	Bathroom Caulk				No
12	Restroom and Hall			26	12"x12" Sticky Back Faux Ceramic Tile				No
12	Restroom and Hall			27	12"x12" Yellow Sticky Back Floor Tile		48 SF		Yes

Barnard House at
 Historic Troy Village
 Troy, MI
 List by Functional Space

<i>FS#</i>	<i>FS Description</i>	<i>Floor</i>	<i>FS Notes</i>	<i>HM#</i>	<i>Homogeneous Material Description</i>	<i>HM Notes</i>	<i>Amount</i>	<i>Units</i>	<i>ACM?</i>
13	Wood Paneled Room	2	Addition Section of House	6	Glazing on Interior Windows				No
13	Wood Paneled Room			7	12"x12" Tongue and Groove Ceiling Tile	Stapled Up			No
13	Wood Paneled Room			22	Wallboard				No
13	Wood Paneled Room			27	12"x12" Yellow Sticky Back Floor Tile		400 SF		Yes
14	Attic	2		30	Orange Foil Backed Insulation	1837 section only			No
E	Exterior	E		28	Window Glazing				No
E	Exterior			29	Siding Sealant	Around Entire House			No

Section 2.4

List by Homogenous Material

HM#	Homogeneous Material Description	HM Notes	FS#	FS Description	Floor	FS Notes	Amount	Units	ACM?	F/NF	SM/TSI/MM
1	Wall Plaster with Wall Coverings		1	Main Entrance/Living Room	1	Original 1837 House			No	NF	MM
1	Wall Plaster with Wall Coverings		2	First Floor Bedroom	1	Original 1837 House			No	NF	MM
1	Wall Plaster with Wall Coverings	Behind Drywall and Joint Compound	3	Kitchen	1	Original 1837 House			No	NF	MM
1	Wall Plaster with Wall Coverings		4	Bathroom and Hallway	1	Original 1837 House			No	NF	MM
1	Wall Plaster with Wall Coverings		12	Restroom and Hall	2	Addition Section of House			No	NF	MM
2	Ceiling Plaster with Wall Coverings		1	Main Entrance/Living Room	1	Original 1837 House			No	NF	MM
2	Ceiling Plaster with Wall Coverings		2	First Floor Bedroom	1	Original 1837 House			No	NF	MM
2	Ceiling Plaster with Wall Coverings	Behind Drywall and Joint Compound	3	Kitchen	1	Original 1837 House			No	NF	MM
2	Ceiling Plaster with Wall Coverings		12	Restroom and Hall	2	Addition Section of House			No	NF	MM
3	Farm House Wallpaper		1	Main Entrance/Living Room	1	Original 1837 House			No	NF	MM
4	Mosaic Design Wallpaper		1	Main Entrance/Living Room	1	Original 1837 House			No	NF	MM
5	14"x14" Tongue and Groove Ceiling Tile	Stapled Up	1	Main Entrance/Living Room	1	Original 1837 House			No	F	MM
5	14"x14" Tongue and Groove Ceiling Tile	Stapled Up	5	Men's Front Entrance	1	Addition Section of House			No	F	MM
5	14"x14" Tongue and Groove Ceiling Tile	Stapled Up	6	Center Room	1	Addition Section of House			No	F	MM
5	14"x14" Tongue and Groove Ceiling Tile	Stapled Up	8	Women's Front Entrance	1	Addition Section of House			No	F	MM
6	Glazing on Interior Windows		1	Main Entrance/Living Room	1	Original 1837 House			No	NF	MM
6	Glazing on Interior Windows		2	First Floor Bedroom	1	Original 1837 House			No	NF	MM
6	Glazing on Interior Windows		3	Kitchen	1	Original 1837 House			No	NF	MM
6	Glazing on Interior Windows		5	Men's Front Entrance	1	Addition Section of House			No	NF	MM
6	Glazing on Interior Windows		6	Center Room	1	Addition Section of House			No	NF	MM
6	Glazing on Interior Windows		7	Rear Entry Room	1	Addition Section of House			No	NF	MM
6	Glazing on Interior Windows		8	Women's Front Entrance	1	Addition Section of House			No	NF	MM
6	Glazing on Interior Windows		9	All original Room Top of Stairs	2	Addition Section of House			No	NF	MM
6	Glazing on Interior Windows		10	Adjacent Original Room	2	Addition Section of House			No	NF	MM
6	Glazing on Interior Windows		11	Large Center Room	2	Addition Section of House			No	NF	MM
6	Glazing on Interior Windows		12	Restroom and Hall	2	Addition Section of House			No	NF	MM
6	Glazing on Interior Windows		13	Wood Paneled Room	2	Addition Section of House			No	NF	MM
7	12"x12" Tongue and Groove Ceiling Tile	Stapled Up	2	First Floor Bedroom	1	Original 1837 House			No	F	MM
7	12"x12" Tongue and Groove Ceiling Tile	Stapled Up	4	Bathroom and Hallway	1	Original 1837 House			No	F	MM
7	12"x12" Tongue and Groove Ceiling Tile	Stapled Up	12	Restroom and Hall	2	Addition Section of House			No	F	MM
7	12"x12" Tongue and Groove Ceiling Tile	Stapled Up	13	Wood Paneled Room	2	Addition Section of House			No	F	MM
8	Cream and Green Sheet Flooring and Adhesive		2	First Floor Bedroom	1	Original 1837 House			No	NF	MM
9	Drywall and Joint Compound	Walls and Ceiling	3	Kitchen	1	Original 1837 House			No	NF	MM
9	Drywall and Joint Compound	Walls and Ceiling	3	Kitchen	1	Original 1837 House			No	NF	MM
9	Drywall and Joint Compound	Walls and Ceiling	3	Kitchen	1	Original 1837 House			No	NF	MM
10	Loose Fill Vermiculite Insulation	May also be in 1837 Attic &/or Walls	3	Kitchen (Ceiling)	1	Original 1837 House	Unknown		Yes (Assumed)	F	MM
11	Multi-Layer Floor		3	Kitchen	1	Original 1837 House			No	NF	MM

HM#	Homogeneous Material Description	HM Notes	FS#	FS Description	Floor	FS Notes	Amount	Units	ACM?	F/NF	SM/TSI/MM
11	Multi-Layer Floor		4	Bathroom and Hallway	1	Original 1837 House			No	NF	MM
12	Deteriorated Wall paper	Stairs going to Basement	3	Kitchen	1	Original 1837 House			No	F	MM
13	White Caulk	Around area where old cabinets were	3	Kitchen	1	Original 1837 House			No	NF	MM
14	White Grout		4	Bathroom and Hallway	1	Original 1837 House			No	NF	MM
14	White Grout		12	Restroom and Hall	2	Addition Section of House			No	NF	MM
15	Floral Wallpaper		4	Bathroom and Hallway	1	Original 1837 House			No	NF	MM
16	Wall Plaster with Wall Coverings		5	Men's Front Entrance	1	Addition Section of House			No	NF	MM
16	Wall Plaster with Wall Coverings		6	Center Room	1	Addition Section of House			No	NF	MM
16	Wall Plaster with Wall Coverings		7	Rear Entry Room	1	Addition Section of House			No	NF	MM
16	Wall Plaster with Wall Coverings		8	Women's Front Entrance	1	Addition Section of House			No	NF	MM
16	Wall Plaster with Wall Coverings		9	All original Room Top of Stairs	2	Addition Section of House			No	NF	MM
16	Wall Plaster with Wall Coverings		10	Adjacent Original Room	2	Addition Section of House			No	NF	MM
16	Wall Plaster with Wall Coverings		11	Large Center Room	2	Addition Section of House			No	NF	MM
17	Ceiling Plaster with Wall Coverings		5	Men's Front Entrance	1	Addition Section of House			No	NF	MM
17	Ceiling Plaster with Wall Coverings		6	Center Room	1	Addition Section of House			No	NF	MM
17	Ceiling Plaster with Wall Coverings		7	Rear Entry Room	1	Addition Section of House			No	NF	MM
17	Ceiling Plaster with Wall Coverings		8	Women's Front Entrance	1	Addition Section of House			No	NF	MM
17	Ceiling Plaster with Wall Coverings		9	All original Room Top of Stairs	2	Addition Section of House			No	NF	MM
17	Ceiling Plaster with Wall Coverings		10	Adjacent Original Room	2	Addition Section of House			No	NF	MM
17	Ceiling Plaster with Wall Coverings		11	Large Center Room	2	Addition Section of House			No	NF	MM
18	Faux Woven Rug Linoleum		7	Rear Entry Room	1	Addition Section of House			No	NF	MM
19	Faux Mosaic Stone Linoleum		7	Rear Entry Room	1	Addition Section of House			No	NF	MM
20	Red Squares Sheet Flooring		7	Rear Entry Room	1	Addition Section of House			No	NF	MM
21	Skim Coat over Particle board		8	Women's Front Entrance	1	Addition Section of House			No	NF	MM
22	Wallboard		11	Large Center Room	2	Addition Section of House			No	NF	MM
22	Wallboard		13	Wood Paneled Room	2	Addition Section of House			No	NF	MM
23	2'x4' Dots and Gouges Suspended Ceiling Tile		11	Large Center Room	2	Addition Section of House			No	F	MM
24	Drywall and Joint Compound		11	Large Center Room	2	Addition Section of House			No	NF	MM
24	Drywall and Joint Compound		12	Restroom and Hall	2	Addition Section of House			No	NF	MM
25	Bathroom Caulk		12	Restroom and Hall	2	Addition Section of House			No	NF	MM
26	12"x12" Sticky Back Faux Ceramic Tile		12	Restroom and Hall	2	Addition Section of House			No	NF	MM
27	12"x12" Yellow Sticky Back Tile		12	Restroom and Hall	2	Addition Section of House	48 SF		Yes	NF	MM
27	12"x12" Yellow Sticky Back Tile		13	Wood Paneled Room	2	Addition Section of House	400 SF		Yes	NF	MM
28	Window Glazing		E	Exterior	E				No	NF	MM
29	Siding Sealant	Around Entire House	E	Exterior	E				No	NF	MM
30	Orange Foil Backed Insulation	1837 section only	14	Attic	2				No	F	MM

Section 3

Bulk Sample Report, Laboratory Data and Chain of Custody Documents

<i>HM#</i>	<i>Homogeneous Material Description</i>	<i>FS#</i>	<i>FS Description</i>	<i>Floor</i>	<i>Sample #</i>		<i>Sample Location</i>	<i>ACM?</i>
1	Wall Plaster with Wall Coverings	1	Main Entrance/Living Room	1	1	1	NW Corner	No
1	Wall Plaster with Wall Coverings	2	First Floor Bedroom	1	1	2	Sampled from Existing Damaged Areas	No
1	Wall Plaster with Wall Coverings	3	Kitchen	1	1	3	SW Corner	No
2	Ceiling Plaster with Wall Coverings	1	Main Entrance/Living Room	1	2	1	West End of Ceiling by Entrance	No
2	Ceiling Plaster with Wall Coverings	2	First Floor Bedroom	1	2	2	Sampled from Existing Damaged Areas	No
2	Ceiling Plaster with Wall Coverings	3	Kitchen	1	2	3	Center of Ceiling	No
3	Farm House Wallpaper	1	Main Entrance/Living Room	1	3	1	Southeast Corner	No
4	Mosaic Design Wallpaper	1	Main Entrance/Living Room	1	4	1	Southeast Corner	No
5	14"x14" Tongue and Groove Ceiling Tile	1	Main Entrance/Living Room	1	5	1	West End of Ceiling by Entrance	No
6	Glazing on Interior Windows	1	Main Entrance/Living Room	1	6	1	South Wall , Right Window	No
7	12"x12" Tongue and Groove Ceiling Tile	2	First Floor Bedroom	1	7	1	Center of Ceiling	No
8	Cream and Green Sheet Flooring and Adhesive	2	First Floor Bedroom	1	8	1	Between FS 1 and FS 2 Doorway	No
9	Drywall and Joint Compound	3	Kitchen	1	9	1	West Wall	No
9	Drywall and Joint Compound	3	Kitchen	1	9	2	West Wall	No
9	Drywall and Joint Compound	3	Kitchen	1	9	3	Ceiling Center	No
10	Loose Fill Vermiculite Insulation (not submitted)	3	Kitchen	1	10	1	Ceiling Center	Yes (Assumed)
11	Multi-Layer Floor	3	Kitchen	1	11	1	Where Stove was	No
12	Deteriorated Wall paper	3	Kitchen	1	12	1	Stairs going to Basement	No
13	White Caulk	3	Kitchen	1	13	1	Backsplash	No
14	White Grout	4	Bathroom and Hallway	1	14	1	West Wall	No
15	Floral Wallpaper	4	Bathroom and Hallway	1	15	1	West Wall	No
16	Wall Plaster with Wall Coverings	5	Men's Front Entrance	1	16	1	North Wall	No
16	Wall Plaster with Wall Coverings	6	Center Room	1	16	2	South Wall	No
16	Wall Plaster with Wall Coverings	8	Women's Front Entrance	1	16	3	East Wall	No
16	Wall Plaster with Wall Coverings	9	All original Room Top of Stairs	2	16	4	North Wall	No
16	Wall Plaster with Wall Coverings	10	Adjacent Original Room	2	16	5	South Wall	No
17	Ceiling Plaster with Wall Coverings	5	Men's Front Entrance	1	17	1	Center of Ceiling	No
17	Ceiling Plaster with Wall Coverings	7	Rear Entry Room	1	17	2	Closet in Corner	No

HM#	Homogeneous Material Description	FS#	FS Description	Floor	Sample #	Sample Location	ACM?	
17	Ceiling Plaster with Wall Coverings	8	Women's Front Entrance	1	17	3	Former Fireplace	No
17	Ceiling Plaster with Wall Coverings	9	All original Room Top of Stairs	2	17	4	Ceiling Center	No
17	Ceiling Plaster with Wall Coverings	10	Adjacent Original Room	2	17	5	Ceiling Center	No
18	Faux Woven Rug Linoleum	7	Rear Entry Room	1	18	1	Floor by Door	No
19	Faux Mosaic Stone Linoleum	7	Rear Entry Room	1	19	1	Floor by Door	No
20	Red Squares Sheet Flooring	7	Rear Entry Room	1	20	1	Closet Floor	No
21	Skim Coat over Particle board	8	Women's Front Entrance	1	21	1	East Wall	No
22	Wallboard	11	Large Center Room	2	22	1	East Wall	No
23	2'x4' Dots and Gouges Suspended Ceiling Tile	11	Large Center Room	2	23	1	Ceiling Center	No
24	Drywall and Joint Compound	11	Large Center Room	2	24	1	East Wall	No
24	Bathroom Caulk	12	Restroom and Hall	2	24	1	Along Tub	No
25	12"x12" Sticky Back Faux Ceramic Tile	12	Restroom and Hall	2	25	1	Bathroom Floor	No
27	12"x12" Yellow Sticky Back Tile	12	Restroom and Hall	2	27	1	Hallway Left Side	Yes
28	Window Glazing	E	Exterior	E	28	1	North Windows	No
29	Siding Sealant	E	Exterior	E	29	1	North Wall	No
30	Orange Foil Backed Insulation	14	Attic	2	30	1	1837 Section of Attic	No

The Yes or No Designation listed in the ACM? Column represents the overall result for the Homogeneous Material including all layers analyzed by the laboratory. Please see the laboratory report found on the following pages for each sample layer analysis.

Footnotes:

1. Analysis of samples of this material by PLM indicated an asbestos content of <1%. Additional analysis by point count (or TEM) confirmed that the asbestos content was <1%.
2. Analysis of samples of this material by PLM indicated an asbestos content of <1%. Additional analysis by point count (or TEM) determined that the asbestos content was >1%.
3. Analysis of samples of this material by PLM indicated an asbestos content of >1%. Additional analysis by point count (or TEM) confirmed that the asbestos content was >1%.
4. Analysis of samples of this material by PLM indicated an asbestos content of >1%. Additional analysis by point count (or TEM) determined that the asbestos content was <1%.
5. Asbestos was not detected in samples of this material analyzed by PLM. Additional analysis by TEM confirmed that asbestos was not detected.



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<http://www.EMSL.com> / annarborlab@emsl.com

EMSL Order: 081800219

Customer ID: TEST51

Customer PO:

Project ID:

Attention: Scott Chandler
Testing Engineers & Consultants, Inc.
1343 Rochester Rd.
Troy, MI 48083

Phone: (248) 755-1557

Fax: (248) 585-9519

Received Date: 02/02/2018 10:00 AM

Analysis Date: 02/02/2018 - 02/05/2018

Collected Date:

Project: 58640-01 / City of Troy / Pre-Renovation Survey: Barnard House; Troy Historic Village

Test Report: Asbestos Analysis of Bulk Materials via EPA 600/R-93/116 Method using Polarized Light Microscopy

Sample	Description	Appearance	Non-Asbestos		Asbestos
			% Fibrous	% Non-Fibrous	% Type
1-1 081800219-0001	Wallpaper	Various/Beige Fibrous Heterogeneous	90% Cellulose	10% Non-fibrous (Other)	None Detected
1-1 081800219-0001A	Finish Coat	White Non-Fibrous Homogeneous		2% Quartz 98% Non-fibrous (Other)	None Detected
1-1 081800219-0001B	Base Coat	Gray Fibrous Homogeneous	<1% Cellulose <1% Hair	6% Quartz 94% Non-fibrous (Other)	None Detected
1-2 081800219-0002	Wallpaper	Green/Beige Fibrous Homogeneous	95% Cellulose	5% Non-fibrous (Other)	None Detected
1-2 081800219-0002A	Plaster	Gray Fibrous Homogeneous	<1% Cellulose <1% Hair	7% Quartz 93% Non-fibrous (Other)	None Detected
1-3 081800219-0003	Plaster	Gray Fibrous Homogeneous	<1% Cellulose <1% Hair	10% Quartz 90% Non-fibrous (Other)	None Detected
2-1 081800219-0004	Wallpaper	Brown/Gray Fibrous Homogeneous	90% Cellulose	10% Non-fibrous (Other)	None Detected
2-1 081800219-0004A	Plaster	Gray Fibrous Homogeneous	<1% Cellulose <1% Hair	10% Quartz 90% Non-fibrous (Other)	None Detected
2-2 081800219-0005	Wallpaper	Brown Fibrous Homogeneous	95% Cellulose	5% Non-fibrous (Other)	None Detected
2-2 081800219-0005A	Plaster	Gray Fibrous Homogeneous	<1% Cellulose <1% Hair	8% Quartz 92% Non-fibrous (Other)	None Detected
2-3 081800219-0006	Plaster	Brown/Gray Fibrous Homogeneous	<1% Hair	8% Quartz 92% Non-fibrous (Other)	None Detected
3-1 081800219-0007 Adhesive inseparable	Wallpaper	Brown/Gray/Various Fibrous Heterogeneous	95% Cellulose	5% Non-fibrous (Other)	None Detected
4-1 081800219-0008	Wallpaper	Brown/Various/Yello w Fibrous Homogeneous	95% Cellulose	5% Non-fibrous (Other)	None Detected
5-1 081800219-0009	Ceiling Tile	Brown Fibrous Homogeneous	95% Cellulose	5% Non-fibrous (Other)	None Detected
6-1 081800219-0010	Glazing	Gray Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected

Initial report from: 02/06/2018 10:04:45



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EMSL Order: 081800219

Customer ID: TEST51

Customer PO:

Project ID:

Test Report: Asbestos Analysis of Bulk Materials via EPA 600/R-93/116 Method using Polarized Light Microscopy

Sample	Description	Appearance	Non-Asbestos		Asbestos
			% Fibrous	% Non-Fibrous	% Type
7-1 081800219-0011	Ceiling Tile	Brown Fibrous Homogeneous	95% Cellulose	5% Non-fibrous (Other)	None Detected
8-1 081800219-0012	Sheet Flooring and Adhesive	Red/Various/Black Fibrous Heterogeneous	50% Cellulose	50% Non-fibrous (Other)	None Detected
9-1 081800219-0013	Joint Compound	White Non-Fibrous Homogeneous		6% Ca Carbonate 94% Non-fibrous (Other)	None Detected
9-1 081800219-0013A	Drywall	Brown/White Fibrous Heterogeneous	4% Cellulose	96% Non-fibrous (Other)	None Detected
9-2 081800219-0014	Texture	White Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
9-2 081800219-0014A	Drywall	Brown/White Fibrous Heterogeneous	8% Cellulose	92% Non-fibrous (Other)	None Detected
9-3 081800219-0015	Drywall and Joint Compound	Brown/Gray Fibrous Heterogeneous	5% Cellulose	95% Non-fibrous (Other)	None Detected
10-1 081800219-0016 Sample not analyzed at client request	Vermiculite				Not Analyzed
11-1 081800219-0017	Linoleum A	Gray/White/Various Fibrous Heterogeneous	40% Cellulose 5% Glass	55% Non-fibrous (Other)	None Detected
11-1 081800219-0017A	Linoleum B	Gray/Beige Fibrous Heterogeneous	40% Cellulose 5% Glass	55% Non-fibrous (Other)	None Detected
11-1 081800219-0017B	Adhesive	Beige Non-Fibrous Homogeneous	20% Cellulose	80% Non-fibrous (Other)	None Detected
12-1 081800219-0018	Wallpaper	Brown Fibrous Homogeneous	95% Cellulose	5% Non-fibrous (Other)	None Detected
13-1 081800219-0019	Caulk	Beige Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
14-1 081800219-0020	Grout	White Non-Fibrous Homogeneous	2% Wollastonite	98% Non-fibrous (Other)	None Detected
15-1 081800219-0021	Wallpaper	White/Various/Beige Fibrous Homogeneous	90% Cellulose	10% Non-fibrous (Other)	None Detected
16-1 081800219-0022	Wallpaper	Brown/Pink Fibrous Homogeneous	90% Cellulose	10% Non-fibrous (Other)	None Detected
16-1 081800219-0022A	Finish Coat	White Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
16-1 081800219-0022B	Base Coat	Gray Fibrous Homogeneous	<1% Cellulose	8% Quartz 92% Non-fibrous (Other)	None Detected

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EMSL Order: 081800219

Customer ID: TEST51

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Project ID:

Test Report: Asbestos Analysis of Bulk Materials via EPA 600/R-93/116 Method using Polarized Light Microscopy

Sample	Description	Appearance	Non-Asbestos		Asbestos
			% Fibrous	% Non-Fibrous	% Type
16-2	Wallpaper	Gray/Tan Fibrous Homogeneous	90% Cellulose	10% Non-fibrous (Other)	None Detected
081800219-0023					
16-2	Adhesive	Clear Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
081800219-0023A					
16-2	Plaster	Gray Fibrous Homogeneous	<1% Cellulose <1% Hair	7% Quartz 93% Non-fibrous (Other)	None Detected
081800219-0023B					
16-3	Wallpaper	Pink/Beige Fibrous Homogeneous	90% Cellulose	10% Non-fibrous (Other)	None Detected
081800219-0024					
16-3	Plaster	Gray Non-Fibrous Homogeneous		5% Quartz 95% Non-fibrous (Other)	None Detected
081800219-0024A					
16-4	Wallpaper	Brown/Blue Fibrous Homogeneous	90% Cellulose	10% Non-fibrous (Other)	None Detected
081800219-0025					
16-4	Plaster	Gray Fibrous Homogeneous	<1% Cellulose <1% Hair	8% Quartz 92% Non-fibrous (Other)	None Detected
081800219-0025A					
16-5	Wallpaper	Tan Fibrous Homogeneous	90% Cellulose	10% Non-fibrous (Other)	None Detected
081800219-0026					
16-5	Plaster	Gray Fibrous Homogeneous	<1% Hair	9% Quartz 91% Non-fibrous (Other)	None Detected
081800219-0026A					
17-1	Wallpaper	Brown/Gray Fibrous Homogeneous	90% Cellulose	10% Non-fibrous (Other)	None Detected
081800219-0027					
17-1	Plaster	Gray Fibrous Homogeneous	<1% Cellulose <1% Hair	6% Quartz 94% Non-fibrous (Other)	None Detected
081800219-0027A					
17-2	Wallpaper	Brown Fibrous Homogeneous	90% Cellulose	10% Non-fibrous (Other)	None Detected
081800219-0028					
17-2	Plaster	Gray Fibrous Homogeneous	<1% Hair	6% Quartz 94% Non-fibrous (Other)	None Detected
081800219-0028A					
17-3	Finish Coat	White Non-Fibrous Homogeneous	<1% Cellulose	<1% Quartz 100% Non-fibrous (Other)	None Detected
081800219-0029					
17-3	Base Coat	Gray Fibrous Homogeneous	<1% Cellulose	18% Quartz 82% Non-fibrous (Other)	None Detected
081800219-0029A					
17-4	Wallpaper	Tan/Blue Fibrous Homogeneous	90% Cellulose	10% Non-fibrous (Other)	None Detected
081800219-0030					
17-4	Plaster	Gray Fibrous Homogeneous	<1% Hair	8% Quartz 92% Non-fibrous (Other)	None Detected
081800219-0030A					
17-5	Finish Coat	White Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
081800219-0031					
17-5	Base Coat	Gray Non-Fibrous Homogeneous	<1% Cellulose	6% Quartz 94% Non-fibrous (Other)	None Detected
081800219-0031A					

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Customer ID: TEST51

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Project ID:

Test Report: Asbestos Analysis of Bulk Materials via EPA 600/R-93/116 Method using Polarized Light Microscopy

Sample	Description	Appearance	Non-Asbestos		Asbestos
			% Fibrous	% Non-Fibrous	% Type
18-1 081800219-0032	Linoleum	Red/Various/Black Fibrous Heterogeneous	50% Cellulose	50% Non-fibrous (Other)	None Detected
19-1 081800219-0033	Linoleum	White/Various/Blue Fibrous Heterogeneous	55% Cellulose	45% Non-fibrous (Other)	None Detected
20-1 081800219-0034	Sheet Flooring	Red/Various/Black Fibrous Heterogeneous	50% Cellulose	50% Non-fibrous (Other)	None Detected
21-1 081800219-0035	Finish Coat	White Non-Fibrous Homogeneous		4% Ca Carbonate 96% Non-fibrous (Other)	None Detected
21-1 081800219-0035A	Insulation	Brown Fibrous Homogeneous	95% Cellulose	5% Non-fibrous (Other)	None Detected
22-1 081800219-0036	Wallboard	Brown/White Fibrous Heterogeneous	10% Cellulose	90% Non-fibrous (Other)	None Detected
23-1 081800219-0037	Ceiling Tile	Gray Fibrous Homogeneous	60% Cellulose 10% Min. Wool	20% Perlite 10% Non-fibrous (Other)	None Detected
24-1 081800219-0038	Joint Compound A	White Non-Fibrous Homogeneous		3% Ca Carbonate 3% Mica 94% Non-fibrous (Other)	None Detected
24-1 081800219-0038A	Tape	Beige Fibrous Homogeneous	90% Cellulose	10% Non-fibrous (Other)	None Detected
24-1 081800219-0038B	Joint Compound B	White Non-Fibrous Homogeneous		3% Ca Carbonate 3% Mica 94% Non-fibrous (Other)	None Detected
24-1 081800219-0038C	Drywall	Brown/White Fibrous Heterogeneous	6% Cellulose	94% Non-fibrous (Other)	None Detected
25-1 081800219-0039	Caulk	White Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
26-1 081800219-0040	Stickyback Tile	Gray/Black Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
27-1 081800219-0041	Floor Tile	Brown/Gray Non-Fibrous Homogeneous		96% Non-fibrous (Other)	4% Chrysotile
27-1 081800219-0041A	Adhesive	Yellow Non-Fibrous Homogeneous	<1% Cellulose	100% Non-fibrous (Other)	None Detected
28-1 081800219-0042	Glazing	Tan/White Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
29-1 081800219-0043	Sealant	Gray/White Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected



EMSL Analytical, Inc.

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Tel/Fax: (734) 668-6810 / (734) 668-8532

<http://www.EMSL.com> / annarborlab@emsl.com

EMSL Order: 081800219

Customer ID: TEST51

Customer PO:

Project ID:

Analyst(s)

Jamey Cooper (11)

Ryan Shannon (57)

Ryan Shannon, Laboratory Manager
or Other Approved Signatory

EMSL maintains liability limited to cost of analysis. This report relates only to the samples reported and may not be reproduced, except in full, without written approval by EMSL. EMSL bears no responsibility for sample collection activities or analytical method limitations. Interpretation and use of test results are the responsibility of the client. This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST or any agency of the federal government. Non-friable organically bound materials present a problem matrix and therefore EMSL recommends gravimetric reduction prior to analysis. Samples received in good condition unless otherwise noted. Estimated accuracy, precision and uncertainty data available upon request. Unless requested by the client, building materials manufactured with multiple layers (i.e. linoleum, wallboard, etc.) are reported as a single sample. Reporting limit is 1%

Samples analyzed by EMSL Analytical, Inc. Ann Arbor, MI NVLAP Lab Code 101048-4

Initial report from: 02/06/2018 10:04:45

Asbestos Chain of Custody

081800219

Project No:	58640-01	Collected by:	Dylan Stoddard
Client:	City of Troy	Date Collected:	01/29/2018
Project:	Pre-Renovation Survey: Barnard House, Troy Historic Village	Relinquished by:	Dylan Stoddard
Attention:	Scott Chandler	Date:	02/01/2018
Special:	Email results to Schandler@tectest.com	Received by:	MSK
		Date:	2/2/18
		Time:	10:00

			Sample ID			
FS#	FS Description	Homogeneous Material Description	HM#	Sample #	Sample Location	Comments
1	Main Entrance/Living Room	Wall Plaster with Wall Coverings	1	1	NW Corner	
2	First Floor Bedroom	Wall Plaster with Wall Coverings	1	2	Sampled from Existing Damaged Areas	
3	Kitchen	Wall Plaster with Wall Coverings	1	3	SW Corner	
1	Main Entrance/Living Room	Ceiling Plaster with Wall Coverings	2	1	West End of Ceiling by Entrance	
2	First Floor Bedroom	Ceiling Plaster with Wall Coverings	2	2	Sampled from Existing Damaged Areas	
3	Kitchen	Ceiling Plaster with Wall Coverings	2	3	Center of Ceiling	
1	Main Entrance/Living Room	Farm House Wallpaper	3	1	Southeast Corner	
1	Main Entrance/Living Room	Mosaic Design Wallpaper	4	1	Southeast Corner	
1	Main Entrance/Living Room	14"x14" Tongue and Groove Ceiling Tile	5	1	West End of Ceiling by Entrance	
1	Main Entrance/Living Room	Glazing on Interior Windows	6	1	South Wall, Right Window	
2	First Floor Bedroom	12"x12" Tongue and Groove Ceiling Tile	7	1	Center of Ceiling	
2	First Floor Bedroom	Cream and Green Sheet Flooring and Adhesive	8	1	Between FS 1 and FS 2 Doorway	
3	Kitchen	Drywall and Joint Compound	9	1	West Wall	
3	Kitchen	Drywall and Joint Compound	9	2	West Wall	
3	Kitchen	Drywall and Joint Compound	9	3	Ceiling Center	
3	Kitchen	Vermiculite	10	1	Ceiling Center	
3	Kitchen	Multi-Layer Floor	11	1	Where Stove was	
3	Kitchen	Deteriorated Wall paper	12	1	Stairs going to Basement	
3	Kitchen	White Caulk	13	1	Backsplash	

Turn Around Time: 72 HRS.
Method: PLM Std.
Analyze to 1st Positive: YES

Asbestos Chain of Custody

081800219

Project No: 58640-01	Collected by: Dylan Stoddard
Client: City of Troy	Date Collected: 01/29/2018
Project: Pre-Renovation Survey, Barnard House, Troy Historic Village	
	Relinquished by: Dylan Stoddard
	Date: 02/01/2018 Time:
Attention: Scott Chandler	Received by: <i>U.S.</i>
Special: Email results to Schandler@tectest.com	Date: 2/2/18 Time: 10:00

			Sample ID			
FS#	FS Description	Homogeneous Material Description	HM#	Sample #	Sample Location	Comments
4	Bathroom and Hallway	White Grout	14	1	West Wall	
4	Bathroom and Hallway	Floral Wallpaper	15	1	West Wall	
5	Men's Front Entrance	Wall Plaster with Wall Coverings	16	1	North Wall	
6	Center Room	Wall Plaster with Wall Coverings	16	2	South Wall	
8	Women's Front Entrance	Wall Plaster with Wall Coverings	16	3	East Wall	
9	All original Room Top of Stairs	Wall Plaster with Wall Coverings	16	4	North Wall	
10	Adjacent Original Room	Wall Plaster with Wall Coverings	16	5	South Wall	
5	Men's Front Entrance	Ceiling Plaster with Wall Coverings	17	1	Center of Ceiling	
7	Rear Entry Room	Ceiling Plaster with Wall Coverings	17	2	Closet in Corner	
8	Women's Front Entrance	Ceiling Plaster with Wall Coverings	17	3	Former Fireplace	
9	All original Room Top of Stairs	Ceiling Plaster with Wall Coverings	17	4	Ceiling Center	
10	Adjacent Original Room	Ceiling Plaster with Wall Coverings	17	5	Ceiling Center	
7	Rear Entry Room	Faux Woven Rug Linoleum	18	1	Floor by Door	
7	Rear Entry Room	Faux Mosaic Stone Linoleum	19	1	Floor by Door	
7	Rear Entry Room	Red Squares Sheet Flooring	20	1	Closet Floor	
8	Women's Front Entrance	Skim Coat over Particle board	21	1	East Wall	
11	Large Center Room	Wallboard	22	1	East Wall	
11	Large Center Room	2'x4' Dots and Gouges Suspended Ceiling Tile	23	1	Ceiling Center	
11	Large Center Room	Drywall and Joint Compound	24	1	East Wall	

Turn Around Time: 72 HRS.
Method: PLM Std.
Analyze to 1st Positive: YES

Asbestos Chain of Custody

081800219

Project No:	58640-01	Collected by:	Dylan Stoddard
Client:	City of Troy	Date Collected:	01/29/2018
Project:	Pre-Renovation Survey; Barnard House; Troy Historic Village	Relinquished by:	Dylan Stoddard
Attention:	Scott Chandler	Date:	02/01/2018
Special:	Email results to Schandler@tectest.com	Received by:	MS
		Date:	2/2/18
		Time:	10:00

FS#	FS Description	Homogeneous Material Description	Sample ID		Sample Location	Comments
			HM#	Sample #		
12	Restroom and Hall	Bathroom Caulk	24	1	Along Tub	
12	Restroom and Hall	12"x12" Sticky Back Faux Ceramic Tile	25	1	Bathroom Floor	
12	Restroom and Hall	12"x12" Yellow Sticky Back Tile	27	1	Hallway Left Side	
E	Exterior	Window Glazing	28	1	North Windows	
E	Exterior	Siding Sealant	29	1	North Wall	

Turn Around Time: 72 HRS.
Method: PLM Std.
Analyze to 1st Positive: YES



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<http://www.EMSL.com/annarborlab@emsl.com>

EMSL Order: 081800351

Customer ID: TEST51

Customer PO: 58640

Project ID:

Attention: Scott Chandler
Testing Engineers & Consultants, Inc.
1343 Rochester Rd.
Troy, MI 48083

Phone: (248) 755-1557

Fax: (248) 585-9519

Received Date: 02/21/2018 10:10 AM

Analysis Date: 02/21/2018

Collected Date:

Project: 58640-01

Test Report: Asbestos Analysis of Bulk Materials via EPA 600/R-93/116 Method using Polarized Light Microscopy

Sample	Description	Appearance	Non-Asbestos		Asbestos
			% Fibrous	% Non-Fibrous	% Type
30-1 081800351-0001	Wrap	Black/Silver Fibrous Heterogeneous	35% Cellulose	65% Non-fibrous (Other)	None Detected
30-1 081800351-0001A	Insulation	Tan Fibrous Homogeneous	98% Cellulose	2% Non-fibrous (Other)	None Detected

Analyst(s)

Eric Budai (2)


Ryan Shannon, Laboratory Manager
or Other Approved Signatory

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Samples analyzed by EMSL Analytical, Inc. Ann Arbor, MI NVLAP Lab Code 101048-4

Initial report from: 02/21/2018 14:32:48



EMSL ANALYTICAL, INC.
LABORATORY • PRODUCTS • TRAINING

Asbestos Chain of Custody

EMSL Order Number (Lab Use Only):

081800351

212 South Wagner Road

Ann Arbor, MI 48103

PHONE: (734) 668-6810

FAX (734) 668-8532

Company Name : Testing Engineers & Consultants, In		EMSL Customer ID:	
Street: 1343 Rochester Road		City: Troy	State/Province: MI
Zip/Postal Code: 48083	Country: US	Telephone #: 2487551557	Fax #: 2487551557
Report To (Name): Scott Chandler		Please Provide Results: <input type="checkbox"/> Fax <input checked="" type="checkbox"/> Email	
Email Address: Schandler@tectest.com		Purchase Order: 58640	
Project Name/Number: 58640-01		EMSL Project ID (Internal Use Only):	
U.S. State Samples Taken: MI		CT Samples: <input type="checkbox"/> Commercial/Taxable <input type="checkbox"/> Residential/Tax Exempt	

EMSL-Bill to: ☒ Same ☐ Different - If Bill to is Different note instructions in Comments**

Third Party Billing requires written authorization from third party

Turnaround Time (TAT) Options* - Please Check

☐ 3 Hour ☒ 6 Hour ☐ 24 Hour ☐ 48 Hour ☐ 72 Hour ☐ 96 Hour ☐ 1 Week ☐ 2 Week

*For TEM Air 3 hr through 6 hr, please call ahead to schedule. *There is a premium charge for 3 Hour TEM AHERA or EPA Level II TAT. You will be asked to sign an authorization form for this service. Analysis completed in accordance with EMSL's Terms and Conditions located in the Analytical Price Guide

PCM - Air ☐ Check if samples are from NY

☐ NIOSH 7400

☐ w/ OSHA 8hr. TWA

PLM - Bulk (reporting limit)

☒ PLM EPA 600/R-93/116 (<1%)

☐ PLM EPA NOB (<1%)

Point Count

☐ 400 (<0.25%) ☐ 1000 (<0.1%)

Point Count w/Gravimetric

☐ 400 (<0.25%) ☐ 1000 (<0.1%)

☐ NYS 198.1 (friable in NY)

☐ NYS 198.6 NOB (non-friable-NY)

☐ NYS 198.8 SOF-V

☐ NIOSH 9002 (<1%)

TEM - Air ☐ 4-4.5hr TAT (AHERA only)

☐ AHERA 40 CFR, Part 763

☐ NIOSH 7402

☐ EPA Level II

☐ ISO 10312

TEM - Bulk

☐ TEM EPA NOB

☐ NYS NOB 198.4 (non-friable-NY)

☐ Chatfield SOP

☐ TEM Mass Analysis-EPA 600 sec. 2.5

TEM - Water: EPA 100.2

Fibers >10µm ☐ Waste ☐ Drinking

All Fiber Sizes ☐ Waste ☐ Drinking

TEM- Dust

☐ Microvac - ASTM D 5755

☐ Wipe - ASTM D6480

☐ Carpet Sonication (EPA 600/J-93/167)

Soil/Rock/Vermiculite

☐ PLM EPA 600/R-93/116 with milling prep (<1%)

☐ PLM EPA 600/R-93/116 with milling prep (<0.25%)

☐ TEM EPA 600/R-93/116 with milling prep (<0.1%)

☐ TEM Qualitative via Filtration Prep

☐ TEM Qualitative via Drop Mount Prep

☐ Cincinnati Method EPA 600/R-04/004 - PLM/TEM (BC only)

Other:

☐

☐ Check For Positive Stop - Clearly Identify Homogenous Group

Filter Pore Size (Air Samples): ☐ 0.8µm ☐ 0.45µm

Samplers Name: Dylan Stoddard

Samplers Signature:

Sample #	Sample Description	Volume/Area (Air) HA # (Bulk)	Date/Time Sampled
30-1	Orange Silver Backed Insulation	30	02.14.18

Client Sample # (s): 30-1

Total # of Samples: 1

Relinquished (Client): Dylan Stoddard

Date: 2-20-18

Time:

Received (Lab): MS

FE

Date: 2/21/18

Time: 10:10am

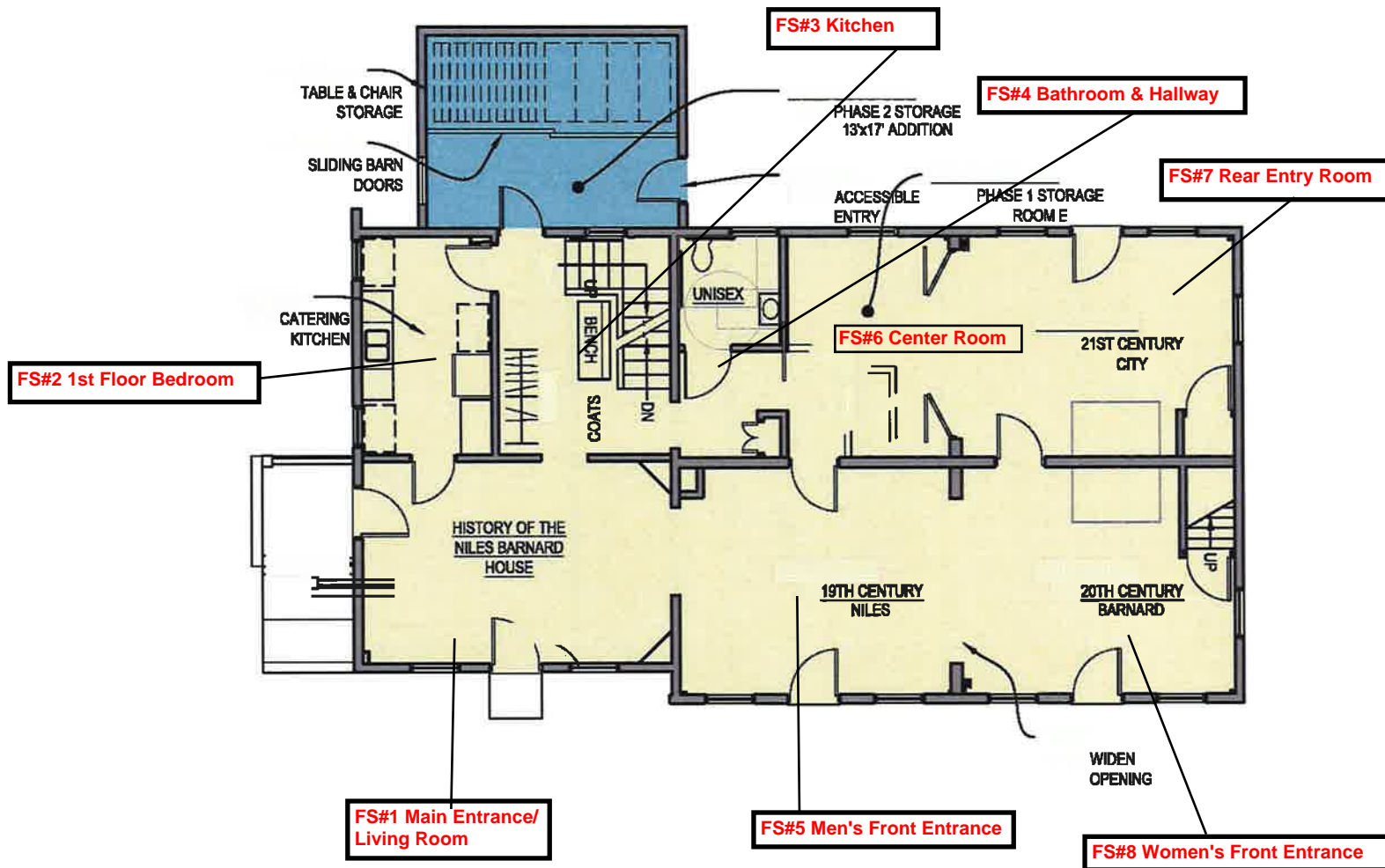
Comments/Special Instructions:

Section 4

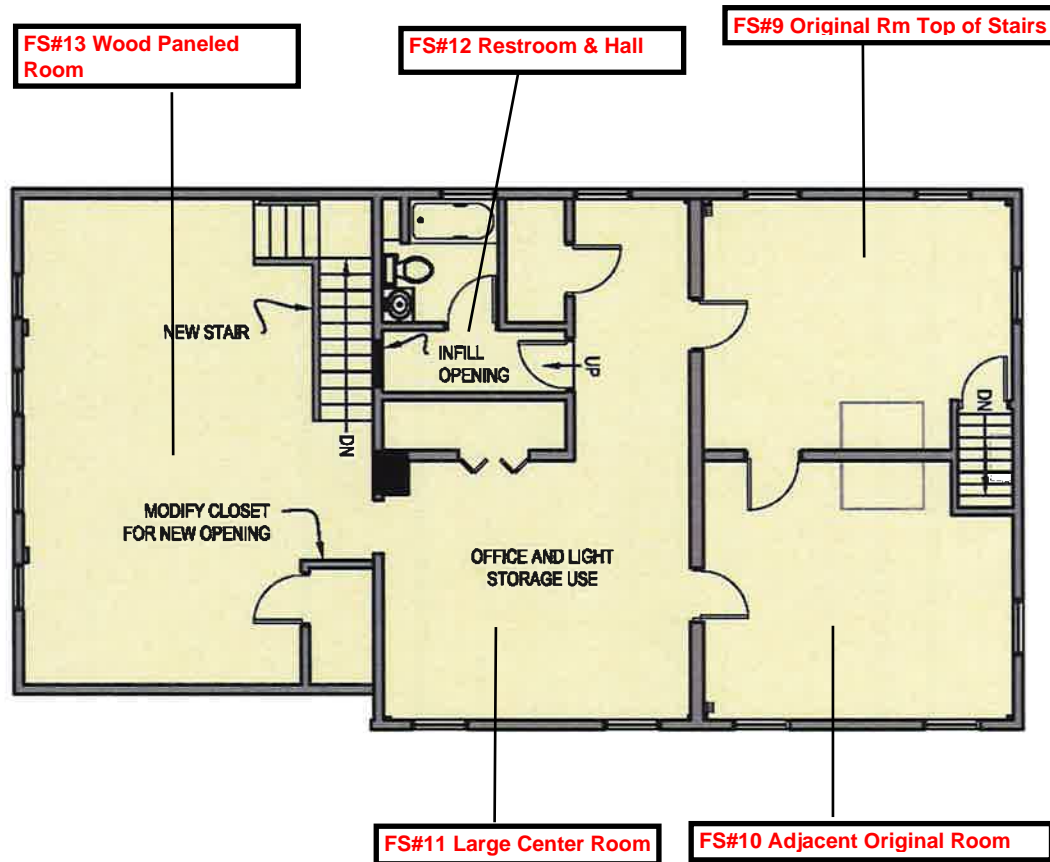
Functional Space Listing and Building Layouts with Functional Space Numbering

Barnard House at
Historic Troy Village
Troy, MI
Functional Space Listing

<i>FS#</i>	<i>FS Description</i>	<i>Floor</i>
1	Main Entrance/Living Room	1
2	First Floor Bedroom	1
3	Kitchen	1
4	Bathroom and Hallway	1
5	Men's Front Entrance	1
6	Center Room	1
7	Rear Entry Room	1
8	Women's Front Entrance	1
9	All original Room Top of Stairs	2
10	Adjacent Original Room	2
11	Large Center Room	2
12	Restroom and Hall	2
13	Wood Paneled Room	2
14	Attic	2
E	Exterior	E



FS#14 Attic- Not Shown
FS#E Exterior



Appendix A

Definitions of Terms and Assessment Criteria

Definitions of Terms and Assessment Criteria

This survey report organizes information on each suspect ACBM that was identified. This appendix describes how to interpret the data found in this report.

Material description contains the description of the suspect homogeneous asbestos-containing building material.

Material Serial Number is used to reference the material for reinspections, etc.

ACM Asbestos-Containing Materials. Materials containing greater than 1 percent (>1%) asbestos.

ACBM Asbestos-Containing Building Materials means surfacing ACM, thermal system insulation ACM, or miscellaneous ACM that is found in or on interior structural members or other parts of a building.

Asbestos type and content describes the type of asbestos and its percentage in the material.

Asbestos Results for positive materials are shown as a percentage. Samples having less than 1% asbestos are reported as containing "Trace" amounts of asbestos and samples with no detected asbestos are reported as "BLD" or below limit of detection.

Sample number(s) identifies a particular material sample obtained from a specific sample location. Sample numbers are used primarily for laboratory identification.

Sample Location identifies where the samples of this material were obtained.

Material Category categorizes each material as surfacing, TSI or miscellaneous.

Surfacing Materials (SM) - Asbestos-containing materials that are sprayed-on, troweled-on or otherwise applied to surfaces, such as acoustical plaster on ceilings and fireproofing on structural members, or other materials on surfaces for acoustical, fireproofing, or other purposes.

Thermal Systems Insulation (TSI) - Asbestos-containing materials applied to pipes, fittings, boilers, breaching, tanks, ducts or other interior structural components to prevent heat loss or gain or water condensation.

Miscellaneous Materials (MM) - Asbestos-containing materials applied to or a part of building components that are not classified as surfacing materials or thermal systems insulation.

Quantity & Units reports approximate total quantity per unit of measure for each material.

Building(s) & Floor(s) specifies where a material is located.

Material Location describes where the material is found throughout the building.

Friability identifies the material as Friable, Non-friable or Jacketed (for thermal systems insulation only) if asbestos is present.

Friable (F) - An asbestos-containing material that can be crumbled, pulverized or reduced to powder, when dry, by hand pressure, such as spray applied fireproofing on structural steel members, spray applied acoustical ceiling materials or damaged thermal systems insulation. Friable materials are of greatest concern due to their potential fiber release.

Non-Friable (NF) - An asbestos-containing material where the asbestos is bound tightly in a matrix or sealed by a protective layer. Non-friable materials can become friable by being rendered to a crumbled, pulverized or powdered state, when dry, by crushing, sanding, sawing, shot-blasting, severe weathering or by other mechanically induced means. Common examples of non-friable materials are adhesives, floor tiles, transite and roofing materials.

Jacketed (J) - An asbestos-containing material applied to thermal systems insulation and “jacketed” with a protective outer layer such as canvas or metal to keep the material in good condition. Undamaged jacketed ACBM is considered non-friable. If the jacketing is damaged, the material is considered friable.

Damage Category describes the type of damage, if any, to the material. The following damage categories are used: None, Physical, Air, and Water.

Material Assessment identifies the condition of the material in relation to physical and water damage, delamination of the material from its substrate, the extent of the damage and the potential for damage from building conditions, such as, accessibility by building occupants, influence of vibration, etc. The six standard assessment categories ranked by hazard potential, with the first being the lowest hazard are as follows: 1) Friable ACBM or TSI in Good Condition with Low Potential for Damage, 2) Friable ACBM or TSI in Good Condition with Moderate Potential for Damage 3) Friable ACBM or TSI in Good Condition with Potential for Significant Damage, 4) Damaged Friable ACBM or TSI with Low Potential for Damage, 5) Damaged Friable ACBM or TSI with Moderate Potential for Damage, 6) Damaged Friable ACBM or TSI with Potential for Significant Damage, and 7) Significantly Damaged ACBM or TSI. Only friable materials are assessed under AHERA regulations. Non-friable materials are not assessed.

Material Condition

Good - Material with no visible damage or deterioration, or showing only very limited damage or deterioration.

Damaged - The damage or deterioration of the material results in inadequate cohesion or adhesion with crumbling, blistering, water stains, marring or otherwise abraded over less than one-tenth (1/10) of the surface if the damage is evenly distributed or one-fourth (1/4) if the damage is localized.

Significant Damage - The damage or deterioration of the material results in inadequate adhesion or cohesion and the damage is extensive and severe with one or more of the following characteristics: 1) Crumbling or blistering over at least one-tenth (1/10) of the surface if evenly distributed, one-fourth (1/4) if the damage is localized; 2) Areas of the material hanging from the surface, delaminated, or showing adhesive failure; 3) Water stains, gouges or marred.

Recommended Response suggests the appropriate options for controlling or maintaining ACBM in a safe manner. For non-school buildings, TEC selects between five options:

Operations & Maintenance (O&M) - A program of work practices to maintain friable ACBM in good condition, ensure cleanup of asbestos fibers previously released, and prevent further release by minimizing and controlling friable ACBM disturbance or damage.

Repair - The restoration of damaged or deteriorated asbestos-containing building materials to an intact condition. Once the intact condition is established, the material should be included in an O&M program. The material is usually only required to be removed if it is significantly damaged, prior to demolition of the building or if it will be disturbed by renovation activities.

Abate Due to Condition - This material is significantly damaged and is unsafe in its current condition. The access to the area should be restricted to personnel equipped with appropriate personal protection. This material should be properly removed by a licensed contractor using workers trained in the safe removal of asbestos.

Abate Prior to Renovation - This material should be properly removed prior to planned renovation activities by a licensed contractor using workers trained in the safe removal of asbestos. This recommendation is usually made only on survey reports prepared prior to planned renovation activities.

Abate Prior to Demolition - This material should be properly removed prior to planned demolition activities by a licensed contractor using workers trained in the safe removal of asbestos. This recommendation is usually made only on survey reports prepared prior to planned demolition activities.

For school buildings, AHERA provides five response actions to choose from:

Removal - The taking out or stripping of substantially all ACBM from damaged Area, a functional space or a homogenous area in a school building.

Repair - Returning damaged ACBM to an undamaged condition or to intact state so as to prevent fiber release.

Encapsulation - Means the treatment of ACBM with material that surrounds or embeds asbestos fibers in an adhesive matrix to prevent the release of fibers, as the encapsulant creates a membrane over the surface (bridging encapsulant) or penetrates the material and binds its components together (penetrating encapsulant).

Enclosure - An airtight, impermeable, permanent barrier around ACBM to prevent the release of asbestos fibers into the air.

Operations and Maintenance - see definition above.

Comments & Damage Description contains any additional information and or specific details of material damage are noted here.

EPA Category provides the appropriate material category as outlined in the NESHAPS regulation. The options are friable, Category I and Category II non-friable ACM.

Friable - Materials containing greater than 1% asbestos are always considered Regulated Asbestos-containing Materials (RACM) that require removal prior to building renovation or demolition activities that impact the material.

Category I non-friable ACM means asbestos-containing packings, gaskets, resilient floor covering, and asphalt roofing products containing more than 1 percent asbestos.

Category II non-friable ACM means any material, excluding Category I non-friable ACM, containing more than 1 percent asbestos that, when dry, cannot be crumbled, pulverized, or reduced to powder by hand pressure.

Needs Determination - Materials that the individual designing the abatement and demolition project needs to inspect and evaluate to determine the potential for the material to become RACM and/or evaluate the asbestos content for the composite and individual layers of the material. For sheet rock with mudding compounds only, the EPA allows using the composite sample result. If the composite result by Point Counting the sample is below 1% asbestos, the material is not RACM.

Appendix B

Bulk Sampling Protocol and Analytical Methods

Bulk Sampling Protocol and Analytical Methods

Bulk samples of suspect asbestos-containing building materials were obtained using standard industrial hygiene techniques including wetting the material to minimize fiber release.

Our sampling strategy for suspect friable surfacing materials was based on the guidelines outlined in the EPA publication Asbestos in Buildings: Simplified Sampling Scheme for Friable Surfacing Materials, and the procedures outlined in 40 CFR 763, Subpart E (ASHERA). For non-friable suspect materials, ASHERA requires the building inspector to determine the appropriate number of samples to obtain and analyze. Usually one to three samples of non-friable materials are collected.

For each homogeneous material identified by visual inspection as suspect material, random samples are obtained. A single bulk sample is randomly selected from each homogeneous material for first-round testing. If the sample is positive, the remaining samples are not analyzed; if the sample is negative, the other samples are submitted for study. Every sample must be reported negative if the material is to be considered non-asbestos-containing.

The bulk samples were delivered to an independent laboratory that participates in the bulk sample proficiency analysis program conducted by the United States Environmental Protection Agency and is accredited by the National Voluntary Laboratory Program (NVLAP). The samples were analyzed using Polarized Light Microscopy (PLM) with dispersion staining to estimate the percent of asbestos composition by volume. Samples with no observable asbestiform minerals are designated as None-Detected. Samples in which asbestiform minerals are observed, but exist in concentrations of less than one percent, are designated as present in Trace amounts; all other samples are designated as asbestos-containing with the appropriate percent of asbestos noted.

Appendix C

Summary of Regulatory Requirements

Summary of Regulatory Requirements

This appendix provides a summary of building owner and manager requirements under various asbestos regulations promulgated by the Michigan Occupational Safety and Health Administration (MIOSHA) and the Environmental Protection Agency (EPA) to protect building occupants and employees from exposure to asbestos.

Survey Requirements

Prior to any renovation activity, MIOSHA and EPA regulations require that a complete asbestos survey be performed to determine if asbestos is present in any suspect asbestos-containing material that will be present in the construction or work area. This survey report addresses accessible materials. It is recommended that prior to renovation activities, inaccessible areas that could contain asbestos materials be inspected.

Notification and Posting Requirements

Regulatory agencies feel that the building owner or manager should be responsible for knowing and communicating the locations of asbestos in their buildings to building employees, outside contractors and tenants to prevent exposure to asbestos.

Under the Michigan Occupational Safety and Health Act (Act 154), building owners and managers are required to provide annual notifications regarding known asbestos-containing materials in their buildings to building employees, tenants, vendors and outside contractors. Therefore, specific information contained in this survey report is required to be included in the notification.

MIOSHA requires building employees, outside contractors, vendors and construction contractors bidding on or performing work in buildings be provided with notification regarding asbestos-containing materials in their work areas. MIOSHA also requires that asbestos warning signs be posted in mechanical rooms.

Demolition/Renovation Requirements

The National Emission Standard for Hazardous Air Pollutants (40 CFR Part 61; Subpart M) provides specific notification requirements for both renovations and demolitions of buildings. Either the owner, operator (contractor) or their representatives must file the notices. According to NESHAP, an operation is considered a demolition if the overall project involves the wrecking or taking out of any load supporting structural members at the subject facility. Notification is required even if there are no asbestos-containing materials in the facility. Notification must be provided to the Michigan Department of Environmental Quality (MDEQ), Air Quality Division no later than 10 working days prior to the scheduled demolition.

For the scheduled demolition of structures having RACM, the RACM must be removed prior to demolition. RACM are either friable asbestos-containing materials, Category I non-friable ACM that has become friable or will become friable (such as floor coverings), or Category II non-friable ACM that has a high probability of becoming friable during the demolition process notification would be required 10 working days prior to beginning asbestos removal and demolition.

If a facility to be demolished contains less than the cutoff amount of RACM, this would be termed a demolition below the cutoff and notification would be required 10 working days prior to beginning demolition.

In a demolition above the cutoff, both the removal and demolition operations should be reported on the same notification form and all required information submitted at least 10 days prior to the beginning of the asbestos removal. For all work outside Wayne County, a completed copy of the notification form must be sent to the Air Quality Division of the MDEQ as well as to the United States Environmental Protection Agency (Region V). For work in Wayne County (including the city of Detroit), completed forms must be sent to the NESHAP Asbestos Program Detroit Field Office, MDEQ, AQD.

NESHAP defines "planned renovations" as a renovation operation or a number of renovation operations in which RACM will be removed or stripped within a given period of time and can be predicted. For planned renovations above the cutoff (where amounts of RACM to be removed equals or exceeds 260 linear feet on pipes, or at least 160 square feet on other facility components), NESHAP requires notification no later than 10 working days before removing or disturbing the RACM.

Michigan Act 135 (Section 220(1-4) or (8) also requires notification when removing asbestos-containing materials greater than 10 linear feet or 15 square feet. For projects involving the removal of RACM prior to demolition, a copy of the same form must also be submitted to the Michigan Department Licensing and Regulatory Affairs (LARA) Asbestos Program Office at least 10 days prior to the scheduled removal.

Removal Requirements

Under EPA regulations, asbestos-containing materials must be properly removed by licensed asbestos abatement contractors prior to renovation or demolition activities that would disturb friable materials or cause non-friable materials to become friable and a regulated material. All ACM should be collected, processed, packaged, transported and disposed of according to applicable federal, state and local regulations, which includes but is not limited to NESHAP 40 CFR, Section 61.150 and the Asbestos Standards for Construction 29 CFR 1926.1101.

Repair of Damaged Materials and Cleanup of Debris

MIOSHA requires that asbestos-containing debris be immediately cleaned up. It is recommended that damaged materials that may release fibers be repaired as soon as possible to prevent fiber release and potential exposures.

Training Requirements

MIOSHA requires employers whose employees are likely to or required to disturb asbestos to receive an asbestos training course. Refresher training is required to be provided annually.

Appendix D

Photographs



Barnard House at
Troy Historic Village, Troy MI
(South side)



East exposure of Barnard House
(Addition Section)



North exposure of Barnard House



West exposure of Barnard House
(Original 1837 Construction)



Original 1837 Section of Barnard House
(South exposure)



Original 1837 Section of Barnard House
(North exposure)



Addition section of Barnard House
(South exposure)



Addition Section of Barnard House
(North exposure)



FS# - 1
Main Entrance/Living Room



FS# - 2
First Floor Bedroom



FS# - 3
Kitchen



FS# - 4
Bathroom and Hallway

FS# - 5
Men's Front Entrance
(Not Pictured)



FS# - 6
Center Room



FS# - 7
Rear Entry Room



FS# - 8
Women's Front Entrance



FS# - 9
All original Room Top of Stairs



FS# - 10
Adjacent Original Room



FS# - 11
Large Center Room



FS# - 12
Restroom and Hall



FS# - 13
Wood Paneled Room



HM# - 1
Wall Plaster with Wall Coverings



HM# - 2
Ceiling Plaster with Wall Coverings



HM# - 3 Farm House Design Wallpaper
HM# - 4 Mosaic Design Wallpaper



HM# - 5
14"x14" Tongue and Groove Ceiling Tile



HM# - 6 Glazing on Interior Windows
HM# - 28 Window Glazing



HM# - 7
12"x12" Tongue and Groove Ceiling Tile



HM# - 8
Cream and Green Sheet Flooring and Adhesive



HM# - 9
Drywall and Joint Compound



HM# - 10
Loose fill Vermiculite Insulation



HM# - 11
Multi-Layer Floor



HM# - 12
Deteriorated Wall Paper



HM# - 13
White Caulk



HM# - 14
White Grout
HM# - 15
Floral Wallpaper



HM# - 16
Wall Plaster with Wall Coverings



HM# - 17
Ceiling Plaster with Wall Coverings



HM# - 18
Faux Woven Rug Linoleum



HM# - 19
Faux Mosaic Stone Linoleum



HM# - 20
Red Squares Sheet Flooring



HM# - 21
Skim Coat over Particle board



HM# - 22
Wallboard



HM# - 23
2'x4' Dots and Gouges Suspended Ceiling Tile
HM# - 24
Drywall and Joint Compound



HM# - 25
Bathroom Caulk



HM# - 26
12"x12" Sticky Back Faux Ceramic Tile



HM# - 27
12"x12" Yellow Sticky Back Tile



HM# - 29
Siding Sealant



HM# - 30
Orange Insulation with Silver Foil Backing



Testing Engineers & Consultants, Inc.

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(248) 588-6200 or (313) T-E-S-T-I-N-G • Fax (248) 588-6232
www.testingengineers.com

TEC Report Number: 58640-02
Date Issued: February 19, 2018

Ms. Ashely Levin
Project Manager
City of Troy
Department of Public Works
4693 Rochester Road
Troy, Michigan 48085

Re: Pre-Renovation Lead Containing Paint Survey Report. Project: Barnard House located at Troy Historic Village; 60 West Wattles Road; Troy, MI 48098

Dear Ms. Levin:

Enclosed please find our report of pre-renovation lead containing paint survey of interior and exterior building components at the above referenced location. We hope that you find this report complete and self-explanatory.

We are pleased to provide this service. Should you have any questions regarding this report or require additional information, please contact this office at your convenience.

Respectfully Yours,
TESTING ENGINEERS & CONSULTANTS, INC.

A handwritten signature in blue ink that reads "Scott M. Chandler". The signature is fluid and cursive, with the first letters of the first and last names being capitalized and prominent.

Scott M. Chandler, CIH, LEED AP
Manager, Industrial Hygiene Services
SMC/brr

Enclosure

Copyright 2017 Testing Engineers & Consultants, Inc. All rights reserved.

All services undertaken are subject to the following policy. Reports are submitted for exclusive use of the clients to whom they are addressed. Their significance is subject to the adequacy and representative character of the samples and the comprehensiveness of the tests, examinations and surveys made. No quotation from reports or use of TEC's name is permitted except as expressly authorized by TEC in writing.

CONSULTING ENGINEERS & FULL-SERVICE PROFESSIONAL TESTING AND INSPECTION
OFFICES IN ANN ARBOR, DETROIT, AND TROY
FOUNDED IN 1966

Testing Engineers & Consultants, Inc.

City of Troy – Department of Public Works

Ms. Ashely Levin

February 19, 2018

TEC Report Number: 58640-02

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Testing Engineers & Consultants, Inc.

City of Troy – Department of Public Works

Ms. Ashely Levin

February 19, 2018

TEC Report Number: 58640-02

EXECUTIVE SUMMARY

Testing Engineers & Consultants, Inc. (TEC) was retained by The City of Troy – Department of Public Works to conduct a pre-renovation lead containing paint survey of interior and exterior building components of the Barnard House located at 60 West Wattles Road; Troy, MI 48098. Painted surfaces may be disturbed during upcoming renovation activities.

Painted surfaces were analyzed for lead content using an X-ray fluorescence (XRF) analyzer. Lead-based paint ($\geq 1.0 \text{ mg/cm}^2$ or 0.5% lead by weight) was identified in the survey area. Lead-containing paint (greater than instrument detection limit but less than 1.0 mg/cm^2) was also identified in the survey area. The exterior and interior paint condition ranged from damaged to intact. A spreadsheet summarizing our survey results is found in Appendix A.

Testing Engineers & Consultants, Inc.

City of Troy – Department of Public Works

Ms. Ashely Levin

February 19, 2018

TEC Report Number: 58640-02

Section 1 Introduction

On February 16 2018, Testing Engineers and Consultants conducted a pre- renovation lead containing paint survey of paint/component/substrate combinations associated with interior and exterior areas of the Barnard House located at 60 West Wattles Road; Troy, MI 48098.

The Barnard House is a historic homestead building that has been relocated to the Troy Historic Village. The original structure was constructed circa 1837 to 1850. Planned restoration activities for the building will likely involve disturbance of painted surfaces on the building's interior or exterior.

This report establishes lead concentrations in painted surfaces as a general guidance tool for the purpose of conducting safe maintenance, renovation, or demolition activities in the building.

This report was prepared for the express use and benefit of The City of Troy- Department of Public Works, its agents and employees. The information in this report or portions thereof may be required to be included in notifications to the residents, employees, contractors, or other visitors to the building. This report is not intended to be used by the owner or its agents as a specification or work plan for any of the work suggested or recommended herein.

The survey did not include areas behind walls and/or columns, beneath flooring, under carpeting, above solid ceilings, underground or in any other inaccessible areas.

Testing Engineers & Consultants, Inc.

City of Troy – Department of Public Works

Ms. Ashely Levin

February 19, 2018

TEC Report Number: 58640-02

Section 2 Methodology

TEC evaluated paint/component/substrate combinations of building materials encountered on the interior and exterior of the survey area. The lead content of painted surfaces was determined using a Niton XLp300A x-ray fluorescence (XRF) analyzer. XRF instruments irradiate the paint on a given surface causing the lead in the paint, if present, to emit a characteristic frequency of x-ray radiation. The analyzer identifies and counts these x-rays to instantaneously determine the concentration in the paint film. The intensity of this radiation is measured by the detector and is proportional to the amount of lead in the paint. The results are reported in milligrams of lead per square centimeter of surface area (mg/cm^2).

The instrument is a direct-read device, does not require substrate correction and does not report inconclusive results. The limit of detection is approximately $0.01 \text{ mg}/\text{cm}^2$.

For surfaces with multiple layers of paint, the instrument provides the operator with additional information regarding their relative ages. These are reported separately as “K-shell” (high energy) and “L-shell” (low energy) lead concentrations. The “K-shell” reading reflects the amount of lead present in the older layers of paint, and the “L-shell” reading reflects the amount of lead present in the surface layers of the paint.

Quality control for the analyzer involves on-site calibration. For each project, the analyzer is calibrated at the beginning of the project. In the event that a battery change is required during the project, an additional calibration is taken before the battery is replaced. The lead analyzer calibration check readings were taken on a Standard Reference Material (SRM) paint film from the National Institute of Standards and Technology (NIST).

In order to obtain a reading, the face of the instrument is pressed flush against the surface to be tested. It is then held in place for the duration of the test. The test is complete when the measurement has reached an acceptable range of accuracy.

All calibration and test data are stored on board the instrument and later downloaded into a spreadsheet.

For this pre-renovation lead containing survey project, TEC designated the address side of each building as side A, and then proceeded in a clockwise direction to designate the remaining sides as B through D.

Testing Engineers & Consultants, Inc.

City of Troy – Department of Public Works

Ms. Ashely Levin

February 19, 2018

TEC Report Number: 58640-02

Section 3 Findings

Our spot sampling findings are summarized in Appendix A. The LBP? column in the table indicates whether the paint on the particular building component meets the regulatory definition of lead-based paint (i.e., $\geq 1.0 \text{ mg/cm}^2$). The actual value recorded for the paint is found in the next column (Lead; mg/cm^2).

Lead error represents the amount of statistical uncertainty associated with the result calculated by the instrument's software. This uncertainty is computed and reported as two standard deviations (2σ) of the mean (average) value as determined by the instrument. Taking the sum of the reported lead value and the lead error ($\pm 2\sigma$) yields the range of values for which there is a 95% probability that the true lead concentration will be found.

Section 4 Discussion and Conclusions

Lead-based paint and lead containing paint were identified on the majority of interior and exterior paint/component/substrate combinations that were tested.

Activities involving the disturbance of painted building materials at this site may entail compliance with one or more of the following Standards, depending upon the amount of lead in the paint, the scope and intent of work to be performed, as well as the occupant population.

The Construction Industry Standard for Lead (29 CFR 1926.62) applies to employers whose construction activities involve disturbance of lead-containing materials. It establishes a permissible exposure limit (PEL) of 50 micrograms per cubic meter of air (50 ug/m^3) averaged over an eight-hour period. An action level (AL) of 30 ug/m^3 has also been established.

The quantity of lead found in the paint has no bearing on an employer's compliance requirement with the Standard. This is because the Standard requires compliance with an occupational exposure to *airborne* lead concentrations, regardless of the quantity of lead in the paint. Occupational overexposures may occur when using certain work practices on surfaces that contain lead in quantities less than 1.0 mg/cm^2 .

Other requirements, such as preliminary exposure assessment, written compliance plan, worker training and medical evaluation are also included in the Standard. An employer may be exempt from many of the Standard's requirements if objective data is available demonstrating that employee exposures for a given activity will not exceed the action limit.

Testing Engineers & Consultants, Inc.

City of Troy – Department of Public Works

Ms. Ashely Levin

February 19, 2018

TEC Report Number: 58640-02

We note that demolished building components with lead-containing paint can be disposed at a facility licensed to accept construction debris.

The State of Michigan Lead Abatement Act and Lead Hazard Remediation Rules establish requirements for performing lead abatement activities. Work must be performed by certified lead abatement workers and certified lead abatement supervisors if the work is determined to constitute a lead abatement activity. Lead abatement is defined as “any measure or set of measures designed to permanently remove or cover *lead-based paint* or *lead-based paint hazards*. Abatement includes, but is not limited to: (1) The removal of paint and dust, the permanent enclosure or encapsulation of lead-based paint, the replacement of painted surfaces or fixtures, or the removal or permanent covering of soil, when lead-based paint hazards are present in such paint, dust or soil; and (2) all preparation, cleanup, disposal, and post-abatement clearance testing activities associated with such measures”.

Abatement does not include renovation, remodeling, landscaping or other activities, when such activities are not designed to permanently eliminate lead-based paint hazards, but are designed to repair, restore, or remodel a given structure or dwelling, even though these activities may incidentally result in a reduction or elimination of lead-based paint hazards. Furthermore, abatement does not include interim controls, operations and maintenance activities, or other measures and activities designed to temporarily, but not permanently, reduce lead-based paint hazards.

Firms performing work that disturbs lead-based paint in target housing or child-occupied facilities must be certified and use lead-safe work practices during renovations (EPA Renovation, Repair and Painting Rule). Target housing is defined as a home or residential unit built on or before December 31, 1977. A child occupied facility is a pre-1978 building that meets the following criteria:

- Visited regularly by the same child, 6 years of age or younger.
- The visits are on at least two different days within any week (Sunday through Saturday period), provided that each day’s visit lasts at least 3 hours.
- Combined weekly visits last at least 6 hours, and the combined annual visits last at least 60 hours.

Child occupied facilities may be located in a public or commercial building or in target housing. These facilities include schools, child care facilities and daycare centers.

APPENDIX A

Pre-Renovation Lead Containing Paint Survey Findings

Appendix A
Pre- Renovation Lead Containing Paint Survey: Barnard House
Troy Historic Villiage
Troy, MI
Survey Date: 2/16/2018

Index Number	Type	Room	Component	Side	Substrate	Color	Testing Date	Condition	LBP?	Depth Index	Action Level	Lead (mg/cm2)	Lead Error
1	ShutterCal						2/16/2018					1.46	0
2	Paint	Calibration 1 (1.04 ±0.06)					2/16/2018		Positive	1.06	1	1.1	0.1
3	Paint	Calibration 2 (<0.01)					2/16/2018		Negative	1	1	<LOD	0.03
4	Paint	Calibration 3 (0.71 ±0.08)					2/16/2018		Negative	1.02	1	0.7	0.3
5	Paint	Calibration 4 (1.53 ±0.09)					2/16/2018		Positive	1.05	1	1.5	0.4
6	Paint	Southeast Stair Room	Cove Base Molding	A	Wood	White	2/16/2018	Intact	Positive	9.38	1	12.6	10.9
7	Paint	Southeast Stair Room	Support Beam	A	Wood	White	2/16/2018	Intact	Positive	10	1	24.3	23.2
8	Paint	Southeast Stair Room	Wall	A	Drywall	White	2/16/2018	Fair	Null	3.93	1	0.06	0.13
9	Paint	Southeast Stair Room	Wall	A	Drywall	White	2/16/2018	Fair	Negative	6.52	1	0.1	0.12
10	Paint	Southeast Stair Room	Wall	A	Drywall	White	2/16/2018	Fair	Negative	2.96	1	0.04	0.09
11	Paint	Southeast Stair Room	Pipes	A	Metal	White	2/16/2018	Intact	Positive	3.2	1	2.4	1
12	Paint	Southeast Stair Room	Door Molding	A	Wood	White	2/16/2018	Intact	Positive	10	1	11.2	9.9
13	Paint	Southeast Stair Room	Door Frame	A	Wood	White	2/16/2018	Intact	Positive	6.07	1	7.7	6.5
14	Paint	Southeast Stair Room	Door	A	Wood	White	2/16/2018	Intact	Positive	6.89	1	13.9	11.1
15	Paint	Southeast Stair Room	Closet Door	A	Wood	White	2/16/2018	Intact	Negative	1	1	<LOD	0.02
16	Paint	Southeast Stair Room	Closet Wall	A	Wood	White	2/16/2018	Intact	Negative	10	1	-0.63	1.62
17	Paint	Southeast Stair Room	Cove Base Molding	B	Wood	White	2/16/2018	Intact	Positive	10	1	15.5	14.2
18	Paint	Southeast Stair Room	Door Molding	B	Wood	White	2/16/2018	Intact	Positive	7.96	1	19.2	16.8
19	Paint	Southeast Stair Room	Door Frame	B	Wood	White	2/16/2018	Intact	Positive	10	1	20.8	17.3
20	Paint	Southeast Stair Room	Door jamb	B	Wood	White	2/16/2018	Intact	Positive	7.23	1	21.7	17.8
21	Paint	Southeast Stair Room	Door	B	Wood	White	2/16/2018	Intact	Positive	10	1	23.2	18.6
22	Paint	Southeast Stair Room	Wall	B	Wood	White	2/16/2018	Fair	Negative	6.3	1	0.6	0.3
23	Paint	Southeast Stair Room	Cove Base Molding	C	Wood	White	2/16/2018	Intact	Positive	6.14	1	12.2	10.3
24	Paint	Southeast Stair Room	Radiator Cover	C	Metal	White	2/16/2018	Intact	Negative	2.7	1	0.15	0.22
25	Paint	Southeast Stair Room	Support Beam	C	Wood	White	2/16/2018	Intact	Positive	4.49	1	15.8	14.6
26	Paint	Southeast Stair Room	Door Molding	C	Wood	White	2/16/2018	Intact	Positive	10	1	20.1	17.4
27	Paint	Southeast Stair Room	Door Frame	C	Wood	White	2/16/2018	Intact	Positive	8.68	1	16.5	15.4
28	Paint	Southeast Stair Room	Door	C	Wood	White	2/16/2018	Intact	Positive	9.41	1	15.9	14.6
29	Paint	Southeast Stair Room	Wall	C	Wood	White	2/16/2018	Fair	Negative	4.14	1	0.11	0.23
30	Paint	Southeast Stair Room	Window Frame Molding	C	Wood	White	2/16/2018	Intact	Positive	10	1	1.9	0.9
31	Paint	Southeast Stair Room	Window Frame	C	Wood	White	2/16/2018	Intact	Positive	8.24	1	11.5	10.3
32	Paint	Southeast Stair Room	Window	C	Wood	White	2/16/2018	Fair	Negative	1.78	1	0.28	0.32
33	Paint	Southeast Stair Room	Window Sill	C	Wood	White	2/16/2018	Intact	Positive	9.57	1	10.2	8.7
34	Paint	Southeast Stair Room	Cove Base Molding	D	Wood	White	2/16/2018	Intact	Positive	9.56	1	8.5	7
35	Paint	Southeast Stair Room	Radiator Cover	D	Metal	White	2/16/2018	Intact	Null	1.33	1	0.05	0.32
36	Paint	Southeast Stair Room	Radiator Cover	D	Metal	White	2/16/2018	Intact	Null	2.42	1	0.1	0.24
37	Paint	Southeast Stair Room	Radiator Cover	D	Metal	White	2/16/2018	Intact	Negative	3.51	1	0.14	0.33
38	Paint	Southeast Stair Room	Window Molding	D	Wood	White	2/16/2018	Fair	Positive	8.58	1	20.3	17
39	Paint	Southeast Stair Room	Window Frame	D	Wood	White	2/16/2018	Fair	Positive	10	1	18.1	16.3
40	Paint	Southeast Stair Room	Window	D	Wood	White	2/16/2018	Fair	Positive	8.38	1	9.2	8.2
41	Paint	Southeast Stair Room	Window Sill	D	Wood	White	2/16/2018	Fair	Positive	9.42	1	12.7	10.7
42	Paint	Southeast Stair Room	Door Molding	D	Wood	White	2/16/2018	Intact	Positive	10	1	20.1	16.9
43	Paint	Southeast Stair Room	Door Frame	D	Wood	White	2/16/2018	Intact	Positive	8.44	1	19.3	16.2

Appendix A
Pre- Renovation Lead Containing Paint Survey: Barnard House
Troy Historic Villiage
Troy, MI
Survey Date: 2/16/2018

Index Number	Type	Room	Component	Side	Substrate	Color	Testing			Depth Index	Action Level	Lead	
							Date	Condition	LBP?			(mg/cm2)	Lead Error
44	Paint	Southeast Stair Room	Door	D	Wood	White	2/16/2018	Intact	Positive	7.27	1	14.1	11.5
45	Paint	Southeast Stair Room	Wall	D	Wood	White	2/16/2018	Intact	Negative	5.36	1	0.7	0.2
46	Paint	Southeast Stair Room	Floor		Wood	Dark Brown	2/16/2018	Intact	Negative	1.34	1	0.4	0.3
47	Paint	Southeast Stair Room	Floor		Wood	Green	2/16/2018	Intact	Negative	1	1	0.22	0.2
48	Paint	Southeast Stair Room	Ceiling		Ceiling Tile	White	2/16/2018	Intact	Null	1	1	<LOD	0.04
49	Paint	Southeast Stair Room	Ceiling		Ceiling Tile	White	2/16/2018	Intact	Negative	1	1	<LOD	0.02
50	Paint	South Center Room	Cove Base Molding	A	Wood	White	2/16/2018	Intact	Positive	10	1	7.3	4.5
51	Paint	South Center Room	Support Beam	A	Wood	White	2/16/2018	Intact	Positive	2.39	1	9.1	7.1
52	Paint	South Center Room	Wall	A	Wood	White	2/16/2018	Fair	Negative	1	1	<LOD	0.02
53	Paint	South Center Room	Wall	A	Wood	White	2/16/2018	Fair	Negative	1	1	<LOD	0.02
54	Paint	South Center Room	Door Frame Molding	A	Wood	White	2/16/2018	Intact	Positive	10	1	25.3	24
55	Paint	South Center Room	Door Frame	A	Wood	White	2/16/2018	Intact	Positive	9.18	1	23.9	22.8
56	Paint	South Center Room	Crown Molding	A	Wood	White	2/16/2018	Intact	Null	1	1	<LOD	0.02
57	Paint	South Center Room	Crown Molding	A	Wood	White	2/16/2018	Intact	Negative	1.67	1	0.01	0.05
58	Paint	South Center Room	Cove Base Molding Moldi	A	Wood	White	2/16/2018	Intact	Positive	10	1	8.4	6.9
59	Paint	South Center Room	Wall	A	Plaster	White	2/16/2018	Intact	Null	10	1	0.06	0.89
60	Paint	South Center Room	Wall	A	Plaster	White	2/16/2018	Intact	Negative	1	1	<LOD	0.02
61	Paint	South Center Room	Door Frame Molding	A	Plaster	White	2/16/2018	Intact	Positive	10	1	22.5	18
62	Paint	South Center Room	Door Frame	A	Plaster	White	2/16/2018	Intact	Positive	10	1	24.9	19.5
63	Paint	South Center Room	Door	A	Plaster	White	2/16/2018	Intact	Positive	10	1	22.5	18.5
64	Paint	South Center Room	Crown Molding	A	Plaster	White	2/16/2018	Intact	Negative	1.04	1	<LOD	0.03
65	Paint	South Center Room	Crown Molding	A	Plaster	White	2/16/2018	Intact	Negative	1	1	<LOD	0.02
66	Paint	South Center Room	Cove Base Molding	C	Wood	White	2/16/2018	Intact	Positive	9.12	1	7	4.4
67	Paint	South Center Room	Wall	C	Plaster	White	2/16/2018	Fair	Negative	1	1	<LOD	0.02
68	Paint	South Center Room	Door Molding	C	Plaster	White	2/16/2018	Intact	Positive	10	1	11.4	9.8
69	Paint	South Center Room	Door Frame	C	Plaster	White	2/16/2018	Intact	Positive	10	1	8.1	6.7
70	Paint	South Center Room	Door	C	Plaster	White	2/16/2018	Intact	Positive	10	1	11.9	10.5
71	Paint	South Center Room	Crown Molding	C	Plaster	White	2/16/2018	Intact	Null	10	1	0.05	0.88
72	Paint	South Center Room	Crown Molding	C	Plaster	White	2/16/2018	Intact	Null	1	1	<LOD	0.02
73	Paint	South Center Room	Crown Molding	C	Plaster	White	2/16/2018	Intact	Negative	1	1	<LOD	0.02
74	Paint	South Center Room	Cove Base Molding	D	Wood	White	2/16/2018	Intact	Positive	10	1	7.9	6.9
75	Paint	South Center Room	Radiator Cover	D	Metal	White	2/16/2018	Intact	Negative	1	1	<LOD	0.02
76	Paint	South Center Room	Radiator Cover	D	Metal	White	2/16/2018	Intact	Null	2.12	1	0.08	0.22
77	Paint	South Center Room	Radiator Cover	D	Metal	White	2/16/2018	Intact	Null	1.39	1	0.03	0.12
78	Paint	South Center Room	Radiator Cover	D	Metal	White	2/16/2018	Intact	Negative	1.89	1	0.06	0.12
79	Paint	South Center Room	Window Molding	D	Wood	White	2/16/2018	Fair	Positive	8.86	1	22	18
80	Paint	South Center Room	Window Frame	D	Wood	White	2/16/2018	Fair	Positive	10	1	20.5	17.8
81	Paint	South Center Room	Window	D	Wood	White	2/16/2018	Fair	Positive	10	1	8.2	6.8
82	Paint	South Center Room	Window Sill	D	Wood	White	2/16/2018	Fair	Positive	10	1	14.5	11.7
83	Paint	South Center Room	Door Frame	D	Wood	White	2/16/2018	Intact	Positive	10	1	22.2	17.8
84	Paint	South Center Room	Door Frame	D	Wood	White	2/16/2018	Intact	Positive	10	1	21.4	17.5
85	Paint	South Center Room	Door	D	Wood	White	2/16/2018	Intact	Positive	10	1	14.2	11.7
86	Paint	South Center Room	Crown Molding	D	Wood	White	2/16/2018	Intact	Null	1	1	<LOD	0.02

Appendix A
Pre- Renovation Lead Containing Paint Survey: Barnard House
Troy Historic Villiage
Troy, MI
Survey Date: 2/16/2018

Index Number	Type	Room	Component	Side	Substrate	Color	Testing			Depth Index	Action Level	Lead	
							Date	Condition	LBP?			(mg/cm2)	Lead Error
87	Paint	South Center Room	Crown Molding	D	Wood	White	2/16/2018	Intact	Negative	2.48	1	0.01	0.06
88	Paint	South Center Room	Ceiling		Ceiling Tile	White	2/16/2018	Intact	Negative	1	1	<LOD	0.02
89	Paint	South Center Room	Floor		Wood	Blue	2/16/2018	Intact	Positive	2.88	1	2.8	1.7
90	Paint	South Center Room	Floor		Wood	Brown	2/16/2018	Intact	Positive	1.76	1	2.1	1.1
91	Paint	South Center Room	Ceiling		Plaster	White	2/16/2018	Intact	Null	1	1	0.01	0.09
92	Paint	South Center Room	Ceiling		Plaster	White	2/16/2018	Intact	Negative	1	1	0.01	0.02
93	Paint	Southwest Room	Cove Base Molding	A	Wood	White	2/16/2018	Intact	Positive	10	1	27	20.6
94	Paint	Southwest Room	Radiator Cover	A	Metal	White	2/16/2018	Intact	Negative	2.13	1	0.09	0.2
95	Paint	Southwest Room	Wall	A	Plaster	White	2/16/2018	Intact	Negative	2	1	<LOD	0.03
96	Paint	Southwest Room	Support Beam	A	Plaster	White	2/16/2018	Intact	Negative	1.36	1	0.01	0.05
97	Paint	Southwest Room	Door Frame Molding	A	Wood	White	2/16/2018	Intact	Positive	10	1	5.9	3.6
98	Paint	Southwest Room	Door Frame	A	Wood	White	2/16/2018	Intact	Positive	10	1	19.3	17.1
99	Paint	Southwest Room	Door	A	Wood	White	2/16/2018	Intact	Positive	10	1	21.4	17.8
100	Paint	Southwest Room	Cove Base Molding	B	Wood	White	2/16/2018	Intact	Negative	1	1	<LOD	0.03
101	Paint	Southwest Room	Cove Base Molding	B	Wood	White	2/16/2018	Intact	Positive	10	1	26.6	20.9
102	Paint	Southwest Room	Wall	B	Plaster	White	2/16/2018	Intact	Negative	1	1	<LOD	0.02
103	Paint	Southwest Room	Door Frame Molding	B	Plaster	White	2/16/2018	Intact	Negative	4.5	1	0.26	0.54
104	Paint	Southwest Room	Door Frame	B	Plaster	White	2/16/2018	Intact	Negative	3.93	1	0.19	0.43
105	Paint	Southwest Room	Door Frame	B	Plaster	White	2/16/2018	Intact	Negative	2.53	1	0.11	0.24
106	Paint	Southwest Room	Shelf	B	Plaster	White	2/16/2018	Intact	Negative	2.88	1	0.15	0.31
107	Paint	Southwest Room	Cove Base Molding	C	Plaster	White	2/16/2018	Intact	Positive	10	1	20.3	16.9
108	Paint	Southwest Room	Door Molding	C	Plaster	White	2/16/2018	Intact	Positive	10	1	31.8	28.5
109	Paint	Southwest Room	Door Frame	C	Wood	White	2/16/2018	Intact	Positive	10	1	28.3	21.4
110	Paint	Southwest Room	Wall	C	Plaster	White	2/16/2018	Intact	Negative	1	1	<LOD	0.02
111	Paint	Southwest Room	Shelf	C	Wood	White	2/16/2018	Intact	Negative	1.4	1	0.03	0.1
112	Paint	Southwest Room	Cove Base Molding	D	Wood	White	2/16/2018	Intact	Positive	10	1	27.2	25.7
113	Paint	Southwest Room	Radiator Cover	D	Wood	White	2/16/2018	Intact	Negative	1.22	1	0.04	0.07
114	Paint	Southwest Room	Wall	D	Plaster	White	2/16/2018	Fair	Negative	1	1	<LOD	0.02
115	Paint	Southwest Room	Window Molding	D	Plaster	White	2/16/2018	Fair	Positive	9.56	1	4.6	3.4
116	Paint	Southwest Room	Window Frame	D	Wood	White	2/16/2018	Damaged	Positive	10	1	21.2	17.5
117	Paint	Southwest Room	Window	D	Wood	White	2/16/2018	Damaged	Negative	1.9	1	0.13	0.23
118	Paint	Southwest Room	Window Sill	D	Wood	White	2/16/2018	Fair	Positive	10	1	22.5	18.6
119	Paint	Southwest Room	Floor		Wood	Brown	2/16/2018	Intact	Positive	1.81	1	1.9	0.7
120	Paint	Southwest Room	Ceiling		Plaster	Brown	2/16/2018	Intact	Negative	2.27	1	0.1	0.14
121	Paint	Northwest Room	Cove Base Molding	A	Wood	White	2/16/2018	Intact	Positive	7.45	1	26.2	25.1
122	Paint	Northwest Room	Radiator Cover	A	Metal	White	2/16/2018	Intact	Negative	2.29	1	0.15	0.27
123	Paint	Northwest Room	Wall	A	Wood	White	2/16/2018	Intact	Negative	1	1	<LOD	0.02
124	Paint	Northwest Room	Window Frame	A	Wood	White	2/16/2018	Intact	Positive	10	1	20.2	17.6
125	Paint	Northwest Room	Window	A	Wood	White	2/16/2018	Intact	Negative	2.6	1	0.3	0.44
126	Paint	Northwest Room	Cove Base Molding	B	Wood	White	2/16/2018	Intact	Positive	5.17	1	4.7	3.7
127	Paint	Northwest Room	Wall	B	Plaster	White	2/16/2018	Intact	Negative	1	1	0	0.02
128	Paint	Northwest Room	Support Beam	B	Wood	White	2/16/2018	Intact	Positive	9.75	1	16.1	14.9
129	Paint	Northwest Room	Cove Base Molding	C	Wood	White	2/16/2018	Intact	Positive	5.73	1	25.9	20

Appendix A
Pre- Renovation Lead Containing Paint Survey: Barnard House
Troy Historic Villiage
Troy, MI
Survey Date: 2/16/2018

Index Number	Type	Room	Component	Side	Substrate	Color	Testing		LBP?	Depth Index	Action Level	Lead (mg/cm2)	Lead Error
130	Paint	Northwest Room	Wall	C	Plaster	White	2/16/2018	Intact	Negative	1	1	<LOD	0.02
131	Paint	Northwest Room	Door Molding	C	Wood	White	2/16/2018	Intact	Positive	3.7	1	1.3	0.3
132	Paint	Northwest Room	Door Frame	C	Wood	White	2/16/2018	Intact	Positive	9.75	1	5.9	4.1
133	Paint	Northwest Room	Door	C	Wood	White	2/16/2018	Fair	Positive	7.15	1	28.4	27.1
134	Paint	Northwest Room	Cove Base Molding	D	Wood	White	2/16/2018	Intact	Positive	3.89	1	5	3.9
135	Paint	Northwest Room	Wall	D	Plaster	White	2/16/2018	Intact	Negative	1	1	<LOD	0.02
136	Paint	Northwest Room	Door Molding	D	Wood	White	2/16/2018	Intact	Negative	1.62	1	0.13	0.21
137	Paint	Northwest Room	Door Frame	D	Wood	White	2/16/2018	Intact	Negative	1.93	1	0.12	0.22
138	Paint	Northwest Room	Ceiling		Plaster	Brown	2/16/2018	Intact	Negative	1	1	<LOD	0.02
139	Paint	Northwest Room	Floor		Wood	Brown	2/16/2018	Intact	Negative	1.32	1	0.02	0.08
140	Paint	Northwest Room	Floor		Wood	White	2/16/2018	Intact	Positive	1.7	1	2.9	1.8
141	Paint	Kitchen	Wall	A	Plaster	Green	2/16/2018	Intact	Negative	1	1	<LOD	0.02
142	Paint	Kitchen	Door Frame	A	Wood	White	2/16/2018	Damaged	Positive	10	1	23.9	20
143	Paint	Kitchen	Cove Base Molding	B	Wood	White	2/16/2018	Intact	Positive	10	1	7.6	4.6
144	Paint	Kitchen	Radiator Cover	B	Metal	White	2/16/2018	Intact	Negative	3.16	1	0.08	0.23
145	Paint	Kitchen	Wall	B	Plaster	Green	2/16/2018	Intact	Null	10	1	0.7	0.2
146	Paint	Kitchen	Wall	B	Plaster	Green	2/16/2018	Intact	Null	9.06	1	0.8	0.3
147	Paint	Kitchen	Wall	B	Plaster	Green	2/16/2018	Intact	Null	10	1	0.9	0.3
148	Paint	Kitchen	Door Frame	B	Wood	White	2/16/2018	Damaged	Positive	7.8	1	15.1	14.1
149	Paint	Kitchen	Door	B	Wood	White	2/16/2018	Damaged	Positive	10	1	4.4	3.3
150	Paint	Kitchen	Window Frame	B	Wood	White	2/16/2018	Intact	Positive	10	1	5.6	3.8
151	Paint	Kitchen	Window	B	Wood	White	2/16/2018	Intact	Positive	10	1	2.6	1.6
152	Paint	Kitchen	Cove Base Molding	C	Wood	White	2/16/2018	Intact	Positive	4.94	1	18.2	16.5
153	Paint	Kitchen	Door Frame	C	Wood	White	2/16/2018	Intact	Positive	10	1	17.2	16.1
154	Paint	Kitchen	Door	C	Wood	White	2/16/2018	Intact	Positive	10	1	16	12.6
155	Paint	Kitchen	Wall	C	Plaster	Green	2/16/2018	Intact	Negative	6.59	1	0.6	0.3
156	Paint	Kitchen	Cabinet	C	Wood	White	2/16/2018	Intact	Negative	1	1	<LOD	0.02
157	Paint	Kitchen	Door Frame	C	Wood	White	2/16/2018	Damaged	Positive	10	1	14.1	12
158	Paint	Kitchen	Door	C	Wood	White	2/16/2018	Damaged	Positive	10	1	24.9	19.7
159	Paint	Kitchen	Cove Base Molding	D	Wood	White	2/16/2018	Intact	Positive	10	1	6.2	4.3
160	Paint	Kitchen	Radiator Cover	D	Metal	White	2/16/2018	Intact	Negative	6.53	1	0.11	0.28
161	Paint	Kitchen	Wall	D	Plaster	Green	2/16/2018	Intact	Negative	1.95	1	0.7	0.3
162	Paint	Kitchen	Door Molding	D	Wood	White	2/16/2018	Intact	Negative	4.19	1	0.13	0.36
163	Paint	Kitchen	Door Frame	D	Wood	White	2/16/2018	Intact	Negative	2.47	1	0.12	0.25
164	Paint	Kitchen	Ceiling		Drywall	White	2/16/2018	Intact	Null	1	1	0.02	0.08
165	Paint	Kitchen	Ceiling		Drywall	White	2/16/2018	Intact	Null	4.75	1	0.22	0.64
166	Paint	Kitchen	Ceiling		Drywall	White	2/16/2018	Intact	Null	3.97	1	0.12	0.39
167	Paint	Kitchen	Ceiling		Drywall	White	2/16/2018	Intact	Null	1.33	1	0.04	0.13
168	Paint	Kitchen	Ceiling		Drywall	White	2/16/2018	Intact	Negative	3.16	1	0.09	0.25
169	Paint	Bathroom #1	Wall	A	Drywall	White	2/16/2018	Intact	Negative	3.06	1	0.11	0.19
170	Paint	Bathroom #1	Wall	B	Drywall	White	2/16/2018	Intact	Null	1	1	<LOD	0.02
171	Paint	Bathroom #1	Wall	B	Drywall	White	2/16/2018	Intact	Negative	1	1	<LOD	0.02
172	Paint	Bathroom #1	Closet Door	B	Wood	White	2/16/2018	Intact	Negative	1	1	<LOD	0.02

Appendix A
Pre- Renovation Lead Containing Paint Survey: Barnard House
Troy Historic Villiage
Troy, MI
Survey Date: 2/16/2018

Index Number	Type	Room	Component	Side	Substrate	Color	Testing		LBP?	Depth Index	Action Level	Lead (mg/cm2)	Lead Error
173	Paint	Bathroom #1	Wall	B	Drywall	White	2/16/2018	Intact	Negative	1	1	<LOD	0.02
174	Paint	Bathroom #1	Radiator Cover	C	Metal	White	2/16/2018	Intact	Negative	1.81	1	0.14	0.23
175	Paint	Bathroom #1	Wall	C	Drywall	White	2/16/2018	Intact	Negative	2.14	1	0.04	0.13
176	Paint	Bathroom #1	Wall	D	Drywall	White	2/16/2018	Intact	Negative	2.72	1	0.07	0.15
177	Paint	Bathroom #1	Door Frame	D	Wood	White	2/16/2018	Intact	Negative	2.14	1	0.06	0.17
178	Paint	Bathroom #1	Door	D	Wood	White	2/16/2018	Intact	Negative	5.36	1	0.14	0.44
179	Paint	Bathroom #1	Mirror	A	Wood	White	2/16/2018	Intact	Negative	1.3	1	<LOD	0.04
180	Paint	Hallway	Wall	A	Drywall	White	2/16/2018	Fair	Null	1	1	<LOD	0.02
181	Paint	Hallway	Wall	A	Drywall	White	2/16/2018	Intact	Negative	2.68	1	0.06	0.13
182	Paint	Hallway	Door Frame	A	Drywall	White	2/16/2018	Intact	Positive	9.95	1	26.4	20.8
183	Paint	Hallway	Door	A	Wood	White	2/16/2018	Fair	Positive	9.88	1	26.4	24.8
184	Paint	Hallway	Wall	B	Drywall	White	2/16/2018	Fair	Negative	1.77	1	0.04	0.12
185	Paint	Hallway	Cove Base Molding	B	Wood	White	2/16/2018	Intact	Negative	1.5	1	0.04	0.11
186	Paint	Hallway	Wall	C	Drywall	White	2/16/2018	Fair	Negative	1.02	1	0.02	0.04
187	Paint	Hallway	Door Frame	C	Wood	White	2/16/2018	Intact	Negative	3.18	1	0.28	0.45
188	Paint	Hallway	Wall	D	Drywall	White	2/16/2018	Intact	Negative	4.15	1	0.11	0.34
189	Paint	Hallway	Door Frame	D	Wood	White	2/16/2018	Intact	Negative	3.32	1	0.4	0.5
190	Paint	Hallway	Cove Base Molding	D	Wood	White	2/16/2018	Intact	Negative	1.43	1	0.02	0.08
191	Paint	Hallway	Ceiling		Drywall	White	2/16/2018	Intact	Negative	2.33	1	0.07	0.08
192	Paint	North Center Room	Cove Base Molding	A	Wood	White	2/16/2018	Intact	Positive	4.76	1	2.7	1.5
193	Paint	North Center Room	Wall	A	Drywall	White	2/16/2018	Damaged	Negative	1.41	1	0.05	0.12
194	Paint	North Center Room	Cabinet	A	Wood	White	2/16/2018	Intact	Null	3.12	1	1.1	0.2
195	Paint	North Center Room	Cabinet	A	Wood	White	2/16/2018	Intact	Negative	1.18	1	0.3	0.27
196	Paint	North Center Room	Door Frame	A	Wood	White	2/16/2018	Intact	Positive	2.75	1	1.2	0.2
197	Paint	North Center Room	Cove Base Molding	B	Wood	White	2/16/2018	Intact	Positive	4.16	1	3.2	2.2
198	Paint	North Center Room	Radiator Cover	B	Metal	White	2/16/2018	Intact	Null	1	1	0.05	0.27
199	Paint	North Center Room	Radiator Cover	B	Metal	White	2/16/2018	Intact	Negative	1.12	1	0.05	0.1
200	Paint	North Center Room	Wall	B	Plaster	White	2/16/2018	Damaged	Negative	1.37	1	0.05	0.06
201	Paint	North Center Room	Window Molding	B	Wood	White	2/16/2018	Intact	Positive	9.7	1	26.7	25.1
202	Paint	North Center Room	Window Frame	B	Wood	White	2/16/2018	Fair	Positive	7.4	1	24.3	19.1
203	Paint	North Center Room	Window	B	Wood	White	2/16/2018	Fair	Null	5.48	1	1.9	1.1
204	Paint	North Center Room	Window	B	Wood	White	2/16/2018	Fair	Positive	6.12	1	2.1	1
205	Paint	North Center Room	Window Sill	B	Wood	White	2/16/2018	Damaged	Positive	4.44	1	28.7	26.7
206	Paint	North Center Room	Cove Base Molding	C	Wood	White	2/16/2018	Intact	Positive	3.64	1	1.7	0.7
207	Paint	North Center Room	Wall	C	Drywall	White	2/16/2018	Damaged	Negative	1.61	1	0.04	0.12
208	Paint	North Center Room	Door Molding	C	Wood	White	2/16/2018	Intact	Positive	9.83	1	27.5	25.8
209	Paint	North Center Room	Door Frame	C	Wood	White	2/16/2018	Intact	Positive	10	1	30.7	27.4
210	Paint	North Center Room	Door	C	Wood	White	2/16/2018	Intact	Positive	6.95	1	4.7	2.9
211	Paint	North Center Room	Cove Base Molding	D	Wood	White	2/16/2018	Intact	Positive	3.42	1	4.4	3.2
212	Paint	North Center Room	Wall	D	Drywall	White	2/16/2018	Damaged	Negative	2.53	1	0.12	0.25
213	Paint	North Center Room	Door Frame Molding	D	Wood	White	2/16/2018	Intact	Positive	8.88	1	32.1	28.7
214	Paint	North Center Room	Door Frame	D	Wood	White	2/16/2018	Intact	Positive	7.41	1	30	26.7
215	Paint	North Center Room	Door	D	Wood	White	2/16/2018	Intact	Positive	5.87	1	31.2	28.3

Appendix A
Pre- Renovation Lead Containing Paint Survey: Barnard House
Troy Historic Villiage
Troy, MI
Survey Date: 2/16/2018

Index Number	Type	Room	Component	Side	Substrate	Color	Testing Date	Condition	LBP?	Depth Index	Action Level	Lead (mg/cm2)	Lead Error
216	Paint	North Center Room	Floor		Wood	Brown	2/16/2018	Intact	Null	1.17	1	0.2	0.6
217	Paint	North Center Room	Floor		Wood	Brown	2/16/2018	Intact	Positive	2.36	1	2	0.8
218	Paint	Northeast Room	Cove Base Molding	A	Wood	White	2/16/2018	Intact	Positive	3.03	1	2.1	1
219	Paint	Northeast Room	Wall	A	Plaster	Blue	2/16/2018	Intact	Negative	1.95	1	0.08	0.13
220	Paint	Northeast Room	Pipes	A	Metal	Blue	2/16/2018	Intact	Negative	4.26	1	0.14	0.37
221	Paint	Northeast Room	Cove Base Molding	B	Wood	White	2/16/2018	Intact	Null	2.87	1	1.6	3.2
222	Paint	Northeast Room	Cove Base Molding	B	Wood	White	2/16/2018	Intact	Null	4.12	1	2.6	5.4
223	Paint	Northeast Room	Cove Base Molding	B	Wood	White	2/16/2018	Intact	Null	3.56	1	2.1	4.2
224	Paint	Northeast Room	Cove Base Molding	B	Wood	White	2/16/2018	Intact	Positive	3.64	1	2	1
225	Paint	Northeast Room	Radiator Cover	B	Metal	White	2/16/2018	Intact	Null	3.23	1	0.29	0.74
226	Paint	Northeast Room	Radiator Cover	B	Metal	White	2/16/2018	Intact	Negative	1	1	0.06	0.1
227	Paint	Northeast Room	Wall	B	Plaster	Blue	2/16/2018	Damaged	Negative	5.82	1	0.19	0.55
228	Paint	Northeast Room	Window Molding	B	Wood	White	2/16/2018	Intact	Positive	5.47	1	25.7	23.8
229	Paint	Northeast Room	Window Frame	B	Wood	White	2/16/2018	Intact	Positive	4.3	1	25.6	23.9
230	Paint	Northeast Room	Window	B	Wood	White	2/16/2018	Intact	Positive	3.46	1	4.4	3.2
231	Paint	Northeast Room	Window Sill	B	Wood	White	2/16/2018	Intact	Positive	4.48	1	9	7.8
232	Paint	Northeast Room	Door Frame Molding	B	Wood	White	2/16/2018	Intact	Positive	4.67	1	28.8	26.6
233	Paint	Northeast Room	Door Frame	B	Wood	White	2/16/2018	Damaged	Positive	4.26	1	22.1	18.3
234	Paint	Northeast Room	Door	B	Wood	White	2/16/2018	Damaged	Positive	5.72	1	14.4	13.2
235	Paint	Northeast Room	Wall	C	Plaster	Blue	2/16/2018	Intact	Negative	1.69	1	0.04	0.09
236	Paint	Northeast Room	Shelf	C	Wood	Blue	2/16/2018	Intact	Negative	2.23	1	0.14	0.26
237	Paint	Northeast Room	Window Frame	C	Wood	White	2/16/2018	Intact	Positive	7.46	1	16.3	14.7
238	Paint	Northeast Room	Window	C	Wood	White	2/16/2018	Intact	Positive	3.09	1	6.1	4.5
239	Paint	Northeast Room	Window Sill	C	Wood	White	2/16/2018	Intact	Positive	5.36	1	15.3	12.5
240	Paint	Northeast Room	Cove Base Molding	D	Wood	White	2/16/2018	Intact	Positive	3.48	1	1.8	0.8
241	Paint	Northeast Room	Wall	D	Plaster	White	2/16/2018	Intact	Negative	1.19	1	0.03	0.08
242	Paint	Northeast Room	Door Frame Molding	D	Wood	White	2/16/2018	Intact	Positive	5.43	1	21.4	17.4
243	Paint	Northeast Room	Door Frame	D	Wood	White	2/16/2018	Intact	Positive	5.35	1	24.2	19.8
244	Paint	Northeast Room	Floor		Wood	Brown	2/16/2018	Intact	Negative	1.23	1	0.14	0.19
245	Paint	Northeast Room	Ceiling		Drywall	White	2/16/2018	Intact	Null	1	1	0.01	0.09
246	Paint	Northeast Room	Ceiling		Drywall	White	2/16/2018	Intact	Null	1.62	1	0.03	0.13
247	Paint	Northeast Room	Ceiling		Drywall	White	2/16/2018	Intact	Null	1.66	1	0.04	0.18
248	Paint	Northeast Room	Ceiling		Drywall	White	2/16/2018	Intact	Negative	1.48	1	0.04	0.1
249	Paint	East Stairs	Wall	A	Plaster	White	2/16/2018	Damaged	Negative	1.12	1	0.1	0.09
250	Paint	East Stairs	Wall	A	Plaster	Blue	2/16/2018	Damaged	Null	1	1	0.01	0.06
251	Paint	East Stairs	Wall	A	Plaster	Blue	2/16/2018	Damaged	Negative	1.3	1	0.01	0.04
252	Paint	East Stairs	Door	B	Wood	White	2/16/2018	Intact	Positive	1.68	1	10.1	8
253	Paint	East Stairs	Door Frame	B	Wood	White	2/16/2018	Intact	Positive	1.7	1	10.1	7.3
254	Paint	East Stairs	Wall	C	Plaster	White	2/16/2018	Damaged	Negative	1.26	1	0.14	0.09
255	Paint	East Stairs	Wall	C	Plaster	Blue	2/16/2018	Damaged	Negative	4.75	1	0.03	0.1
256	Paint	East Stairs	Wall	D	Plaster	Blue	2/16/2018	Damaged	Negative	3.91	1	0.03	0.11
257	Paint	East Stairs	Door Frame	D	Wood	White	2/16/2018	Intact	Positive	1.59	1	8.8	6.7
258	Paint	East Stairs	Wall	D	Plaster	White	2/16/2018	Damaged	Negative	1	1	0.01	0.02

Appendix A
Pre- Renovation Lead Containing Paint Survey: Barnard House
Troy Historic Villiage
Troy, MI
Survey Date: 2/16/2018

Index Number	Type	Room	Component	Side	Substrate	Color	Testing Date	Condition	LBP?	Depth Index	Action Level	Lead (mg/cm2)	Lead Error
259	Paint	East Stairs	Stair Riser		Wood	White	2/16/2018	Intact	Positive	1.61	1	6.4	4.8
260	Paint	2nd Floor Northeast Room	Cove Base Molding	A	Wood	White	2/16/2018	Intact	Positive	1.7	1	10.1	7.4
261	Paint	2nd Floor Northeast Room	Wall	A	Plaster	Blue	2/16/2018	Damaged	Negative	1.41	1	0.06	0.07
262	Paint	2nd Floor Northeast Room	Door framw molding	A	Wood	White	2/16/2018	Intact	Positive	1.69	1	31.5	27.8
263	Paint	2nd Floor Northeast Room	Door Frame	A	Wood	White	2/16/2018	Intact	Positive	1.82	1	25	19.4
264	Paint	2nd Floor Northeast Room	Door	A	Wood	White	2/16/2018	Intact	Positive	1.82	1	26	24.6
265	Paint	2nd Floor Northeast Room	Cove Base Molding	B	Wood	White	2/16/2018	Intact	Positive	1.55	1	9	6.8
266	Paint	2nd Floor Northeast Room	Radiator Cover	B	Metal	Blue	2/16/2018	Intact	Negative	1	1	<LOD	0.03
267	Paint	2nd Floor Northeast Room	Radiator Cover	B	Metal	Blue	2/16/2018	Intact	Negative	1.14	1	0.03	0.08
268	Paint	2nd Floor Northeast Room	Wall	B	Plaster	Blue	2/16/2018	Damaged	Negative	1.96	1	0.18	0.19
269	Paint	2nd Floor Northeast Room	Window Molding	B	Wood	White	2/16/2018	Intact	Positive	1.7	1	10.1	8.5
270	Paint	2nd Floor Northeast Room	Window Frame	B	Wood	White	2/16/2018	Intact	Positive	1.54	1	9.6	7.3
271	Paint	2nd Floor Northeast Room	Window	B	Wood	White	2/16/2018	Intact	Positive	1.54	1	7.8	5.7
272	Paint	2nd Floor Northeast Room	Window Sill	B	Wood	White	2/16/2018	Intact	Negative	1.45	1	0.5	0.4
273	Paint	2nd Floor Northeast Room	Support Beam	B	Wood	Blue	2/16/2018	Damaged	Positive	2.2	1	22.1	18.2
274	Paint	2nd Floor Northeast Room	Cove Base Molding	C	Wood	White	2/16/2018	Intact	Positive	1.86	1	27.6	25.2
275	Paint	2nd Floor Northeast Room	Wall	C	Plaster	Blue	2/16/2018	Damaged	Negative	1	1	0.09	0.09
276	Paint	2nd Floor Northeast Room	Window Frame Molding	C	Wood	White	2/16/2018	Intact	Positive	1.7	1	17.6	15
277	Paint	2nd Floor Northeast Room	Window Frame	C	Wood	White	2/16/2018	Intact	Positive	1.58	1	10.1	8.1
278	Paint	2nd Floor Northeast Room	Window	C	Wood	White	2/16/2018	Intact	Positive	1.6	1	9.4	7.3
279	Paint	2nd Floor Northeast Room	Window Sill	C	Wood	White	2/16/2018	Fair	Positive	1.57	1	9	6.9
280	Paint	2nd Floor Northeast Room	Cove Base Molding	D	Wood	White	2/16/2018	Intact	Positive	1.67	1	9.5	7.6
281	Paint	2nd Floor Northeast Room	Wall	D	Plaster	Blue	2/16/2018	Damaged	Negative	1	1	0.03	0.05
282	Paint	2nd Floor Northeast Room	Door Molding	D	Plaster	Blue	2/16/2018	Intact	Positive	1.67	1	10.1	8.7
283	Paint	2nd Floor Northeast Room	Door Frame	D	Plaster	Blue	2/16/2018	Intact	Positive	1.99	1	29.5	27.7
284	Paint	2nd Floor Northeast Room	Door	D	Plaster	Blue	2/16/2018	Intact	Positive	1.6	1	10.1	8.4
285	Paint	2nd Floor Northeast Room	Ceiling		Plaster	Blue	2/16/2018	Damaged	Null	1	1	0.01	0.03
286	Paint	2nd Floor Northeast Room	Ceiling		Plaster	Blue	2/16/2018	Damaged	Null	2.36	1	0.06	0.34
287	Paint	2nd Floor Northeast Room	Ceiling		Plaster	Blue	2/16/2018	Damaged	Null	1	1	0.01	0.13
288	Paint	2nd Floor Northeast Room	Ceiling		Plaster	Blue	2/16/2018	Damaged	Negative	1.15	1	0.02	0.04
289	Paint	2nd Floor Southeast Room	Cove Base Molding	A	Wood	White	2/16/2018	Intact	Positive	1.49	1	9.1	6.7
290	Paint	2nd Floor Southeast Room	Wall	A	Plaster	White	2/16/2018	Damaged	Negative	2.17	1	0.09	0.12
291	Paint	2nd Floor Southeast Room	Door Molding	A	Wood	White	2/16/2018	Intact	Positive	1.76	1	18.6	15.9
292	Paint	2nd Floor Southeast Room	Door Frame	A	Wood	White	2/16/2018	Intact	Positive	1.75	1	8.7	6.9
293	Paint	2nd Floor Southeast Room	Door	A	Wood	White	2/16/2018	Intact	Positive	1.81	1	8.8	5.9
294	Paint	2nd Floor Southeast Room	Cove Base Molding	B	Wood	White	2/16/2018	Intact	Positive	1.54	1	8.8	6.6
295	Paint	2nd Floor Southeast Room	Wall	B	Plaster	White	2/16/2018	Damaged	Negative	1.23	1	0.05	0.08
296	Paint	2nd Floor Southeast Room	Door Molding	B	Plaster	White	2/16/2018	Intact	Positive	1.51	1	9.7	7.3
297	Paint	2nd Floor Southeast Room	Cove Base Molding	C	Wood	White	2/16/2018	Intact	Positive	1.72	1	23.4	18.5
298	Paint	2nd Floor Southeast Room	Wall	C	Plaster	White	2/16/2018	Damaged	Negative	1	1	0.04	0.06
299	Paint	2nd Floor Southeast Room	Window Molding	C	Wood	White	2/16/2018	Intact	Positive	1.65	1	10.1	8.9
300	Paint	2nd Floor Southeast Room	Window Frame	C	Wood	White	2/16/2018	Fair	Positive	1.85	1	18.2	15.5
301	Paint	2nd Floor Southeast Room	Window	C	Wood	White	2/16/2018	Fair	Positive	1.46	1	7.6	5.4

Appendix A
Pre- Renovation Lead Containing Paint Survey: Barnard House
Troy Historic Villiage
Troy, MI
Survey Date: 2/16/2018

Index Number	Type	Room	Component	Side	Substrate	Color	Testing			Depth Index	Action Level	Lead	
							Date	Condition	LBP?			(mg/cm2)	Lead Error
302	Paint	2nd Floor Southeast Room	Window Sill	C	Wood	White	2/16/2018	Fair	Positive	1.55	1	9	6.8
303	Paint	2nd Floor Southeast Room	Support Beam	C	Wood	White	2/16/2018	Intact	Positive	2.22	1	19.3	16.5
304	Paint	2nd Floor Southeast Room	Cove Base Molding	D	Wood	White	2/16/2018	Intact	Positive	1.54	1	10.1	8.9
305	Paint	2nd Floor Southeast Room	Radiator Cover	D	Metal	Blue	2/16/2018	Intact	Negative	1	1	<LOD	0.02
306	Paint	2nd Floor Southeast Room	Radiator Cover	D	Metal	Blue	2/16/2018	Intact	Null	1	1	<LOD	0.04
307	Paint	2nd Floor Southeast Room	Radiator Cover	D	Metal	Blue	2/16/2018	Intact	Null	10	1	0.06	0.33
308	Paint	2nd Floor Southeast Room	Radiator Cover	D	Metal	Blue	2/16/2018	Intact	Negative	1	1	<LOD	0.03
309	Paint	2nd Floor Southeast Room	Wall	D	Plaster	White	2/16/2018	Damaged	Null	1.27	1	0.06	0.07
310	Paint	2nd Floor Southeast Room	Wall	D	Plaster	White	2/16/2018	Damaged	Null	1.28	1	0.11	0.12
311	Paint	2nd Floor Southeast Room	Wall	D	Plaster	White	2/16/2018	Damaged	Negative	1.78	1	0.1	0.09
312	Paint	2nd Floor Southeast Room	Window Molding	D	Wood	White	2/16/2018	Intact	Positive	1.64	1	18.7	15.8
313	Paint	2nd Floor Southeast Room	Window Frame	D	Wood	White	2/16/2018	Intact	Positive	1.7	1	20.5	17.2
314	Paint	2nd Floor Southeast Room	Window	D	Wood	White	2/16/2018	Intact	Positive	1.7	1	9.4	7.5
315	Paint	2nd Floor Southeast Room	Window Sill	D	Wood	White	2/16/2018	Intact	Positive	1.56	1	10.1	7.9
316	Paint	2nd Floor Southeast Room	Ceiling		Plaster	Blue	2/16/2018	Damaged	Negative	1.27	1	0.01	0.03
317	Paint	2nd Floor Center Room	Cove Base Molding	A	Wood	White	2/16/2018	Intact	Positive	1.79	1	7.4	5.8
318	Paint	2nd Floor Center Room	Cove Base Molding	A	Wood	White	2/16/2018	Intact	Positive	1.81	1	9.9	8.3
319	Paint	2nd Floor Center Room	Radiator Cover	A	Metal	White	2/16/2018	Intact	Negative	1	1	<LOD	0.02
320	Paint	2nd Floor Center Room	Wall	A	Plaster	Blue	2/16/2018	Intact	Negative	1	1	<LOD	0.02
321	Paint	2nd Floor Center Room	Wall	A	Plaster	Blue	2/16/2018	Intact	Negative	1	1	<LOD	0.02
322	Paint	2nd Floor Center Room	Door Frame	A	Wood	White	2/16/2018	Intact	Positive	2.44	1	3.7	2.6
323	Paint	2nd Floor Center Room	Closet Door	A	Wood	White	2/16/2018	Intact	Positive	3.39	1	8.5	6.9
324	Paint	2nd Floor Center Room	Cove Base Molding	B	Wood	White	2/16/2018	Intact	Positive	2.08	1	21.9	17.6
325	Paint	2nd Floor Center Room	Wall	B	Plaster	White	2/16/2018	Intact	Negative	1	1	<LOD	0.02
326	Paint	2nd Floor Center Room	Window Molding	B	Wood	White	2/16/2018	Damaged	Negative	1.7	1	0.02	0.08
327	Paint	2nd Floor Center Room	Window Frame	B	Wood	White	2/16/2018	Damaged	Positive	2.48	1	18.2	15.8
328	Paint	2nd Floor Center Room	Window	B	Wood	White	2/16/2018	Damaged	Positive	1.9	1	4.2	2.9
329	Paint	2nd Floor Center Room	Window Sill	B	Wood	White	2/16/2018	Damaged	Negative	1.76	1	0.8	0.2
330	Paint	2nd Floor Center Room	Cove Base Molding	C	Wood	White	2/16/2018	Intact	Null	2.02	1	10.1	13.1
331	Paint	2nd Floor Center Room	Cove Base Molding	C	Wood	White	2/16/2018	Intact	Positive	1.88	1	8.8	7.3
332	Paint	2nd Floor Center Room	Wall	C	Plaster	White	2/16/2018	Intact	Negative	5.13	1	0.04	0.22
333	Paint	2nd Floor Center Room	Wall	C	Plaster	White	2/16/2018	Intact	Negative	1.73	1	0.01	0.04
334	Paint	2nd Floor Center Room	Door Molding	C	Wood	White	2/16/2018	Intact	Positive	1.93	1	10.1	7.2
335	Paint	2nd Floor Center Room	Radiator Cover	C	Wood	White	2/16/2018	Intact	Negative	1	1	<LOD	0.02
336	Paint	2nd Floor Center Room	Radiator Cover	D	Metal	White	2/16/2018	Intact	Negative	1	1	<LOD	0.02
337	Paint	2nd Floor Center Room	Wall	D	Plaster	White	2/16/2018	Intact	Negative	1	1	<LOD	0.02
338	Paint	2nd Floor Center Room	Window Molding	D	Plaster	White	2/16/2018	Fair	Positive	2.02	1	17.2	14.8
339	Paint	2nd Floor Center Room	Window Frame	D	Plaster	White	2/16/2018	Fair	Positive	1.86	1	5.5	4.4
340	Paint	2nd Floor Center Room	Window	D	Plaster	White	2/16/2018	Fair	Positive	1.95	1	7.9	6.6
341	Paint	2nd Floor Center Room	Window Sill	D	Wood	White	2/16/2018	Fair	Positive	1.65	1	8.2	6.3
342	Paint	2nd Floor Center Room	Ceiling		Plaster	White	2/16/2018	Intact	Negative	1	1	<LOD	0.02
343	Paint	2nd Floor Center Room	Ceiling		Plaster	White	2/16/2018	Intact	Negative	1	1	<LOD	0.02
344	Paint	2nd Floor Bathroom	Wall	A	Plaster	White	2/16/2018	Intact	Negative	1	1	0.07	0.11

Appendix A
Pre- Renovation Lead Containing Paint Survey: Barnard House
Troy Historic Villiage
Troy, MI
Survey Date: 2/16/2018

Index Number	Type	Room	Component	Side	Substrate	Color	Testing			Depth Index	Action Level	Lead	
							Date	Condition	LBP?			(mg/cm2)	Lead Error
345	Paint	2nd Floor Bathroom	Wall	A	Plaster	White	2/16/2018	Intact	Negative	1.42	1	0.05	0.07
346	Paint	2nd Floor Bathroom	Wall	B	Plaster	White	2/16/2018	Intact	Negative	1.2	1	0.06	0.11
347	Paint	2nd Floor Bathroom	Window Frame	B	Wood	White	2/16/2018	Intact	Positive	5.23	1	20.7	17.4
348	Paint	2nd Floor Bathroom	Radiator Cover	C	Metal	White	2/16/2018	Intact	Null	2.1	1	0.09	0.27
349	Paint	2nd Floor Bathroom	Radiator Cover	C	Metal	White	2/16/2018	Intact	Negative	1.55	1	0.08	0.15
350	Paint	2nd Floor Bathroom	Radiator Cover	D	Metal	White	2/16/2018	Intact	Negative	4.71	1	0.18	0.44
351	Paint	2nd Floor Bathroom	Wall	D	Plaster	White	2/16/2018	Intact	Negative	1.66	1	0.1	0.13
352	Paint	2nd Floor Bathroom	Door Molding	D	Wood	White	2/16/2018	Intact	Negative	1.58	1	0.03	0.1
353	Paint	2nd Floor Bathroom	Door Frame	D	Wood	White	2/16/2018	Intact	Positive	3.14	1	10.1	8.4
354	Paint	2nd Floor Bathroom	Door	D	Wood	White	2/16/2018	Intact	Negative	1	1	<LOD	0.02
355	Paint	2nd Floor Bathroom	Door	D	Wood	White	2/16/2018	Intact	Negative	1	1	<LOD	0.03
356	Paint	2nd Floor Hallway	Door Molding	A	Wood	White	2/16/2018	Intact	Positive	3.26	1	19.1	16.6
357	Paint	2nd Floor Hallway	Door Frame	A	Wood	Brown	2/16/2018	Intact	Positive	3.22	1	20.2	17.5
358	Paint	2nd Floor Hallway	Wall	A	Plaster	White	2/16/2018	Intact	Negative	2.4	1	0.07	0.11
359	Paint	2nd Floor Hallway	Wall	B	Plaster	White	2/16/2018	Intact	Negative	1.8	1	0.04	0.12
360	Paint	2nd Floor Hallway	Door Molding	B	Wood	White	2/16/2018	Intact	Negative	1.78	1	0.02	0.1
361	Paint	2nd Floor Hallway	Door Molding	C	Wood	White	2/16/2018	Intact	Negative	1	1	0.01	0.05
362	Paint	2nd Floor Hallway	Door	C	Wood	White	2/16/2018	Intact	Negative	1	1	<LOD	0.02
363	Paint	2nd Floor Hallway	Wall	C	Plaster	White	2/16/2018	Intact	Null	1.69	1	0.06	0.23
364	Paint	2nd Floor Hallway	Wall	C	Plaster	White	2/16/2018	Intact	Negative	1.95	1	0.05	0.15
365	Paint	2nd Floor Hallway	Wall	D	Plaster	White	2/16/2018	Intact	Negative	1.34	1	0.03	0.09
366	Paint	2nd Floor West Room	Window Frame	A	Wood	Brown	2/16/2018	Intact	Null	2.8	1	7.3	10.3
367	Paint	2nd Floor West Room	Window Frame	A	Wood	Brown	2/16/2018	Intact	Positive	2.86	1	7.6	6.3
368	Paint	2nd Floor West Room	Window	A	Wood	Brown	2/16/2018	Intact	Positive	2.27	1	4.2	3.2
369	Paint	2nd Floor West Room	Window Sill	A	Wood	Brown	2/16/2018	Intact	Positive	2.29	1	1.6	0.6
370	Paint	2nd Floor West Room	Radiator Cover	B	Metal	Brown	2/16/2018	Intact	Negative	1.97	1	0.04	0.13
371	Paint	2nd Floor West Room	Stair Rail	C	Wood	Brown	2/16/2018	Intact	Positive	4.99	1	10.4	8.6
372	Paint	2nd Floor West Room	Stair Tread	C	Wood	Brown	2/16/2018	Intact	Negative	1	1	<LOD	0.03
373	Paint	2nd Floor West Room	Stair Tread	C	Wood	Brown	2/16/2018	Intact	Negative	1	1	<LOD	0.03
374	Paint	2nd Floor West Room	Cupboard	D	Wood	Brown	2/16/2018	Intact	Negative	1	1	<LOD	0.02
375	Paint	2nd Floor West Room	Door Frame	D	Wood	Brown	2/16/2018	Intact	Negative	2.18	1	0.13	0.25
376	Paint	2nd Floor West Room	Radiator Cover	D	Metal	Brown	2/16/2018	Intact	Negative	1	1	<LOD	0.03
377	Paint	2nd Floor West Room	Radiator Cover	D	Metal	Brown	2/16/2018	Intact	Negative	1	1	<LOD	0.02
378	Paint	Basement	I beams		Metal	Red	2/16/2018	Intact	Negative	1	1	<LOD	0.02
379	Paint	Basement	Support Post		Metal	Red	2/16/2018	Intact	Negative	1	1	<LOD	0.02
380	Paint	Basement	Fire Door	A	Metal	Gray	2/16/2018	Intact	Negative	1	1	<LOD	0.02
381	Paint	Exterior	Door Frame	A	Wood	White	2/16/2018	Damaged	Positive	10	1	19.5	17.5
382	Paint	Exterior	Screen Door	A	Wood	White	2/16/2018	Damaged	Negative	2.1	1	0.02	0.09
383	Paint	Exterior	Front Door	A	Wood	White	2/16/2018	Fair	Positive	5.77	1	19.5	16.8
384	Paint	Exterior	Siding	A	Wood	White	2/16/2018	Intact	Positive	10	1	23	19
385	Paint	Exterior	Awning Support	A	Wood	White	2/16/2018	Fair	Positive	10	1	10.6	8.8
386	Paint	Exterior	Soffit	A	Wood	White	2/16/2018	Fair	Positive	9.85	1	7.7	6.2
387	Paint	Exterior	Handrail	A	Wood	White	2/16/2018	Intact	Negative	1	1	<LOD	0.02

Appendix A
Pre- Renovation Lead Containing Paint Survey: Barnard House
Troy Historic Villiage
Troy, MI
Survey Date: 2/16/2018

Index Number	Type	Room	Component	Side	Substrate	Color	Testing					Lead	
							Date	Condition	LBP?	Depth Index	Action Level	(mg/cm2)	Lead Error
388	Paint	Exterior	Stairs	A	Wood	White	2/16/2018	Intact	Negative	1	1	<LOD	0.03
389	Paint	Exterior	Cellar Door	A	Wood	White	2/16/2018	Damaged	Negative	1	1	<LOD	0.03
390	Paint	Exterior	Cellar Door	A	Wood	White	2/16/2018	Damaged	Negative	1	1	<LOD	0.02
391	Paint	Exterior	Window Frame	A	Wood	White	2/16/2018	Damaged	Negative	2.51	1	0.4	0.2
392	Paint	Exterior	Window	A	Wood	White	2/16/2018	Damaged	Null	1.28	1	0.5	0.5
393	Paint	Exterior	Window	A	Wood	White	2/16/2018	Damaged	Negative	1.84	1	0.4	0.4
394	Paint	Exterior	Window Shutter	A	Vinyl	White	2/16/2018	Intact	Negative	6.34	1	0.04	0.24
395	Paint	Exterior	Siding	B	Wood	White	2/16/2018	Fair	Positive	2.64	1	7.9	6.4
396	Paint	Exterior	Door Frame	B	Wood	White	2/16/2018	Damaged	Positive	4.28	1	2.4	1.3
397	Paint	Exterior	Door	B	Wood	White	2/16/2018	Damaged	Negative	1	1	<LOD	0.03
398	Paint	Exterior	Door	B	Wood	White	2/16/2018	Damaged	Negative	1.92	1	0.01	0.07
399	Paint	Exterior	Window Frame	B	Wood	White	2/16/2018	Damaged	Null	9.52	1	0.5	1.4
400	Paint	Exterior	Window Frame	B	Wood	White	2/16/2018	Damaged	Negative	4.24	1	0.24	0.5
401	Paint	Exterior	Window	B	Wood	White	2/16/2018	Damaged	Negative	1.33	1	0.13	0.19
402	Paint	Exterior	Window Shutter	B	Vinyl	Green	2/16/2018	Intact	Negative	1	1	<LOD	0.02
403	Paint	Exterior	Window Shutter	B	Vinyl	Green	2/16/2018	Intact	Negative	1	1	<LOD	0.02
404	Paint	Exterior	Window Shutter	B	Vinyl	Green	2/16/2018	Intact	Negative	1	1	<LOD	0.03
405	Paint	Exterior	Handrail	B	Wood	White	2/16/2018	Intact	Negative	1	1	<LOD	0.02
406	Paint	Exterior	Stairs	B	Wood	White	2/16/2018	Intact	Negative	1	1	<LOD	0.02
407	Paint	Exterior	Downspout	B	Metal	White	2/16/2018	Intact	Negative	1	1	<LOD	0.02
408	Paint	Exterior	Siding	C	Metal	White	2/16/2018	Intact	Positive	6.05	1	25.9	20.4
409	Paint	Exterior	Window Frame	C	Wood	White	2/16/2018	Damaged	Positive	8.65	1	23.2	18.9
410	Paint	Exterior	Window	C	Wood	White	2/16/2018	Damaged	Negative	2.48	1	0.5	0.4
411	Paint	Exterior	Window Shutter	C	Wood	White	2/16/2018	Intact	Negative	7.69	1	0.08	0.41
412	Paint	Exterior	Door Frame	D	Wood	White	2/16/2018	Intact	Positive	4.86	1	2.9	1.9
413	Paint	Exterior	Door Frame	D	Wood	Green	2/16/2018	Intact	Null	4.07	1	0.6	0.9
414	Paint	Exterior	Door Frame	D	Wood	Green	2/16/2018	Intact	Negative	2.84	1	0.4	0.5
415	Paint	Exterior	Door Frame	D	Wood	White	2/16/2018	Intact	Positive	6.26	1	16.6	15.2
416	Paint	Exterior	Door	D	Wood	White	2/16/2018	Intact	Null	2.56	1	0.27	0.5
417	Paint	Exterior	Door	D	Wood	White	2/16/2018	Intact	Negative	1.38	1	0.08	0.15
418	Paint	Exterior	Siding	D	Wood	White	2/16/2018	Intact	Positive	10	1	36.8	31.3
419	Paint	Exterior	Window Frame	D	Wood	White	2/16/2018	Damaged	Negative	7.85	1	0.18	0.42
420	Paint	Exterior	Window	D	Wood	White	2/16/2018	Damaged	Negative	1.63	1	0.5	0.4
421	Paint	Exterior	Window Shutter	D	Vinyl	Green	2/16/2018	Intact	Positive	10	1	2.3	1
422	Paint	Exterior	Window Shutter	D	Vinyl	Green	2/16/2018	Intact	Negative	7.21	1	0.07	0.22

LBP? = Does the tested paint film meet the regulatory definition of lead-based paint? (Positive/Negative)

mg/cm2 = milligrams of lead per square centimeter of surface area

Instrument Used: Niton XLp300A

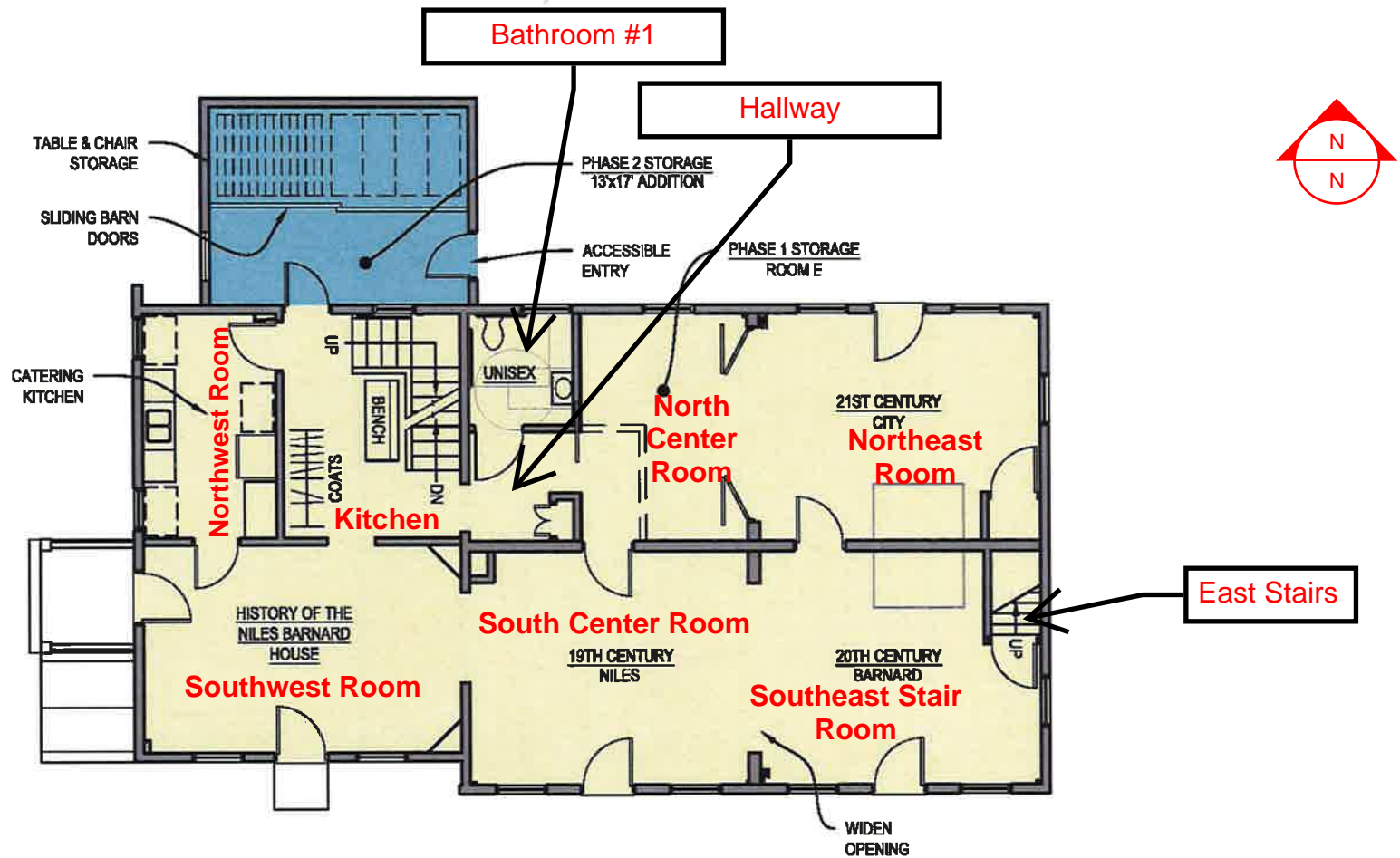
Lead (mg/cm²) = Calculated value of lead found in the paint film

Lead Error (mg/cm²) = The amount of statistical uncertainty associated with the reported lead value. Represents two standard deviations (2σ)

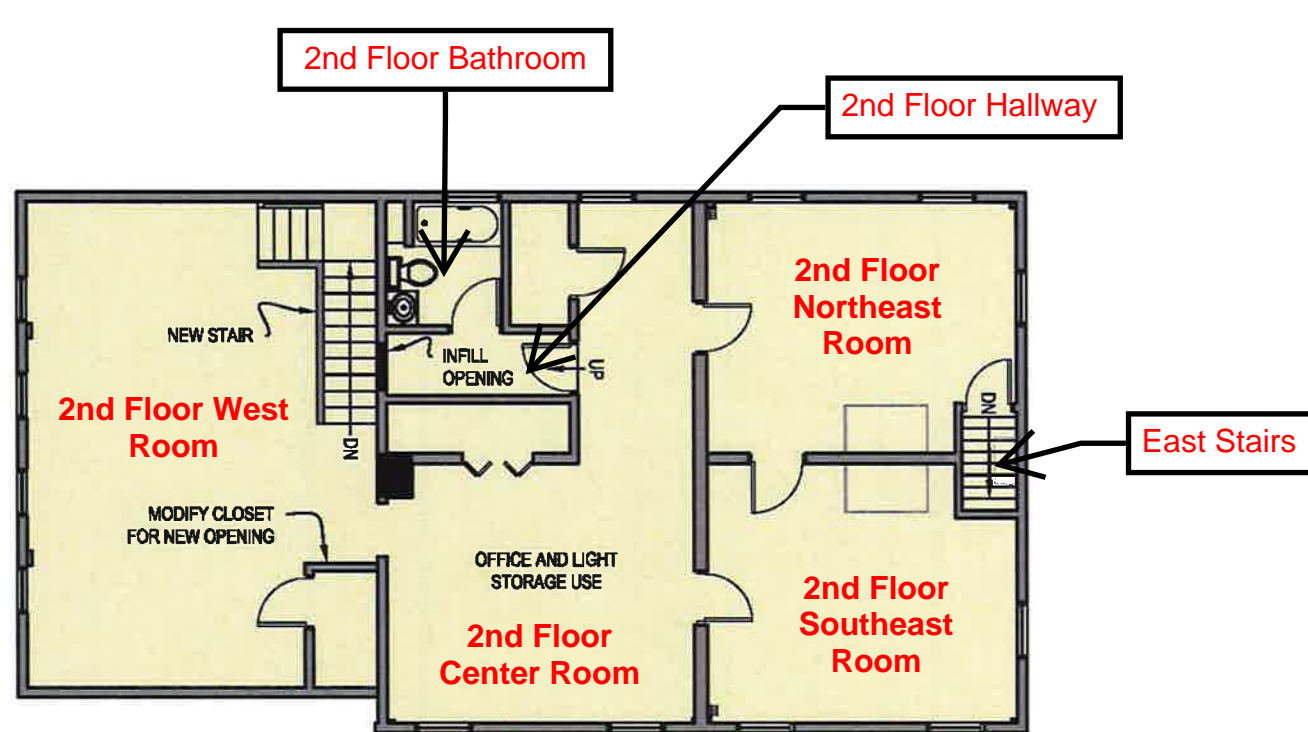
APPENDIX B

Room Locations Map

Appendix B Barnard Home Room Locations



Appendix B
Barnard Home Room Locations



SECTION 01 10 00 - SUMMARY

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Project information.
2. Work covered by Contract Documents.
3. Work by Owner.
4. Access to site.
5. Work restrictions.
6. Specification and drawing conventions.
7. Miscellaneous provisions.

B. Related Requirements:

1. Section 01 50 00 "Temporary Facilities and Controls" for limitations and procedures governing temporary use of Owner's facilities.

1.2 PROJECT INFORMATION

A. Project Identification: **NILES BARNARD RENOVATION PROJECT**

1. Project Location: TROY, MI.

B. Owner: **CITY OF TROY**

1. Owner's Representative: **KURT BOVENSIEP, PUBLIC WORKS DIRECTOR**

C. Project Web Site: A project Web site administered by OHM Advisors will be used for purposes of managing communication and documents during the construction stage.

1. See Section 01 31 00 "Project Management and Coordination." for requirements for using Project Web site.

1.3 WORK COVERED BY CONTRACT DOCUMENTS

A. The Work of Project is defined by the Contract Documents and consists of the following:

1. Abatement of asbestos and lead in existing area of work identified on drawings. No work is to be completed on second floor unless required to complete work identified in contract documents. Scope of work to include methods of abatement permissible by state law by accredited and certified company performing work.
2. Exterior renovation improvements include refurbishment of windows, doors, and siding along with installation of insulation in exterior walls. Construction of building addition to complement the existing building, along with landings at exterior doors.
3. Renovation of existing first floor includes refurbishment of doors, along with new finish installations through. A new central stair for basement access to be provided.
4. Mechanical, Electrical, and Plumbing upgrades and replacement of fixtures as indicated on drawings.
5. Structural reinforcement of existing floor joists.

B. Type of Contract.

1. Project will be constructed under a single prime contract.

1.4 WORK BY OWNER

- A. General: Cooperate fully with Owner so work may be carried out smoothly, without interfering with or delaying work under this Contract or work by Owner. Coordinate the Work of this Contract with work performed by Owner.
- B. Preceding Work: Owner will perform the following construction operations at Project site. Those operations are scheduled to be substantially complete before work under this Contract begins.
 - 1. Installation of sanitary and water lines and connections to building.
- C. Subsequent Work: Owner will perform the following additional work at site after Substantial Completion. Completion of that work will depend on successful completion of preparatory work under this Contract.
 - 1. Final site grading,
 - 2. Sidewalks to building addition and exterior door landings.
 - 3. Security and Alarm

1.5 OWNER-FURNISHED PRODUCTS

- A. Owner will furnish products indicated. The Work includes receiving, unloading, handling, storing, protecting, and installing Owner-furnished products and making building services connections.
- B. Owner-Furnished Products:
 - 1. Equipment identified as part of Allowances.
- C. Owner's Responsibilities:
 - 1. Arrange for and deliver Owner-reviewed Shop Drawings, Product Data, and Samples to Contractor.
 - 2. Arrange and pay for delivery to Site.
 - 3. Upon delivery, inspect products jointly with Contractor.
 - 4. Submit claims for transportation damage and replace damaged, defective, or deficient items.
 - 5. Arrange for manufacturer's warranties, inspections, and service.
- D. Contractor's Responsibilities
 - 1. Receive and unload products at Site; inspect for completeness or damage jointly with Owner.
 - 2. Handle, store, install, and finish products.
 - 3. Repair or replace items damaged after receipt.

1.6 ACCESS TO SITE

- A. General: Contractor shall have limited use of Project site for construction operations as indicated by the Contract limits and as indicated by requirements of this Section.
- B. Use of Site: Limit use of Project site to areas within the Contract limits indicated. Do not disturb portions of Project site beyond areas in which the Work is indicated.
 - 1. Driveways, Walkways and Entrances: Keep driveways and entrances serving premises clear and available to Owner, Owner's employees, and emergency vehicles at all times. Do not use these areas for parking or storage of materials.
 - a. Schedule deliveries to minimize use of driveways and entrances by construction operations.
 - b. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on-site.

C. Condition of Existing Building: Maintain portions of existing building affected by construction operations in a weathertight condition throughout construction period. Repair damage caused by construction operations.

D. Contractor shall not operate heavy equipment on any side street within the project area without permission from the Engineer, Owner, and authority having jurisdiction.

1.7 COORDINATION WITH OCCUPANTS

A. Partial Owner Occupancy: Owner will occupy the premises during entire construction period, with the exception of areas under construction. Cooperate with Owner during construction operations to minimize conflicts and facilitate Owner usage. Perform the Work so as not to interfere with Owner's operations. Maintain existing exits unless otherwise indicated.

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

1.8 WORK RESTRICTIONS

A. Work Restrictions, General: Comply with restrictions on construction operations.

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

B. Existing Utility Interruptions: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after providing temporary utility services according to requirements indicated:

1. Notify Owner not less than two days in advance of proposed utility interruptions.

C. Noise, Vibration, and Odors: Coordinate operations that may result in high levels of noise and vibration, odors, or other disruption to Owner occupancy with Owner.

1. Notify Owner not less than two days in advance of proposed disruptive operations.

D. Controlled Substances: Use of tobacco products and other controlled substances on Project site is not permitted.

1.9 SPECIFICATION AND DRAWING CONVENTIONS

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

1. Imperative mood and streamlined language are generally used in the Specifications. The words "shall," "shall be," or "shall comply with," depending on the context, are implied where a colon (:) is used within a sentence or phrase.
2. Specification requirements are to be performed by Contractor unless specifically stated otherwise.

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

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

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

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 10 00

SECTION 01 21 00 - ALLOWANCES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes administrative and procedural requirements governing allowances.
- B. Types of allowances include the following:
 - 1. Lump-sum allowances.

1.2 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.

1.3 ACTION SUBMITTALS

- A. Submit proposals for purchase of products or systems included in allowances, in the form specified for Change Orders.

1.4 INFORMATIONAL SUBMITTALS

- A. Submit invoices or delivery slips to show actual quantities of materials delivered to the site for use in fulfillment of each allowance.
- B. Submit time sheets and other documentation to show labor time and cost for installation of allowance items that include installation as part of the allowance.
- C. 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 or selected by Architect 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 selected by Architect under allowance shall be included as part of the Contract Sum and not part of the allowance.

- C. Unused Materials: Return unused materials purchased under an allowance to manufacturer or supplier for credit to Owner, after installation has been completed and accepted.
 - 1. If requested by Architect, retain and prepare unused material for storage by Owner. Deliver unused material to Owner's storage space as directed.

1.7 TESTING AND INSPECTING ALLOWANCES

- A. Testing and inspecting will be paid directly by owner and include the cost of engaging testing agencies, actual tests and inspections, and reporting results.

1.8 ADJUSTMENT OF ALLOWANCES

- A. Allowance Adjustment: To adjust allowance amounts, prepare a Change Order proposal based on the difference between purchase amount and the allowance, multiplied by final measurement of work-in-place where applicable. If applicable, include reasonable allowances for cutting losses, tolerances, mixing wastes, normal product imperfections, and similar margins.
 - 1. Include installation costs in purchase amount only where indicated as part of the allowance.
 - 2. If requested, prepare explanation and documentation to substantiate distribution of overhead costs and other margins claimed.
 - 3. Submit substantiation of a change in scope of work, if any, claimed in Change Orders related to unit-cost allowances.
 - 4. Owner reserves the right to establish the quantity of work-in-place by independent quantity survey, measure, or count.
- B. Submit claims for increased costs because of a change in scope or nature of the allowance described in the Contract Documents, whether for the purchase order amount or Contractor's handling, labor, installation, overhead, and profit.
 - 1. Do not include Contractor's or subcontractor's indirect expense in the Change Order cost amount unless it is clearly shown that the nature or extent of work has changed from what could have been foreseen from information in the Contract Documents.

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. Allowance No. 1: Lump Sum Allowance: Include the sum of \$4,500 for equipment to be installed in kitchenette, including ice maker, refrigerator, and microwave oven.

END OF SECTION 01 21 00

SECTION 01 23 00 - ALTERNATES

PART 1 - GENERAL

1.1 SUMMARY

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

1.2 DEFINITIONS

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

1.3 PROCEDURES

- A. Coordination: Revise or adjust affected adjacent work as necessary to completely integrate work of the alternate into Project.
 - 1. Include as part of each alternate, miscellaneous devices, accessory objects, and similar items incidental to or required for a complete installation whether or not indicated as part of alternate.
- B. Notification: Immediately following award of the Contract, notify each party involved, in writing, of the status of each alternate. Indicate if alternates have been accepted, rejected, or deferred for later consideration. Include a complete description of negotiated revisions to alternates.
- C. Execute accepted alternates under the same conditions as other work of the Contract.
- D. Schedule: A schedule of alternates is included at the end of this Section. Specification Sections referenced in schedule contain requirements for materials necessary to achieve the work described under each alternate.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 SCHEDULE OF ALTERNATES

- A. Alternate No. 1: Windows in existing building.
 - 1. Base Bid: Provide refurbished windows and storm windows as indicated on drawings.
 - 2. Alternate: Provide wood windows in lieu of refurbishing windows and storm windows. Wood windows shall be of similar shape and sizes as refurbished windows and as specified in 08 52 00 WOOD WINDOWS.

- B. Alternate No. 2: Pex/Brass Fittings.
 - 1. Base Bid: Provide fittings as indicated on drawings.
 - 2. Alternate: Provide PEX for aboveground domestic water in lieu of copper. Refer to Plumbing Piping & Valve Application Schedule on sheet M7.1.
- C. Alternate No. 3: Cultured Stone Base.
 - 1. Base Bid: Provide cultured stone base as indicated on drawings.
 - 2. Alternate: Provide stone base using existing stone on site, enlarge brick ledge to 4" wide. Provide flashing and weeps behind stone. Match mortar and look to existing conditions.
- D. Alternate No. 4: Interior Base and Crown Molding –
 - 1. Base Bid: Provide detail as indicated on detail 8/AI102.
 - 2. Alternate: Remove and Salvage molding, install gypsum board to ceiling and floor, reinstall molding over gypsum board.

END OF SECTION 01 23 00

SECTION 01 25 00 - SUBSTITUTION PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes administrative and procedural requirements for substitutions.
- B. Related Requirements:
 - 1. Section 01 60 00 "Product Requirements" for requirements for submitting comparable product submittals for products by listed manufacturers.

1.2 DEFINITIONS

- A. Substitutions: Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents and proposed by Contractor.

1.3 ACTION SUBMITTALS

- A. Substitution Requests: Submit three copies of each request for consideration. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.
 - 1. Substitution Request Form: Use CSI Form 13.1A.
 - 2. Documentation: Show compliance with requirements for substitutions and the following, as applicable:
 - a. Statement indicating why specified product or fabrication or installation cannot be provided, if applicable.
 - b. Coordination information, including a list of changes or revisions needed to other parts of the Work and to construction performed by Owner and separate contractors that will be necessary to accommodate proposed substitution.
 - c. Detailed comparison of significant qualities of proposed substitution with those of the Work specified. Include annotated copy of applicable Specification Section. Significant qualities may include attributes such as performance, weight, size, durability, visual effect, sustainable design characteristics, warranties, and specific features and requirements indicated. Indicate deviations, if any, from the Work specified.
 - d. Product Data, including drawings and descriptions of products and fabrication and installation procedures.
 - e. Samples, where applicable or requested.
 - f. Certificates and qualification data, where applicable or requested.
 - g. List of similar installations for completed projects with project names and addresses and names and addresses of engineers and owners.
 - h. Material test reports from a qualified testing agency indicating and interpreting test results for compliance with requirements indicated.
 - i. Research reports evidencing compliance with building code in effect for Project.
 - j. Detailed comparison of Contractor's construction schedule using proposed substitution with products specified for the Work, including effect on the overall Contract Time. If specified product or method of construction cannot be provided within the Contract Time, include letter from manufacturer, on manufacturer's letterhead, stating date of receipt of purchase order, lack of availability, or delays in delivery.
 - k. Cost information, including a proposal of change, if any, in the Contract Sum.
 - l. Contractor's certification that proposed substitution complies with requirements in the Contract Documents except as indicated in substitution request, is compatible with related materials, and is appropriate for applications indicated.

- m. Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results.
- 3. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within seven days of receipt of a request for substitution. Architect will notify Contractor of acceptance or rejection of proposed substitution within fifteen days of receipt of request, or seven days of receipt of additional information or documentation, whichever is later.
 - a. Forms of Acceptance: Change Order or Construction Change Directive.
 - b. Use product specified if Architect does not issue a decision on use of a proposed substitution within time allocated.

1.4 QUALITY ASSURANCE

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

PART 2 - PRODUCTS

2.1 SUBSTITUTIONS

- A. Substitutions for Cause: Submit requests for substitution immediately on discovery of need for change, but not later than fifteen days prior to time required for preparation and review of related submittals.
 - 1. Conditions: Architect will consider Contractor's request for substitution when the following conditions are satisfied:
 - a. Requested substitution is consistent with the Contract Documents and will produce indicated results.
 - b. Requested substitution will not adversely affect Contractor's construction schedule.
 - c. Requested substitution has received necessary approvals of authorities having jurisdiction.
 - d. Requested substitution is compatible with other portions of the Work.
 - e. Requested substitution has been coordinated with other portions of the Work.
 - f. Requested substitution provides specified warranty.
 - g. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.
- B. Substitutions for Convenience: Not allowed .

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 25 00

SECTION 01 26 00 - CONTRACT MODIFICATION PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes administrative and procedural requirements for handling and processing Contract modifications.

1.2 MINOR CHANGES IN THE WORK

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

1.3 PROPOSAL REQUESTS

- A. Owner-Initiated Proposal Requests: Architect will issue a detailed description of proposed changes in the Work that may require adjustment to the Contract Sum or the Contract Time. If necessary, the description will include supplemental or revised Drawings and Specifications.
 - 1. Work Change Proposal Requests issued by Architect are not instructions either to stop work in progress or to execute the proposed change.
 - 2. Within 20 days, when not otherwise specified after receipt of Proposal Request, submit a quotation estimating cost adjustments to the Contract Sum and the Contract Time necessary to execute the change.
 - a. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
 - b. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
 - c. Include costs of labor and supervision directly attributable to the change.
 - d. Include an updated Contractor's construction schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
 - e. Quotation Form: Use CSI Form 13.6D, "Proposal Worksheet Summary," and Form 13.6C, "Proposal Worksheet Detail." or forms acceptable to Architect.
- B. Contractor-Initiated Work Change Proposals: If latent or changed conditions require modifications to the Contract, Contractor may initiate a claim by submitting a request for a change to Architect.
 - 1. Include a statement outlining reasons for the change and the effect of the change on the Work. Provide a complete description of the proposed change. Indicate the effect of the proposed change on the Contract Sum and the Contract Time.
 - 2. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
 - 3. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
 - 4. Include costs of labor and supervision directly attributable to the change.
 - 5. Include an updated Contractor's construction schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.

6. Comply with requirements in Section 01 25 00 "Substitution Procedures" if the proposed change requires substitution of one product or system for product or system specified.
7. Work Change Proposal Request Form: Use CSI Form 13.6A, "Change Order Request (Proposal)," with attachments CSI Form 13.6D, "Proposal Worksheet Summary," and Form 13.6C, "Proposal Worksheet Detail." or a form acceptable to Architect.

1.4 ADMINISTRATIVE CHANGE ORDERS

- A. Allowance Adjustment: See Section 01 21 00 "Allowances" for administrative procedures for preparation of Change Order Proposal for adjusting the Contract Sum to reflect actual costs of allowances.

1.5 CHANGE ORDER PROCEDURES

- A. On Owner's approval of a Work Changes Proposal Request, Architect will issue a Change Order for signatures of Owner and Contractor on a Change Order form provided by the Architect.

1.6 CONSTRUCTION CHANGE DIRECTIVE

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

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 26 00

SECTION 01 29 00 - PAYMENT PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes administrative and procedural requirements necessary to prepare and process Applications for Payment.
- B. Related Requirements:
 - 1. Section 01 21 00 "Allowances" for procedural requirements governing the handling and processing of allowances.
 - 2. Section 01 26 00 "Contract Modification Procedures" for administrative procedures for handling changes to the Contract.

1.2 SCHEDULE OF VALUES

- A. Coordination: Coordinate preparation of the schedule of values with preparation of Contractor's construction schedule.
 - 1. Coordinate line items in the schedule of values with other required administrative forms and schedules, including the following:
 - a. Application for Payment forms with continuation sheets.
 - b. Submittal schedule.
 - c. Items required to be indicated as separate activities in Contractor's construction schedule.
 - 2. Submit the schedule of values to Architect at earliest possible date but no later than seven days before the date scheduled for submittal of initial Applications for Payment.
- B. Format and Content: Use Project Manual table of contents as a guide to establish line items for the schedule of values. Provide at least one line item for each Specification Section.
 - 1. Identification: Include the following Project identification on the schedule of values:
 - a. Project name and location.
 - b. Name of Architect.
 - c. Architect's project number.
 - d. Contractor's name and address.
 - e. Date of submittal.
 - 2. Arrange schedule of values consistent with format of AIA Document G703.
 - 3. Round amounts to nearest whole dollar; total shall equal the Contract Sum.
 - 4. Provide a separate line item in the schedule of values for each part of the Work where Applications for Payment may include materials or equipment purchased or fabricated and stored, but not yet installed.
 - a. Differentiate between items stored on-site and items stored off-site. If specified, include evidence of insurance or bonded warehousing.
 - 5. Allowances: Provide a separate line item in the schedule of values for each allowance. Show line-item value of unit-cost allowances, as a product of the unit cost, multiplied by measured quantity. Use information indicated in the Contract Documents to determine quantities.
 - 6. Each item in the schedule of values and Applications for Payment shall be complete. Include total cost and proportionate share of general overhead and profit for each item.
 - a. Temporary facilities and other major cost items that are not direct cost of actual work-in-place may be shown either as separate line items in the schedule of values or distributed as general overhead expense, at Contractor's option.

7. Schedule Updating: Update and resubmit the schedule of values before the next Applications for Payment when Change Orders or Construction Change Directives result in a change in the Contract Sum.

1.3 APPLICATIONS FOR PAYMENT

- A. Each Application for Payment shall be consistent with previous applications and payments as certified by Architect and paid for by Owner.
 1. Initial Application for Payment, Application for Payment at time of Substantial Completion, and final Application for Payment involve additional requirements.
- B. Payment Application Times: Submit Application for Payment to Architect by the day of the month agreed upon with the Owner. The period covered by each Application for Payment is one month, ending on the agreed upon day of month.
- C. Application for Payment Forms: Use AIA Document G702 and AIA Document G703 as form for Applications for Payment.
- D. Application Preparation: Complete every entry on form. Notarize and execute by a person authorized to sign legal documents on behalf of Contractor. Architect will return incomplete applications without action.
 1. Entries shall match data on the schedule of values and Contractor's construction schedule. Use updated schedules if revisions were made.
 2. Include amounts of Change Orders, Work Change Directives and Construction Change Directives issued before last day of construction period covered by application.
- E. Transmittal: Submit three signed and notarized original copies of each Application for Payment to Architect by a method ensuring receipt within 24 hours. One copy shall include waivers of lien and similar attachments if required.
 1. Transmit each copy with a transmittal form listing attachments and recording appropriate information about application.
- F. Initial Application for Payment: Administrative actions and submittals that must precede or coincide with submittal of first Application for Payment include the following:
 1. List of subcontractors.
 2. Schedule of values.
 3. Contractor's construction schedule (preliminary if not final).
 4. Schedule of unit prices.
 5. Submittal schedule (preliminary if not final).
 6. List of Contractor's staff assignments.
 7. List of Contractor's principal consultants.
 8. Copies of building permits.
 9. Copies of authorizations and licenses from authorities having jurisdiction for performance of the Work.
 10. Initial progress report.
 11. Report of preconstruction conference.
 12. Certificates of insurance and insurance policies.
- G. Application for Payment at Substantial Completion: After Architect issues the Certificate of Substantial Completion, submit an Application for Payment showing 100 percent completion for portion of the Work claimed as substantially complete.
 1. Include documentation supporting claim that the Work is substantially complete and a statement showing an accounting of changes to the Contract Sum.
 2. This application shall reflect Certificates of Partial Substantial Completion issued previously for Owner occupancy of designated portions of the Work.

- H. Final Payment Application: After completing Project closeout requirements, submit final Application for Payment with releases and supporting documentation not previously submitted and accepted, including, but not limited, to the following:
1. Evidence of completion of Project closeout requirements.
 2. Insurance certificates for products and completed operations where required and proof that taxes, fees, and similar obligations were paid.
 3. Updated final statement, accounting for final changes to the Contract Sum.
 4. AIA Document G706-1994, "Contractor's Affidavit of Payment of Debts and Claims."
 5. AIA Document G706A-1994, "Contractor's Affidavit of Release of Liens."
 6. AIA Document G707-1994, "Consent of Surety to Final Payment."
 7. Evidence that claims have been settled.
 8. Final liquidated damages settlement statement.
 9. Releases from the public agencies from which permits have been obtained for Work under this agreement.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 29 00

SECTION 01 31 00 - PROJECT MANAGEMENT AND COORDINATION

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes administrative provisions for coordinating construction operations on Project including, but not limited to, the following:
 - 1. Requests for Information (RFIs).
 - 2. Project Web site.
 - 3. Project meetings.
- B. Related Requirements:
 - 1. Section 01 73 00 "Execution" for procedures for coordinating general installation and field-engineering services, including establishment of benchmarks and control points.

1.2 DEFINITIONS

- A. RFI: Request from Contractor seeking information required by or clarifications of the Contract Documents.

1.3 INFORMATIONAL SUBMITTALS

- A. Subcontract List: Prepare a written summary identifying individuals or firms proposed for each portion of the Work. Use CSI Form 1.5A or similar. Include the following information in tabular form:
 - 1. Name, address, and telephone number of entity performing subcontract or supplying products.

1.4 GENERAL COORDINATION PROCEDURES

- A. Coordination: Coordinate construction operations included in different Sections of the Specifications to ensure efficient and orderly installation of each part of the Work. Coordinate construction operations, included in different Sections that depend on each other for proper installation, connection, and operation.
 - 1. Schedule construction operations in sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.
 - 2. Coordinate installation of different components to ensure maximum performance and accessibility for required maintenance, service, and repair.
 - 3. Make adequate provisions to accommodate items scheduled for later installation.
- B. Prepare memoranda for distribution to each party involved, outlining special procedures required for coordination. Include such items as required notices, reports, and list of attendees at meetings.
 - 1. Prepare similar memoranda for Owner and separate contractors if coordination of their Work is required.
- C. Coordination with Owner and other contractors: The Owner may have construction projects occurring within or adjacent to the project limits during the life of this contract. Coordinate construction with all such projects that may be ongoing in the vicinity. Where the Contractor's work affects the operation of the Owner's utilities, coordinate work with the Owner. Contact Owner's representative. Give at least 48 hours of notice to the Owner in order to schedule

activities such as valve operation, hydrant operation, sewer and structure cleanout, and similar items of work. No claim for extra compensation or adjustments in the contract prices will be allowed on account of delay or failure of others to complete the work scheduled.

1.5 REQUESTS FOR INFORMATION (RFIs)

- A. General: Immediately on discovery of the need for additional information or interpretation of the Contract Documents, Contractor shall prepare and submit an RFI in the form specified.
 - 1. Architect will return RFIs submitted to Architect by other entities controlled by Contractor with no response.
 - 2. Coordinate and submit RFIs in a prompt manner so as to avoid delays in Contractor's work or work of subcontractors.
- B. Content of the RFI: Include a detailed, legible description of item needing information or interpretation and the following:
 - 1. Project name.
 - 2. Project number.
 - 3. Date.
 - 4. Name of Contractor.
 - 5. Name of Architect
 - 6. RFI number, numbered sequentially.
 - 7. RFI subject.
 - 8. Specification Section number and title and related paragraphs, as appropriate.
 - 9. Drawing number and detail references, as appropriate.
 - 10. Field dimensions and conditions, as appropriate.
 - 11. Contractor's suggested resolution. If Contractor's solution(s) impacts the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.
 - 12. Contractor's signature.
 - 13. Attachments: Include sketches, descriptions, measurements, photos, Product Data, Shop Drawings, coordination drawings, and other information necessary to fully describe items needing interpretation.
 - 14. Space for Architect's response.
- C. RFI Forms: Soft-ware generated form with substantially the same content as indicated above, acceptable to Architect.
- D. Architect's Action: Architect will review each RFI, determine action required, and respond. Allow seven working days for Architect's response for each RFI. RFIs received by Architect after 1:00 p.m. will be considered as received the following working day.
 - 1. The following RFIs will be returned without action:
 - a. Requests for approval of submittals.
 - b. Requests for approval of substitutions.
 - c. Requests for coordination information already indicated in the Contract Documents.
 - d. Requests for adjustments in the Contract Time or the Contract Sum.
 - e. Requests for interpretation of Architect's actions on submittals.
 - f. Incomplete RFIs or inaccurately prepared RFIs.
 - 2. Architect's action may include a request for additional information, in which case Architect's time for response will date from time of receipt of additional information.
 - 3. Architect's action on RFIs that may result in a change to the Contract Time or the Contract Sum may be eligible for Contractor to submit Change Proposal according to Section 01 26 00 "Contract Modification Procedures."
 - a. If Contractor believes the RFI response warrants change in the Contract Time or the Contract Sum, notify Architect in writing within 10 days of receipt of the RFI response.

- E. RFI Log: Prepare, maintain, and submit a tabular log of RFIs organized by the RFI number. Submit log at each construction progress meeting. Use CSI Log Form 13.2B or similar form. Include the following:
1. Project name.
 2. Name and address of Contractor.
 3. Name and address of Architect.
 4. RFI number including RFIs that were dropped and not submitted.
 5. RFI description.
 6. Date the RFI was submitted.
 7. Date Architect's response was received.
- F. On receipt of Architect's action, update the RFI log and immediately distribute the RFI response to affected parties. Review response and notify Architect's within seven days if Contractor disagrees with response.
1. Identification of related Minor Change in the Work, Construction Change Directive, and Proposal Request, as appropriate.

1.6 PROJECT MEETINGS

- A. General: Schedule and conduct meetings and conferences at Project site unless otherwise indicated.
1. Attendees: Inform participants and others involved, and individuals whose presence is required, of date and time of each meeting. Notify Owner and Architect of scheduled meeting dates and times.
 2. Agenda: Prepare the meeting agenda. Distribute the agenda to all invited attendees.
 3. Minutes: record significant discussions and agreements achieved. Distribute the meeting minutes to everyone concerned, including Owner and Architect, within three days of the meeting.
- B. Preconstruction Conference: Schedule and conduct a preconstruction conference before starting construction, at a time convenient to Owner and Architect, but no later than 15 days after execution of the Agreement.
1. Attendees: Authorized representatives of Owner, Architect; Contractor and its superintendent; major subcontractors; and other concerned parties shall attend the conference. Participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
 2. Agenda: Discuss items of significance that could affect progress, including the following:
 - a. Tentative construction schedule.
 - b. Critical work sequencing and long-lead items.
 - c. Designation of key personnel and their duties.
 - d. Procedures for processing field decisions and Change Orders.
 - e. Procedures for RFIs.
 - f. Procedures for testing and inspecting.
 - g. Procedures for processing Applications for Payment.
 - h. Distribution of the Contract Documents.
 - i. Submittal procedures.
 - j. Preparation of record documents.
 - k. Use of the premises
 - l. Work restrictions.
 - m. Working hours.
 - n. Owner's occupancy requirements.
 - o. Responsibility for temporary facilities and controls.
 - p. Parking availability.
 - q. Office, work, and storage areas.
 - r. Equipment deliveries and priorities.

- s. Security.
 - t. Progress cleaning.
 - 3. Minutes: Entity responsible for conducting meeting will record and distribute meeting minutes.
- C. Preinstallation Conferences: Conduct a preinstallation conference at Project site before each construction activity that requires coordination with other construction.
- 1. Attendees: Installer and representatives of manufacturers and fabricators involved in or affected by the installation and its coordination or integration with other materials and installations that have preceded or will follow, shall attend the meeting. Advise Architect of scheduled meeting dates.
 - 2. Agenda: Review progress of other construction activities and preparations for the particular activity under consideration, including requirements for the following:
 - a. Contract Documents.
 - b. Options.
 - c. Related RFIs.
 - d. Related Change Orders.
 - e. Submittals.
 - f. Review of mockups.
 - g. Possible conflicts.
 - h. Compatibility problems.
 - i. Time schedules.
 - j. Weather limitations.
 - k. Manufacturer's written instructions.
 - l. Warranty requirements.
 - m. Compatibility of materials.
 - n. Acceptability of substrates.
 - o. Temporary facilities and controls.
 - p. Space and access limitations.
 - q. Regulations of authorities having jurisdiction.
 - r. Testing and inspecting requirements.
 - s. Installation procedures.
 - t. Coordination with other work.
 - u. Required performance results.
 - v. Protection of adjacent work.
 - w. Protection of construction and personnel.
 - 3. Record significant conference discussions, agreements, and disagreements, including required corrective measures and actions.
 - 4. Reporting: Distribute minutes of the meeting to each party present and to other parties requiring information.
 - 5. Do not proceed with installation if the conference cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of the Work and reconvene the conference at earliest feasible date.
- D. Progress Meetings: Conduct progress meetings at twice monthly intervals.
- 1. Attendees: In addition to representatives of Owner and Architect, each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the meeting shall be familiar with Project and authorized to conclude matters relating to the Work.
 - 2. Agenda: Review and correct or approve minutes of previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.
 - a. Contractor's Construction Schedule: Review progress since the last meeting. Determine whether each activity is on time, ahead of schedule, or behind schedule, in relation to

Contractor's construction schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.

- 1) Review schedule for next period.
- b. Review present and future needs of each entity present, including the following:
 - 1) Interface requirements.
 - 2) Sequence of operations.
 - 3) Status of submittals.
 - 4) Deliveries.
 - 5) Off-site fabrication.
 - 6) Access.
 - 7) Site utilization.
 - 8) Temporary facilities and controls.
 - 9) Progress cleaning.
 - 10) Quality and work standards.
 - 11) Status of correction of deficient items.
 - 12) Field observations.
 - 13) Status of RFIs.
 - 14) Status of proposal requests.
 - 15) Pending changes.
 - 16) Status of Change Orders.
 - 17) Pending claims and disputes.
 - 18) Documentation of information for payment requests.
3. Minutes: Contractor will record and distribute the meeting minutes to each party present and to parties requiring information.
 - a. Schedule Updating: Revise Contractor's construction schedule after each progress meeting where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with the report of each meeting.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 31 00

SECTION 01 33 00 - SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes requirements for the submittal schedule and administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other submittals.
- B. Related Requirements:
 - 1. Section 01 29 00 "Payment Procedures" for submitting Applications for Payment and the schedule of values.
 - 2. Section 01 31 00 "Project Management and Coordination" for submitting coordination drawings and subcontract list and for requirements for web-based Project software.
 - 3. Section 01 32 00 "Construction Progress Documentation" for submitting schedules and reports, including Contractor's construction schedule.
 - 4. Section 01 40 00 "Quality Requirements" for submitting test and inspection reports, and schedule of tests and inspections.
 - 5. Section 01 77 00 "Closeout Procedures" for submitting closeout submittals and maintenance material submittals.
 - 6. Section 01 78 23 "Operation and Maintenance Data" for submitting operation and maintenance manuals.
 - 7. Section 01 78 39 "Project Record Documents" for submitting record Drawings, record Specifications, and record Product Data.

1.2 DEFINITIONS

- A. Action Submittals: Written and graphic information and physical samples that require Architect's responsive action.
- B. Informational Submittals: Written and graphic information and physical samples that do not require Architect's responsive action. Submittals may be rejected for not complying with requirements.

1.3 SUBMITTALS SCHEDULE

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

1.4 SUBMITTAL ADMINISTRATIVE REQUIREMENTS

- A. Architect's Digital Data Files: Electronic copies of digital data files of the Contract Drawings can be provided by Architect for Contractor's use in preparing submittals. Request for and release of documents to be coordinated during submittal schedule.
- B. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.
 - 1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.

2. Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.
 - a. Architect reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.
- C. Processing Time: Allow time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Architect's receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.
1. Initial Review: Allow 15 days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. Architect will advise Contractor when a submittal being processed must be delayed for coordination.
 2. Intermediate Review: If intermediate submittal is necessary, process it in same manner as initial submittal.
 3. Resubmittal Review: Allow 15 days for review of each resubmittal.
- D. Electronic Submittals: Identify and incorporate information in each electronic submittal file as follows:
1. Assemble complete submittal package into a single indexed file incorporating submittal requirements of a single Specification Section and transmittal form with links enabling navigation to each item.
 2. Name file with submittal number or other unique identifier, including revision identifier.
 - a. File name shall use Specification Section number followed by an underscore and then a sequential number followed by descriptor (e.g., 061000_01_Engineered Wood.pdf). Resubmittals shall include an alphabetic suffix after another decimal point (e.g., 061000_01_A_Engineered Wood.pdf).
 3. Provide means for insertion to permanently record Contractor's review and approval markings and action taken by Architect.
 4. Transmittal Form for Electronic Submittals: Use electronic form acceptable to Owner, containing the following information:
 - a. Project name.
 - b. Date.
 - c. Name and address of Architect.
 - d. Name of Construction Manager.
 - e. Name of Contractor.
 - f. Name of firm or entity that prepared submittal.
 - g. Names of subcontractor, manufacturer, and supplier.
 - h. Category and type of submittal.
 - i. Submittal purpose and description.
 - j. Specification Section number and title.
 - k. Specification paragraph number or drawing designation and generic name for each of multiple items.
 - l. Drawing number and detail references, as appropriate.
 - m. Location(s) where product is to be installed, as appropriate.
 - n. Related physical samples submitted directly.
 - o. Indication of full or partial submittal.
 - p. Transmittal number, numbered consecutively.
 - q. Submittal and transmittal distribution record.
 - r. Other necessary identification.
 - s. Remarks.
- E. Options: Identify options requiring selection by Architect.
- F. Deviations: Identify deviations from the Contract Documents on submittals.

- G. Resubmittals: Make resubmittals in same form and number of copies as initial submittal.
 - 1. Note date and content of previous submittal.
 - 2. Note date and content of revision in label or title block and clearly indicate extent of revision.
 - 3. Resubmit submittals until they are marked with approval notation from Architect's action stamp.
- H. Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, installers, authorities having jurisdiction, and others as necessary for performance of construction activities. Show distribution on transmittal forms.
- I. Use for Construction: Retain complete copies of submittals on Project site. Use only final action submittals that are marked with approval notation from Architect's action stamp.

PART 2 - PRODUCTS

2.1 SUBMITTAL PROCEDURES

- A. General Submittal Procedure Requirements:
 - 1. Post electronic submittals as PDF electronic files directly to Project Web site specifically established for Project.
 - a. Architect will return annotated file.
 - 2. Certificates and Certifications Submittals: Provide a statement that includes signature of entity responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity.
 - a. Provide a digital signature with digital certificate on electronically-submitted certificates and certifications where indicated.
 - b. Provide a notarized statement on original paper copy certificates and certifications where indicated.
- B. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.
 - 1. If information must be specially prepared for submittal because standard published data are not suitable for use, submit as Shop Drawings, not as Product Data.
 - 2. Mark each copy of each submittal to show which products and options are applicable.
 - 3. Include the following information, as applicable:
 - a. Manufacturer's catalog cuts.
 - b. Manufacturer's product specifications.
 - c. Standard color charts.
 - d. Statement of compliance with specified referenced standards.
 - e. Testing by recognized testing agency.
 - f. Application of testing agency labels and seals.
 - g. Notation of coordination requirements.
 - h. Availability and delivery time information.
 - 4. For equipment, include the following in addition to the above, as applicable:
 - a. Wiring diagrams showing factory-installed wiring.
 - b. Printed performance curves.
 - c. Operational range diagrams.
 - d. Clearances required to other construction, if not indicated on accompanying Shop Drawings.
 - 5. Submit Product Data before or concurrent with Samples.
 - 6. Submit Product Data in the following format:
 - a. PDF electronic file.

- C. Shop Drawings: Prepare Project-specific information, drawn accurately to scale.
1. Preparation: Fully illustrate requirements in the Contract Documents. Include the following information, as applicable:
 - a. Identification of products.
 - b. Schedules.
 - c. Compliance with specified standards.
 - d. Notation of coordination requirements.
 - e. Notation of dimensions established by field measurement.
 - f. Relationship and attachment to adjoining construction clearly indicated.
 - g. Seal and signature of professional engineer if specified.
 2. Sheet Size: Except for templates, patterns, and similar full-size drawings, submit Shop Drawings on sheets at least 8-1/2 by 11 inches, but no larger than 30 by 42 inches. Text shall be readable on the size of the drawing provided.
 3. Submit Shop Drawings in the following format:
 - a. PDF electronic file.
- D. Samples: Submit Samples for review of kind, color, pattern, and texture for a check of these characteristics with other elements and for a comparison of these characteristics between submittal and actual component as delivered and installed.
1. Transmit Samples that contain multiple, related components such as accessories together in one submittal package.
 2. Identification: Attach label on unexposed side of Samples that includes the following:
 - a. Generic description of Sample.
 - b. Product name and name of manufacturer.
 - c. Sample source.
 - d. Number and title of applicable Specification Section.
 3. For projects where electronic submittals are required, provide corresponding electronic submittal of Sample transmittal, digital image file illustrating Sample characteristics, and identification information for record.
 4. Disposition: Maintain sets of approved Samples at Project site, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.
 - a. Samples that may be incorporated into the Work are indicated in individual Specification Sections. Such Samples must be in an undamaged condition at time of use.
 - b. Samples not incorporated into the Work, or otherwise designated as Owner's property, are the property of Contractor.
 5. Samples for Initial Selection: Submit manufacturer's color charts consisting of units or sections of units showing the full range of colors, textures, and patterns available.
 - a. Number of Samples: Submit one full set(s) of available choices where color, pattern, texture, or similar characteristics are required to be selected from manufacturer's product line. Architect will return submittal with options selected.
 6. Samples for Verification: Submit full-size units or Samples of size indicated, prepared from same material to be used for the Work, cured and finished in manner specified, and physically identical with material or product proposed for use, and that show full range of color and texture variations expected. Samples include, but are not limited to, the following: partial sections of manufactured or fabricated components; small cuts or containers of materials; complete units of repetitively used materials; swatches showing color, texture, and pattern; color range sets; and components used for independent testing and inspection.
 - a. Number of Samples: Submit two sets of Samples. Architect will retain one Sample sets; remainder will be returned.
 - 1) If variation in color, pattern, texture, or other characteristic is inherent in material or product represented by a Sample, submit at least three sets of paired units that show approximate limits of variations.

- E. Product Schedule: As required in individual Specification Sections, prepare a written summary indicating types of products required for the Work and their intended location. Include the following information in tabular form:
 - 1. Submit product schedule in the following format:
 - a. PDF electronic file.
- F. Coordination Drawings Submittals: Comply with requirements specified in Section 01 31 00 "Project Management and Coordination."
- G. Qualification Data: Prepare written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, contact information of Architects and owners, and other information specified.
- H. Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements in the Contract Documents. Submit record of Welding Procedure Specification and Procedure Qualification Record on AWS forms. Include names of firms and personnel certified.
- I. Installer Certificates: Submit written statements on manufacturer's letterhead certifying that Installer complies with requirements in the Contract Documents and, where required, is authorized by manufacturer for this specific Project.
- J. Manufacturer Certificates: Submit written statements on manufacturer's letterhead certifying that manufacturer complies with requirements in the Contract Documents. Include evidence of manufacturing experience where required.
- K. Product Certificates: Submit written statements on manufacturer's letterhead certifying that product complies with requirements in the Contract Documents.
- L. Material Certificates: Submit written statements on manufacturer's letterhead certifying that material complies with requirements in the Contract Documents.
- M. Material Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements in the Contract Documents.
- N. Product Test Reports: Submit written reports indicating that current product produced by manufacturer complies with requirements in the Contract Documents. Base reports on evaluation of tests performed by manufacturer and witnessed by a qualified testing agency, or on comprehensive tests performed by a qualified testing agency.
- O. Research Reports: Submit written evidence, from a model code organization acceptable to authorities having jurisdiction, that product complies with building code in effect for Project.
- P. Preconstruction Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of tests performed before installation of product, for compliance with performance requirements in the Contract Documents.
- Q. Compatibility Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of compatibility tests performed before installation of product. Include written recommendations for primers and substrate preparation needed for adhesion.

- R. Field Test Reports: Submit written reports indicating and interpreting results of field tests performed either during installation of product or after product is installed in its final location, for compliance with requirements in the Contract Documents.
- S. Design Data: Prepare and submit written and graphic information, including, but not limited to, performance and design criteria, list of applicable codes and regulations, and calculations. Include list of assumptions and other performance and design criteria and a summary of loads. Include load diagrams if applicable. Provide name and version of software, if any, used for calculations. Include page numbers.

PART 3 - EXECUTION

3.1 CONTRACTOR'S REVIEW

- A. Action and Informational Submittals: Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Architect.
- B. Approval Stamp: Stamp each submittal with a uniform, approval stamp. Include Project name and location, submittal number, Specification Section title and number, name of reviewer, date of Contractor's approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents.

3.2 DESIGN PROFESSIONAL'S ACTION

- A. General: Architect will not review submittals that do not bear Contractor's approval stamp and will return them without action.
- B. Action Submittals: Architect will review each submittal, make marks to indicate corrections or revisions required, and return it. Architect will stamp each submittal with an action stamp and will mark stamp appropriately to indicate action, as follows:
 - 1. Approved.
 - 2. Rejected.
 - 3. Approved as Noted
 - 4. Revise and Resubmit.
 - 5. Submit Specified Item.
 - 6. Acknowledge Receipt.
- C. Informational Submittals: Architect will review each submittal and will not return it, or will return it if it does not comply with requirements. Architect will forward each submittal to appropriate party.
- D. Incomplete submittals are unacceptable, will be considered nonresponsive, and will be returned for resubmittal without review.
- E. Submittals not required by the Contract Documents may not be reviewed and may be discarded or returned to Contractor marked "Not Required For Review."

END OF SECTION 01 33 00

SECTION 01 40 00 - QUALITY REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes administrative and procedural requirements for quality assurance and quality control.
- B. Testing and inspecting services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with the Contract Document requirements.
 - 1. Specified tests, inspections, and related actions do not limit Contractor's other quality-assurance and -control procedures that facilitate compliance with the Contract Document requirements.
 - 2. Requirements for Contractor to provide quality-assurance and -control services required by Architect, Owner, or authorities having jurisdiction are not limited by provisions of this Section.
 - 3. Specific test and inspection requirements are not specified in this Section.

1.2 DEFINITIONS

- A. Quality-Assurance Services: Activities, actions, and procedures performed before and during execution of the Work to guard against defects and deficiencies and substantiate that proposed construction will comply with requirements.
- B. Quality-Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work to evaluate that actual products incorporated into the Work and completed construction comply with requirements. Services do not include contract enforcement activities performed by Architect.
- C. Mockups: Full-size physical assemblies that are constructed on-site. Mockups are constructed to verify selections made under Sample submittals; to demonstrate aesthetic effects and, where indicated, qualities of materials and execution; to review coordination, testing, or operation; to show interface between dissimilar materials; and to demonstrate compliance with specified installation tolerances. Mockups are not Samples. Unless otherwise indicated, approved mockups establish the standard by which the Work will be judged.
 - 1. Laboratory Mockups: Full-size physical assemblies constructed at testing facility to verify performance characteristics.
- D. Preconstruction Testing: Tests and inspections performed specifically for Project before products and materials are incorporated into the Work, to verify performance or compliance with specified criteria.
- E. Product Testing: Tests and inspections that are performed by an NRTL, an NVLAP, or a testing agency qualified to conduct product testing and acceptable to authorities having jurisdiction, to establish product performance and compliance with specified requirements.
- F. Source Quality-Control Testing: Tests and inspections that are performed at the source, e.g., plant, mill, factory, or shop.
- G. Field Quality-Control Testing: Tests and inspections that are performed on-site for installation of the Work and for completed Work.

- H. Testing Agency: An entity engaged to perform specific tests, inspections, or both. Testing laboratory shall mean the same as testing agency.
- I. Installer/Applicator/Erector: Contractor or another entity engaged by Contractor as an employee, Subcontractor, or Sub-subcontractor, to perform a particular construction operation, including installation, erection, application, and similar operations.
 - 1. Use of trade-specific terminology in referring to a trade or entity does not require that certain construction activities be performed by accredited or unionized individuals, or that requirements specified apply exclusively to specific trade(s).
- J. Experienced: When used with an entity or individual, "experienced" means having successfully completed a minimum of five previous projects similar in nature, size, and extent to this Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.

1.3 REGULATORY

- A. Public Agency Requirements: It is the intention of these specifications to construct all work in accordance with the applicable requirements of the Owner, the City of Troy Building Department, the contract specifications, and the contract drawings. Where there is a conflict between any of the aforementioned specifications, and the permit requirements for the agency having jurisdiction, the more restrictive shall govern.

1.4 CONFLICTING REQUIREMENTS

- A. Referenced Standards: If compliance with two or more standards is specified and the standards establish different or conflicting requirements for minimum quantities or quality levels, comply with the most stringent requirement. Refer conflicting requirements that are different, but apparently equal, to Architect for a decision before proceeding.
- B. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of requirements. Refer uncertainties to Architect for a decision before proceeding.

1.5 INFORMATIONAL SUBMITTALS

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

1.6 REPORTS AND DOCUMENTS

- A. Test and Inspection Reports: Prepare and submit certified written reports specified in other Sections. Include the following:
 - 1. Date of issue.
 - 2. Project title and number.
 - 3. Name, address, and telephone number of testing agency.
 - 4. Dates and locations of samples and tests or inspections.
 - 5. Names of individuals making tests and inspections.
 - 6. Description of the Work and test and inspection method.
 - 7. Identification of product and Specification Section.
 - 8. Complete test or inspection data.

9. Test and inspection results and an interpretation of test results.
 10. Record of temperature and weather conditions at time of sample taking and testing and inspecting.
 11. Comments or professional opinion on whether tested or inspected Work complies with the Contract Document requirements.
 12. Name and signature of laboratory inspector.
 13. Recommendations on retesting and reinspecting.
- B. Manufacturer's Technical Representative's Field Reports: Prepare written information documenting tests and inspections specified in other Sections. Include the following:
1. Name, address, and telephone number of representative making report.
 2. Statement on condition of substrates and their acceptability for installation of product.
 3. Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.
 4. Results of operational and other tests and a statement of whether observed performance complies with requirements.
 5. Other required items indicated in individual Specification Sections.
- C. Permits, Licenses, and Certificates: For Owner's records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, correspondence, records, and similar documents, established for compliance with standards and regulations bearing on performance of the Work.

1.7 QUALITY ASSURANCE

- A. General: Qualifications paragraphs in this article establish the minimum qualification levels required; individual Specification Sections specify additional requirements.
- B. Manufacturer Qualifications: A firm experienced in manufacturing products or systems similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
- C. Fabricator Qualifications: A firm experienced in producing products similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
- D. Installer Qualifications: A firm or individual experienced in installing, erecting, or assembling work similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.
- E. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of the system, assembly, or product that are similar in material, design, and extent to those indicated for this Project.
- F. Specialists: Certain Specification Sections require that specific construction activities shall be performed by entities who are recognized experts in those operations. Specialists shall satisfy qualification requirements indicated and shall be engaged for the activities indicated.
1. Requirements of authorities having jurisdiction shall supersede requirements for specialists.
- G. Testing Agency Qualifications: An NRTL, an NVLAP, or an independent agency with the experience and capability to conduct testing and inspecting indicated, as documented according to ASTM E 329; and with additional qualifications specified in individual Sections; and, where required by authorities having jurisdiction, that is acceptable to authorities.

1. NRTL: A nationally recognized testing laboratory according to 29 CFR 1910.7.
2. NVLAP: A testing agency accredited according to NIST's National Voluntary Laboratory Accreditation Program.

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

I. Preconstruction Testing: Where testing agency is indicated to perform preconstruction testing for compliance with specified requirements for performance and test methods, comply with the following:

1. Contractor responsibilities include the following:
 - a. Provide test specimens representative of proposed products and construction.
 - b. Submit specimens in a timely manner with sufficient time for testing and analyzing results to prevent delaying the Work.
 - c. Build laboratory mockups at testing facility using personnel, products, and methods of construction indicated for the completed Work.
 - d. When testing is complete, remove test specimens, assemblies, mockups, and laboratory mockups; do not reuse products on Project.
2. Testing Agency Responsibilities: Submit a certified written report of each test, inspection, and similar quality-assurance service to **Architect**, with copy to Contractor. Interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from the Contract Documents.

J. Mockups: Before installing portions of the Work requiring mockups, build mockups for each form of construction and finish required to comply with the following requirements, using materials indicated for the completed Work:

1. Build mockups in location and of size indicated or, if not indicated, as directed by Architect.
2. Notify Architect seven days in advance of dates and times when mockups will be constructed.
3. Demonstrate the proposed range of aesthetic effects and workmanship.
4. Obtain Architect's approval of mockups before starting work, fabrication, or construction.
 - a. Allow seven days for initial review and each re-review of each mockup.
5. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
6. Demolish and remove mockups when directed unless otherwise indicated.

K. Laboratory Mockups: Comply with requirements of preconstruction testing and those specified in individual Specification Sections.

1.8 QUALITY CONTROL

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

1. Owner will furnish Contractor with names, addresses, and telephone numbers of testing agencies engaged and a description of types of testing and inspecting they are engaged to perform.
2. Costs for retesting and reinspecting construction that replaces or is necessitated by work that failed to comply with the Contract Documents will be charged to Contractor and the Contract Sum will be adjusted by Change Order.

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

1. Where services are indicated as Contractor's responsibility, engage a qualified testing agency to perform these quality-control services.
 - a. Contractor shall not employ same entity engaged by Owner, unless agreed to in writing by Owner.
 2. Notify testing agencies at least 24 hours in advance of time when Work that requires testing or inspecting will be performed.
 3. Where quality-control services are indicated as Contractor's responsibility, submit a certified written report, in duplicate, of each quality-control service.
 4. Testing and inspecting requested by Contractor and not required by the Contract Documents are Contractor's responsibility.
 5. Submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.
- C. Manufacturer's Field Services: Where indicated, engage a manufacturer's representative to observe and inspect the Work. Manufacturer's representative's services include examination of substrates and conditions, verification of materials, inspection of completed portions of the Work, and submittal of written reports.
- D. Retesting/Reinspecting: Regardless of whether original tests or inspections were Contractor's responsibility, provide quality-control services, including retesting and reinspecting, for construction that replaced Work that failed to comply with the Contract Documents.
- E. Testing Agency Responsibilities: Cooperate with Architect and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.
1. Notify Architect and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
 2. Determine the location from which test samples will be taken and in which in-situ tests are conducted.
 3. Conduct and interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from requirements.
 4. Submit a certified written report, in duplicate, of each test, inspection, and similar quality-control service through Contractor.
 5. Do not release, revoke, alter, or increase the Contract Document requirements or approve or accept any portion of the Work.
 6. Do not perform any duties of Contractor.
- F. Associated Contractor Services: Cooperate with agencies performing required tests, inspections, and similar quality-control services, and provide reasonable auxiliary services as requested. Notify agency sufficiently in advance of operations to permit assignment of personnel. Provide the following:
1. Access to the Work.
 2. Incidental labor and facilities necessary to facilitate tests and inspections.
 3. Adequate quantities of representative samples of materials that require testing and inspecting. Assist agency in obtaining samples.
 4. Facilities for storage and field curing of test samples.
 5. Delivery of samples to testing agencies.
 6. Preliminary design mix proposed for use for material mixes that require control by testing agency.
 7. Security and protection for samples and for testing and inspecting equipment at Project site.
- G. Coordination: Coordinate sequence of activities to accommodate required quality-assurance and -control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting.
1. Schedule times for tests, inspections, obtaining samples, and similar activities.

1.9 SPECIAL TESTS AND INSPECTIONS

- A. Special Tests and Inspections: Conducted by a qualified testing agency as required by authorities having jurisdiction, as indicated in individual Specification Sections and as follows:
1. Notifying Architect and Contractor promptly of irregularities and deficiencies observed in the Work during performance of its services.
 2. Submitting a certified written report of each test, inspection, and similar quality-control service to Architect with copy to Contractor and to authorities having jurisdiction.
 3. Submitting a final report of special tests and inspections at Substantial Completion, which includes a list of unresolved deficiencies.
 4. Interpreting tests and inspections and stating in each report whether tested and inspected work complies with or deviates from the Contract Documents.
 5. Retesting and re-inspecting corrected work.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 TEST AND INSPECTION LOG

- A. Test and Inspection Log: Prepare a record of tests and inspections. Include the following:
1. Date test or inspection was conducted.
 2. Description of the Work tested or inspected.
 3. Date test or inspection results were transmitted to Architect.
 4. Identification of testing agency or special inspector conducting test or inspection.
- B. Maintain log at Project site. Post changes and revisions as they occur. Provide access to test and inspection log for Architect reference during normal working hours.
1. Submit log at project closeout as part of the project record documents.

3.2 REPAIR AND PROTECTION

- A. General: On completion of testing, inspecting, sample taking, and similar services, repair damaged construction and restore substrates and finishes.
1. Provide materials and comply with installation requirements specified in other Specification Sections or matching existing substrates and finishes. Restore patched areas and extend restoration into adjoining areas with durable seams that are as invisible as possible. Comply with the Contract Document requirements for cutting and patching in Section 01 73 00 "Execution."
- B. Protect construction exposed by or for quality-control service activities.
- C. Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for quality-control services.

END OF SECTION 01 40 00

SECTION 01 50 00 - TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes requirements for temporary utilities, support facilities, and security and protection facilities.
- B. Related Requirements:
 - 1. Section 01 10 00 "Summary" for work restrictions and limitations on utility interruptions.

1.2 USE CHARGES

- A. General: Installation and removal of and use charges for temporary facilities shall be included in the Contract Sum unless otherwise indicated. Allow other entities to use temporary services and facilities without cost, including, but not limited to, Architect, testing agencies, and authorities having jurisdiction.
- B. Water and Sewer Service from Existing System: Water from Owner's existing water system is available for use without metering and without payment of use charges. Provide connections and extensions of services as required for construction operations.
- C. Electric Power Service from Existing System: Electric power from Owner's existing system is available for use without metering and without payment of use charges. Provide connections and extensions of services as required for construction operations.

1.3 INFORMATIONAL SUBMITTALS

- A. Site Plan: Show temporary facilities, utility hookups, staging areas, and parking areas for construction personnel. Refer to attached plan for limits of construction site available to contractor.
- B. Erosion and Sedimentation Control Plan: Show compliance with requirements of EPA Construction General Permit or authorities having jurisdiction, whichever is more stringent.
- C. Fire-Safety Program: Show compliance with requirements of NFPA 241 and authorities having jurisdiction. Indicate Contractor personnel responsible for management of fire prevention program.

1.4 QUALITY ASSURANCE

- A. Electric Service: Comply with NECA, NEMA, and UL standards and regulations for temporary electric service. Install service to comply with NFPA 70.
- B. Tests and Inspections: Arrange for authorities having jurisdiction to test and inspect each temporary utility before use. Obtain required certifications and permits.

1.5 PROJECT CONDITIONS

- A. Temporary Use of Permanent Facilities: Engage Installer of each permanent service to assume responsibility for operation, maintenance, and protection of each permanent service during its

use as a construction facility before Owner's acceptance, regardless of previously assigned responsibilities.

PART 2 - PRODUCTS

2.1 EQUIPMENT

- A. Fire Extinguishers: Portable, UL rated; with class and extinguishing agent as required by locations and classes of fire exposures.
- B. HVAC Equipment: Unless Owner authorizes use of permanent HVAC system, provide vented, self-contained, liquid-propane-gas or fuel-oil heaters with individual space thermostatic control.
 - 1. Use of gasoline-burning space heaters, open-flame heaters, or salamander-type heating units is prohibited.
 - 2. Heating Units: Listed and labeled for type of fuel being consumed, by a qualified testing agency acceptable to authorities having jurisdiction, and marked for intended location and application.
 - 3. Permanent HVAC System: If Owner authorizes use of permanent HVAC system for temporary use during construction, provide filter with MERV of 8 at each return-air grille in system and remove at end of construction and clean HVAC system as required in Section 01 77 00 "Closeout Procedures".

PART 3 - EXECUTION

3.1 TEMPORARY UTILITY INSTALLATION

- A. General: Install temporary service or connect to existing service.
 - 1. Arrange with utility company, Owner, and existing users for time when service can be interrupted, if necessary, to make connections for temporary services.
- B. Sewers and Drainage: Provide temporary utilities to remove effluent lawfully.
 - 1. Connect temporary sewers to municipal system as directed by authorities having jurisdiction.
- C. Water Service: Install water service and distribution piping in sizes and pressures adequate for construction.
- D. Water Service: Connect to Owner's existing water service facilities. Clean and maintain water service facilities in a condition acceptable to Owner. At Substantial Completion, restore these facilities to condition existing before initial use.
- E. Sanitary Facilities: Provide temporary toilets, wash facilities, and drinking water for use of construction personnel. Comply with requirements of authorities having jurisdiction for type, number, location, operation, and maintenance of fixtures and facilities.
 - 1. Toilets: Use of Owner's existing toilet facilities will not be permitted
- F. Heating and Cooling: Provide temporary heating and cooling required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of low temperatures or high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed.

- G. Ventilation and Humidity Control: Provide temporary ventilation required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed. Coordinate ventilation requirements to produce ambient condition required and minimize energy consumption.
- H. Electric Power Service: Connect to Owner's existing electric power service. Maintain equipment in a condition acceptable to Owner.
- I. Lighting: Provide temporary lighting with local switching that provides adequate illumination for construction operations, observations, inspections, and traffic conditions.
 - 1. Install and operate temporary lighting that fulfills security and protection requirements without operating entire system.

3.2 SUPPORT FACILITIES INSTALLATION

- A. Temporary Roads and Paved Areas: Construct and maintain temporary roads and paved areas adequate for construction operations. Locate temporary roads and paved areas within construction limits indicated on Drawings.
 - 1. Provide dust-control treatment that is nonpolluting and non-tracking. Reapply treatment as required to minimize dust.
 - 2. Protect existing site improvements to remain including curbs, pavement, and utilities.
 - 3. Maintain access for fire-fighting equipment and site access.
 - 4. Provisions for Local Traffic
 - a. During the progress of the work, accommodate both local vehicular and pedestrian traffic along the roads.
 - b. Maintain access to all residences and businesses.
 - c. The Contractor's truck and equipment operations on public streets shall be governed by all local traffic ordinances and regulations of the local fire and police departments, and the Owner.
- B. Parking: Use designated areas of Owner's existing parking indicated on drawings for construction personnel. Review additional required parking with Owner, if any required.
- C. Dewatering Facilities and Drains: Comply with requirements of authorities having jurisdiction. Maintain Project site, excavations, and construction free of water.
 - 1. Dispose of rainwater in a lawful manner that will not result in flooding Project or adjoining properties or endanger permanent Work or temporary facilities.
 - 2. Remove snow and ice as required to minimize accumulations.
- D. Waste Disposal Facilities: Provide waste-collection containers in sizes adequate to handle waste from construction operations. Comply with requirements of authorities having jurisdiction. Comply with progress cleaning requirements in Section 01 73 00 "Execution."
- E. Temporary Use of Permanent Stairs: Use of new stairs for construction traffic will be permitted, provided stairs are protected and finishes restored to new condition at time of Substantial Completion.

3.3 SECURITY AND PROTECTION FACILITIES INSTALLATION

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

- B. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction as required to comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.
- C. Temporary Erosion and Sedimentation Control: Comply with authorities having jurisdiction and requirements specified in Section 31 10 00 "Site Clearing."
- D. Temporary Erosion and Sedimentation Control: Provide measures to prevent soil erosion and discharge of soil-bearing water runoff and airborne dust to undisturbed areas and to adjacent properties and walkways, according to **[erosion- and sedimentation-control Drawings] or [authorities having jurisdiction, whichever is more stringent]**.
1. Inspect, repair, and maintain erosion and sedimentation control measures during construction until permanent vegetation has been placed.
 2. If a soil erosion control permit is required on this project, adhere to the specific conditions of the project permit. Where the permit is issued in the name of the Contractor, and requires that a bond be posted, the Contractor shall include in his bid the permit fee, inspection fee, and bond expenses.
 3. The Architect shall have full authority to require compliance with the soil erosion control requirements and may order suspension of the Work if measures are not adequate or a problem develops requiring additional soil erosion control measures, any ordered suspension of the Work shall not be grounds for Contractor's claims for "down time" or "lost time."
- E. Stormwater Control: Comply with requirements of authorities having jurisdiction. Provide barriers in and around excavations and subgrade construction to prevent flooding by runoff of stormwater from heavy rains.
- F. Tree and Plant Protection: Install temporary fencing located as indicated or outside the drip line of trees to protect vegetation from damage from construction operations. Protect tree root systems from damage, flooding, and erosion.
- G. Pest Control: Engage pest-control service to recommend practices to minimize attraction and harboring of rodents, roaches, and other pests and to perform extermination and control procedures at regular intervals so Project will be free of pests and their residues at Substantial Completion. Perform control operations lawfully, using environmentally safe materials.
- H. Temporary Enclosures: Provide temporary enclosures for protection of construction, in progress and completed, from exposure, foul weather, other construction operations, and similar activities. Provide temporary weather-tight enclosure for building exterior.
1. Where heating or cooling is needed and permanent enclosure is not complete, insulate temporary enclosures.
- I. Temporary Fire Protection: Install and maintain temporary fire-protection facilities of types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 241; manage fire prevention program.
1. Prohibit smoking in construction areas.
 2. Supervise welding operations, combustion-type temporary heating units, and similar sources of fire ignition according to requirements of authorities having jurisdiction.
 3. Develop and supervise an overall fire-prevention and -protection program for personnel at Project site. Review needs with local fire department and establish procedures to be followed. Instruct personnel in methods and procedures. Post warnings and information.
 4. Provide temporary standpipes and hoses for fire protection. Hang hoses with a warning sign stating that hoses are for fire-protection purposes only and are not to be removed. Match hose size with outlet size and equip with suitable nozzles.

3.4 MOISTURE AND MOLD CONTROL

- A. Contractor's Moisture Protection Plan: Avoid trapping water in finished work. Document visible signs of mold that may appear during construction.
- B. Exposed Construction Phase: Before installation of weather barriers, when materials are subject to wetting and exposure and to airborne mold spores, protect materials from water damage and keep porous and organic materials from coming into prolonged contact with concrete.
- C. Partially Enclosed Construction Phase: After installation of weather barriers but before full enclosure and conditioning of building, when installed materials are still subject to infiltration of moisture and ambient mold spores, protect as follows:
 - 1. Do not load or install drywall or other porous materials or components, or items with high organic content, into partially enclosed building.
 - 2. Keep interior spaces reasonably clean and protected from water damage.
 - 3. Discard or replace water-damaged and wet material.
 - 4. Discard, replace, or clean stored or installed material that begins to grow mold.
 - 5. Perform work in a sequence that allows any wet materials adequate time to dry before enclosing the material in drywall or other interior finishes.
- D. Controlled Construction Phase of Construction: After completing and sealing of the building enclosure but prior to the full operation of permanent HVAC systems, maintain as follows:
 - 1. Control moisture and humidity inside building by maintaining effective dry-in conditions.
 - 2. Remove materials that cannot be completely restored to their manufactured moisture level within 48 hours.

3.5 OPERATION, TERMINATION, AND REMOVAL

- A. Maintenance: Maintain facilities in good operating condition until removal.
 - 1. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on a 24-hour basis where required to achieve indicated results and to avoid possibility of damage.
- B. Termination and Removal: Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.
 - 1. Materials and facilities that constitute temporary facilities are property of Contractor. Owner reserves right to take possession of Project identification signs.
 - 2. At Substantial Completion, repair, renovate, and clean permanent facilities used during construction period. Comply with final cleaning requirements specified in Section 01 77 00 "Closeout Procedures."
 - 3. Remove temporary paving not intended for integration into permanent paving. Where area is intended for landscape development, remove soil and aggregate fill that do not comply with requirements for fill or subsoil. Remove materials contaminated with road oil, asphalt and other petrochemical compounds, and other substances that might impair growth of plant materials or lawns. Repair or replace street paving, curbs, and sidewalks at temporary entrances, as required by authorities having jurisdiction.

END OF SECTION 01 50 00

SECTION 01 60 00 - PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes administrative and procedural requirements for selection of products for use in Project; product delivery, storage, and handling; manufacturers' standard warranties on products; special warranties; and comparable products.
- B. Related Requirements:
 - 1. Section 01 25 00 "Substitution Procedures" for requests for substitutions.

1.2 DEFINITIONS

- A. Products: Items obtained for incorporating into the Work, whether purchased for Project or taken from previously purchased stock. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.
 - 1. Named Products: Items identified by manufacturer's product name, including make or model number or other designation shown or listed in manufacturer's published product literature, that is current as of date of the Contract Documents.
 - 2. New Products: Items that have not previously been incorporated into another project or facility. Products salvaged or recycled from other projects are not considered new products.
 - 3. Comparable Product: Product that is demonstrated and approved through submittal process to have the indicated qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics that equal or exceed those of specified product.
- B. Basis-of-Design Product Specification: A specification in which a specific manufacturer's product is named and accompanied by the words "basis-of-design product," including make or model number or other designation, to establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of additional manufacturers named in the specification.

1.3 ACTION SUBMITTALS

- A. Comparable Product Requests: Submit request for consideration of each comparable product. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.
 - 1. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within one week of receipt of a comparable product request. Architect will notify Contractor of approval or rejection of proposed comparable product request within 15 days of receipt of request, or seven days of receipt of additional information or documentation, whichever is later.
 - a. Form of Approval: As specified in Section 01 33 00 "Submittal Procedures."
 - b. Use product specified if Architect does not issue a decision on use of a comparable product request within time allocated.
- B. Basis-of-Design Product Specification Submittal: Comply with requirements in Section 01 33 00 "Submittal Procedures." Show compliance with requirements.

1.4 QUALITY ASSURANCE

- A. Compatibility of Options: If Contractor is given option of selecting between two or more products for use on Project, select product compatible with products previously selected, even if previously selected products were also options.

1.5 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, and handle products using means and methods that will prevent damage, deterioration, and loss, including theft and vandalism. Comply with manufacturer's written instructions.
- B. Delivery and Handling:
 - 1. Schedule delivery to minimize long-term storage at Project site and to prevent overcrowding of construction spaces.
 - 2. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.
 - 3. Deliver products to Project site in an undamaged condition in manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
 - 4. Inspect products on delivery to determine compliance with the Contract Documents and to determine that products are undamaged and properly protected.
- C. Storage:
 - 1. Store products to allow for inspection and measurement of quantity or counting of units.
 - 2. Store materials in a manner that will not endanger Project structure.
 - 3. Store products that are subject to damage by the elements, under cover in a weathertight enclosure above ground, with ventilation adequate to prevent condensation.
 - 4. Protect foam plastic from exposure to sunlight, except to extent necessary for period of installation and concealment.
 - 5. Comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.
 - 6. Protect stored products from damage and liquids from freezing.

1.6 PRODUCT WARRANTIES

- A. Warranties specified in other Sections shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents.
 - 1. Manufacturer's Warranty: Written warranty furnished by individual manufacturer for a particular product and specifically endorsed by manufacturer to Owner.
 - 2. Special Warranty: Written warranty required by the Contract Documents to provide specific rights for Owner.
- B. Special Warranties: Prepare a written document that contains appropriate terms and identification, ready for execution.
 - 1. Manufacturer's Standard Form: Modified to include Project-specific information and properly executed.
 - 2. Specified Form: When specified forms are included with the Specifications, prepare a written document using indicated form properly executed.
 - 3. Refer to other Sections for specific content requirements and particular requirements for submitting special warranties.
- C. Submittal Time: Comply with requirements in Section 01 77 00 "Closeout Procedures."

PART 2 - PRODUCTS

2.1 PRODUCT SELECTION PROCEDURES

- A. General Product Requirements: Provide products that comply with the Contract Documents, are undamaged and, unless otherwise indicated, are new at time of installation.
1. Provide products complete with accessories, trim, finish, fasteners, and other items needed for a complete installation and indicated use and effect.
 2. Standard Products: If available, and unless custom products or nonstandard options are specified, provide standard products of types that have been produced and used successfully in similar situations on other projects.
 3. Owner reserves the right to limit selection to products with warranties not in conflict with requirements of the Contract Documents.
 4. Where products are accompanied by the term "as selected," Architect will make selection.
 5. Descriptive, performance, and reference standard requirements in the Specifications establish salient characteristics of products.
- B. Product Selection Procedures:
1. Product: Where Specifications name a single manufacturer and product, provide the named product that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
 2. Manufacturer/Source: Where Specifications name a single manufacturer or source, provide a product by the named manufacturer or source that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
 3. Products:
 - a. Restricted List: Where Specifications include a list of names of both manufacturers and products, provide one of the products listed that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered unless otherwise indicated.
 - b. Nonrestricted List: Where Specifications include a list of names of both available manufacturers and products, provide one of the products listed, or an unnamed product, that complies with requirements. Comply with requirements in "Comparable Products" Article for consideration of an unnamed product.
 4. Manufacturers:
 - a. Restricted List: Where Specifications include a list of manufacturers' names, provide a product by one of the manufacturers listed that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered unless otherwise indicated.
 - b. Nonrestricted List: Where Specifications include a list of available manufacturers, provide a product by one of the manufacturers listed, or a product by an unnamed manufacturer, that complies with requirements. Comply with requirements in "Comparable Products" Article for consideration of an unnamed manufacturer's product.
 5. Basis-of-Design Product: Where Specifications name a product, or refer to a product indicated on Drawings, and include a list of manufacturers, provide the specified or indicated product or a comparable product by one of the other named manufacturers. Drawings and Specifications indicate sizes, profiles, dimensions, and other characteristics that are based on the product named. Comply with requirements in "Comparable Products" Article for consideration of an unnamed product by one of the other named manufacturers.
- C. Visual Matching Specification: Where Specifications require "match Architect's sample", provide a product that complies with requirements and matches Architect's sample. Architect's decision will be final on whether a proposed product matches.
1. If no product available within specified category matches and complies with other specified requirements, comply with requirements in Section 01 25 00 "Substitution Procedures" for proposal of product.

- D. Visual Selection Specification: Where Specifications include the phrase "as selected by Architect from manufacturer's full range" or similar phrase, select a product that complies with requirements. Architect will select color, gloss, pattern, density, or texture from manufacturer's product line that includes both standard and premium items.

2.2 COMPARABLE PRODUCTS

- A. Conditions for Consideration: Architect will consider Contractor's request for comparable product when the following conditions are satisfied. If the following conditions are not satisfied, Architect may return requests without action, except to record noncompliance with these requirements:
1. Evidence that the proposed product does not require revisions to the Contract Documents that it is consistent with the Contract Documents and will produce the indicated results, and that it is compatible with other portions of the Work.
 2. Detailed comparison of significant qualities of proposed product with those named in the Specifications. Significant qualities include attributes such as performance, weight, size, durability, visual effect, and specific features and requirements indicated.
 3. Evidence that proposed product provides specified warranty.
 4. List of similar installations for completed projects with project names and addresses and names and addresses of Architects and owners, if requested.
 5. Samples, if requested.

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 60 00

SECTION 01 73 00 - EXECUTION

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes general administrative and procedural requirements governing execution of the Work including, but not limited to, the following:
 - 1. Construction layout.
 - 2. Field engineering and surveying.
 - 3. Installation of the Work.
 - 4. Cutting and patching.
 - 5. Coordination of Owner-installed products.
 - 6. Progress cleaning.
 - 7. Starting and adjusting.
 - 8. Protection of installed construction.

1.2 QUALITY ASSURANCE

- A. Cutting and Patching: Comply with requirements for and limitations on cutting and patching of construction elements.
 - 1. Structural Elements: When cutting and patching structural elements, notify Architect of locations and details of cutting and await directions from Architect before proceeding. Shore, brace, and support structural element during cutting and patching. Do not cut and patch structural elements in a manner that could change their load-carrying capacity or increase deflection
 - 2. Visual Elements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch exposed construction in a manner that would, in Architect's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. General: Comply with requirements specified in other Sections.
- B. In-Place Materials: Use materials for patching use materials that, when installed, will provide a match acceptable to Architect for the visual and functional performance of in-place materials. For exposed surfaces, use materials that visually match in-place adjacent surfaces to the fullest extent possible.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Existing Conditions: The existence and location of underground and other utilities and construction indicated as existing are not guaranteed. Before beginning sitework, investigate and verify the existence and location of underground utilities, mechanical and electrical systems, and other construction affecting the Work.

1. Before construction, verify the location and invert elevation at points of connection of sanitary sewer, storm sewer, and water-service piping; underground electrical services, and other utilities.
2. Furnish location data for work related to Project that must be performed by public utilities serving Project site.
3. For protection of underground utilities in Michigan, contact "MISS DIG" at 1-800-482-7171 a minimum of three (3) working days prior to excavating. This does not relieve the Contractor of the responsibility of notifying utility owners who may not be part of the "MISS DIG" alert system.
4. Where any utility, water, sewer, gas, telephone or any other public or private utilities are encountered, the Contractor must provide adequate protection for them, and he will be held responsible for any damages to such utilities arising from his operations.
5. When it is apparent that construction operations may endanger the foundation of any utility, conduit, or support of any structure, the Contractor shall notify the utility owner of this possibility, and he shall take such steps as may be required to provide temporary bracing or support of conduits or structures.
6. In all cases where permits or inspection fees are required by utilities in connection with changes to or temporary support of their conduits, the Contractor shall secure permits and pay all inspection fees.
7. When it is necessary in order to carry out the Work that a pole, telephone or electric, be moved to a new location or moved and replaced after construction, the Contractor shall arrange for moving such pole or poles and the lines thereof, and shall pay any charges.
8. Where it is the policy of any utility owner to make his own repairs to damaged conduit or other structures, the Contractor shall cooperate to the fullest extent with the utility owner and shall see that his operations interfere as little as possible with the utility owner's operations.
9. Sump Pump Discharge Pipe: Any discharge pipe from sump pumps or yard drains encountered on this project, whether or not shown on the plans, which discharges to existing ditches and/or storm sewers or across public or private easements, shall be maintained, replaced, or reconnected as necessary. Bulkheads shall be placed only as approved by the Architect. Sump pump connections shall be made to the storm drain pipe by a coring method as approved by the Architect. The Contractor shall use adequate measures to prevent soil erosion, sedimentation, and/or ponding when connecting discharge pipes to existing or proposed ditches. This work shall be considered as incidental to the cost of the project.
10. Existing Sewer Facilities: Existing sewers or drains may be encountered along the line of work. In all such cases, the Contractor shall perform his operation in such a manner that sewer service will not be interrupted. He shall, at his own expense, make all temporary provisions to maintain sewer service (both dry weather and storm flows).
11. Unless otherwise indicated on the plans, the Contractor shall replace, at his own expense, any disturbed sewer or drain, or relay same at a new grade to be established by the Architect such that sufficient clearance for the sewer will be provided.
12. Existing Water Facilities: Where existing water mains and/or water services are encountered in the work, they shall be maintained in operation. They shall be relayed if necessary using the class of pipe and fittings standard to the Owner of the main.
13. Existing Drains: Drainage through existing sewers, ditches and drains shall be maintained at all times during construction, and all nearby gutters shall be kept open for drainage.
14. Maintenance of services as described above shall be considered as incidental to the project cost unless pay items have been included in the bid form for this work.

B. Examination and Acceptance of Conditions: Before proceeding with each component of the Work, examine substrates, areas, and conditions, with Installer or Applicator present where indicated, for compliance with requirements for installation tolerances and other conditions affecting performance. Record observations.

1. Examine roughing-in for mechanical and electrical systems to verify actual locations of connections before equipment and fixture installation.
 2. Examine walls, floors, and roofs for suitable conditions where products and systems are to be installed.
 3. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.
- C. Proceed with installation only after unsatisfactory conditions have been corrected. Proceeding with the Work indicates acceptance of surfaces and conditions.

3.2 CONSTRUCTION LAYOUT

- A. Verification: Before proceeding to lay out the Work, verify layout information shown on Drawings, in relation to existing benchmarks. If discrepancies are discovered, notify Architect promptly.
- B. Building Lines and Levels: Locate and lay out control lines and levels for structures, building foundations, and floor levels, including those required for mechanical and electrical work. Transfer survey markings and elevations for use with control lines and levels. Level foundations and piers from two or more locations.

3.3 INSTALLATION

- A. General: Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.
1. Make vertical work plumb and make horizontal work level.
 2. Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.
 3. Conceal pipes, ducts, and wiring in finished areas unless otherwise indicated.
- B. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.
- C. Install products at the time and under conditions that will ensure the best possible results. Maintain conditions required for product performance until Substantial Completion.
- D. Conduct construction operations so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy.
- E. Sequence the Work and allow adequate clearances to accommodate movement of construction items on site and placement in permanent locations.
- F. Tools and Equipment: Do not use tools or equipment that produce harmful noise levels.
- G. Templates: Obtain and distribute to the parties involved templates for work specified to be factory prepared and field installed. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing products to comply with indicated requirements.
- H. Attachment: Provide blocking and attachment plates and anchors and fasteners of adequate size and number to securely anchor each component in place, accurately located and aligned with other portions of the Work. Where size and type of attachments are not indicated, verify size and type required for load conditions.

1. Mounting Heights: Where mounting heights are not indicated, mount components at heights directed by Architect.
 2. Allow for building movement, including thermal expansion and contraction.
 3. Coordinate installation of anchorages. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.
- I. Joints: Make joints of uniform width. Where joint locations in exposed work are not indicated, arrange joints for the best visual effect. Fit exposed connections together to form hairline joints.
- J. Hazardous Materials: Use products, cleaners, and installation materials that are not considered hazardous.

3.4 CUTTING AND PATCHING

- A. Cutting and Patching, General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.
1. Cut in-place construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.
- B. Temporary Support: Provide temporary support of work to be cut.
- C. Protection: Protect in-place construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.
- D. Existing Utility Services and Mechanical/Electrical Systems: Where existing services/systems are required to be removed, relocated, or abandoned, bypass such services/systems before cutting to prevent interruption to occupied areas.
- E. Cutting: Cut in-place construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.
1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots neatly to minimum size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
 2. Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
 3. Concrete and Masonry: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.
 4. Excavating and Backfilling: Comply with requirements in applicable Sections where required by cutting and patching operations.
 5. Mechanical and Electrical Services: Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting.
 6. Proceed with patching after construction operations requiring cutting are complete.
- F. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other work. Patch with durable seams that are as invisible as practicable. Provide materials and comply with installation requirements specified in other Sections, where applicable.
1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate physical integrity of installation.

2. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will minimize evidence of patching and refinishing.
 3. Floors and Walls: Where walls or partitions that are removed extend one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform finish, color, texture, and appearance. Remove in-place floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.
 4. Ceilings: Patch, repair, or rehang in-place ceilings as necessary to provide an even-plane surface of uniform appearance.
 5. Exterior Building Enclosure: Patch components in a manner that restores enclosure to a weather-tight condition and ensures thermal and moisture integrity of building enclosure.
- G. Cleaning: Clean areas and spaces where cutting and patching are performed. Remove paint, mortar, oils, putty, and similar materials from adjacent finished surfaces.

3.5 PROGRESS CLEANING

- A. General: Clean Project site and work areas daily, including common areas. Enforce requirements strictly. Dispose of materials lawfully.
1. Comply with requirements in NFPA 241 for removal of combustible waste materials and debris.
 2. Do not hold waste materials more than seven days during normal weather or three days if the temperature is expected to rise above 80°F.
 3. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.
- B. Site: Maintain Project site free of waste materials and debris.
- C. Work Areas: Clean areas where work is in progress to the level of cleanliness necessary for proper execution of the Work.
1. Remove liquid spills promptly.
 2. Where dust would impair proper execution of the Work, broom-clean or vacuum the entire work area, as appropriate.
- D. Installed Work: Keep installed work clean. Clean installed surfaces according to written instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended, use cleaning materials that are not hazardous to health or property and that will not damage exposed surfaces.
- E. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.
- F. Exposed Surfaces in Finished Areas: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.
- G. Waste Disposal: Do not bury or burn waste materials on-site. Do not wash waste materials down sewers or into waterways.
- H. During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.

- I. Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.
- J. Limiting Exposures: Supervise construction operations to assure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.

3.6 DUST CONTROL

- A. Maintain haul roads, detour roads, other public or private roads, driveways and parking lots in a dust free condition for the duration of the Contract.
- B. Control dust by application of dust control materials and application methods as approved and as directed by the Architect.
- C. Dust control materials shall be applied as often as is necessary to control dust. Neglect of dust control will not be tolerated.
- D. Should the Contractor be negligent of his duties in providing dust control, the Owner may, with or without notice cause the same to be done and deduct the cost of such work from any monies due or to become due to the Contractor under the Contract. Cost of providing dust control shall be considered incidental to the Work.

3.7 STREET CLEANING

- A. Haul roads, detour roads, other public or private roads, driveways and parking lots will be kept clean and swept at regular intervals to maintain cleanliness.
- B. Trucks hauling excavated material, cement, sand, stone or other loose materials from or to the site shall be tightly covered so that no spillage will occur on the adjacent streets. Before trucks start away from the site, their loads shall be trimmed and covered.
- C. If, in the judgment of the Owner, adequate cleanup efforts are not being expended, including but not limited to, roadway, driveway and drainage maintenance, and removal of surplus materials, further construction shall be halted and work forces directed to the cleanup activity until proper order is restored. Should the Contractor continue to be negligent of his duties in maintaining proper street cleanliness, the Owner will take necessary steps to perform such cleaning and shall charge the Contractor for all costs.

3.8 STARTING AND ADJUSTING

- A. Start equipment and operating components to confirm proper operation. Remove malfunctioning units, replace with new units, and retest.
- B. Adjust equipment for proper operation. Adjust operating components for proper operation without binding.
- C. Test each piece of equipment to verify proper operation. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

3.9 PROTECTION OF INSTALLED CONSTRUCTION

- A. Provide final protection and maintain conditions that ensure installed Work is without damage or deterioration at time of Substantial Completion.
- B. Comply with manufacturer's written instructions for temperature and relative humidity.
- C. Provide and maintain weather protection and heating at Contractor's expense to properly protect the Work under construction from damage if the weather conditions require. This work shall include all windbreaks, insulation cover, and other necessary measures required to provide protection from freezing. Continue to provide weather protection and heating as necessary until such time as the Owner takes over the facility.

END OF SECTION 01 73 00

SECTION 01 77 00 - CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes administrative and procedural requirements for contract closeout, including, but not limited to, the following:
 - 1. Substantial Completion procedures.
 - 2. Final completion procedures.
 - 3. Warranties.
 - 4. Final cleaning.
 - 5. Repair of the Work.
- B. Related Requirements:
 - 1. Section 01 78 23 "Operation and Maintenance Data" for operation and maintenance manual requirements.

1.2 ACTION SUBMITTALS

- A. Product Data: For cleaning agents.
- B. Contractor's List of Incomplete Items: Initial submittal at Substantial Completion.
- C. Certified List of Incomplete Items: Final submittal at Final Completion.

1.3 CLOSEOUT SUBMITTALS

- A. Certificates of Release: From authorities having jurisdiction.
- B. Certificate of Insurance: For continuing coverage.

1.4 MAINTENANCE MATERIAL SUBMITTALS

- A. Schedule of Maintenance Material Items: For maintenance material submittal items specified in other Sections.

1.5 SUBSTANTIAL COMPLETION PROCEDURES

- A. Contractor's List of Incomplete Items: Prepare and submit a list of items to be completed and corrected (Contractor's punch list), indicating the value of each item on the list and reasons why the Work is incomplete.
- B. Submittals Prior to Substantial Completion: Complete the following a minimum of 10 days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.
 - 1. Certificates of Release: Obtain and submit releases from authorities having jurisdiction permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
 - 2. Submit closeout submittals specified in other Division 01 Sections, including project record documents, operation and maintenance manuals, damage or settlement surveys, and similar final record information.

3. Submit closeout submittals specified in individual Sections, including specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
 4. Submit maintenance material submittals specified in individual Sections, including tools, spare parts, extra materials, and similar items, and deliver to location designated by Owner with manufacturer's name and model number where applicable.
 - a. Schedule of Maintenance Material Items: Prepare and submit schedule of maintenance material submittal items, including name and quantity of each item and name and number of related Specification Section. Obtain Owner's signature for receipt of submittals.
 5. Submit test/adjust/balance records.
 6. Submit sustainable design submittals not previously submitted.
 7. Submit changeover information related to Owner's occupancy, use, operation, and maintenance.
- C. Procedures Prior to Substantial Completion: Complete the following a minimum of 10 days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.
1. Advise Owner of pending insurance changeover requirements.
 2. Make final changeover of permanent locks and deliver keys to Owner. Advise Owner's personnel of changeover in security provisions.
 3. Complete startup and testing of systems and equipment.
 4. Perform preventive maintenance on equipment used prior to Substantial Completion.
 5. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems. Submit demonstration and training video recordings specified in Section 01 79 00 "Demonstration and Training."
 6. Advise Owner of changeover in heat and other utilities.
 7. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.
 8. Complete final cleaning requirements, including touchup painting.
 9. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.
- D. Inspection: Submit a written request for inspection to determine Substantial Completion a minimum of 10 days prior to date the work will be completed and ready for final inspection and tests. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare the Certificate of Substantial Completion after inspection or will notify Contractor of items, either on Contractor's list or additional items identified by Architect, that must be completed or corrected before certificate will be issued.
1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.
 2. Results of completed inspection will form the basis of requirements for final completion.

1.6 FINAL COMPLETION PROCEDURES

- A. Preliminary Procedures: Before requesting final inspection for determining final completion, complete the following:
1. Submit a final Application for Payment according to Section 01 29 00 "Payment Procedures."
 2. Certified List of Incomplete Items: Submit certified copy of Architect's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Architect. Certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.
 3. Certificate of Insurance: Submit evidence of final, continuing insurance coverage complying with insurance requirements.

4. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems. Submit demonstration and training video recordings and manufacturer's startup reports.
- B. Inspection: Submit a written request for final inspection to determine acceptance. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare a final Certificate for Payment after inspection or will notify Contractor of construction that must be completed or corrected before certificate will be issued.
 1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.
- C. Review equipment with Owner and provide overview of product maintenance and serviceability requirements.

1.7 LIST OF INCOMPLETE ITEMS (PUNCH LIST)

- A. Organization of List: Include name and identification of each space and area affected by construction operations for incomplete items and items needing correction including, if necessary, areas disturbed by Contractor that are outside the limits of construction. Use CSI Form 14.1A or similar type form.
 1. Organize list of spaces in sequential order, starting with exterior areas first and proceeding from lowest floor to highest floor.
 2. Organize items applying to each space by major element, including categories for ceiling, individual walls, floors, equipment, and building systems.
 3. Submit list of incomplete items in one of the following formats:
 - a. MS Excel electronic file. Architect will return annotated copy.
 - b. PDF electronic file. Architect will return annotated copy.

1.8 SUBMITTAL OF PROJECT WARRANTIES

- A. Time of Submittal: Submit written warranties on request of Architect for designated portions of the Work where commencement of warranties other than date of Substantial Completion is indicated, or when delay in submittal of warranties might limit Owner's rights under warranty.
- B. Organize warranty documents into an orderly sequence based on the table of contents of the Project Manual.
 1. Bind warranties and bonds in heavy-duty, three-ring, vinyl-covered, loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2-by-11-inch paper.
 2. Provide heavy paper dividers with plastic-covered tabs for each separate warranty. Mark tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product and the name, address, and telephone number of Installer.
 3. Identify each binder on the front and spine with the typed or printed title "WARRANTIES," Project name, and name of Contractor.
 4. Warranty Electronic File: Scan warranties and bonds and assemble complete warranty and bond submittal package into a single indexed electronic PDF file with links enabling navigation to each item. Provide bookmarked table of contents at beginning of document.
- C. Provide additional copies of each warranty to include in operation and maintenance manuals.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Cleaning Agents: Use cleaning materials and agents recommended by manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.

PART 3 - EXECUTION

3.1 FINAL CLEANING

- A. General: Perform final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.
- B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.
 - 1. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for entire Project or for a designated portion of Project:
 - a. Clean Project site, yard, and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter, and other foreign substances.
 - b. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.
 - c. Rake grounds that are neither planted nor paved to a smooth, even-textured surface.
 - d. Remove tools, construction equipment, machinery, and surplus material from Project site.
 - e. Remove snow and ice to provide safe access to building.
 - f. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.
 - g. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
 - h. Sweep concrete floors broom clean in unoccupied spaces.
 - i. Vacuum carpet and similar soft surfaces, removing debris and excess nap; clean according to manufacturer's recommendations if visible soil or stains remain.
 - j. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other noticeable, vision-obscuring materials. Replace chipped or broken glass and other damaged transparent materials. Polish mirrors and glass, taking care not to scratch surfaces.
 - k. Remove labels that are not permanent.
 - l. Wipe surfaces of mechanical and electrical equipment, elevator equipment, and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.
 - m. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.
 - n. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.
 - o. Clean light fixtures, lamps, globes, and reflectors to function with full efficiency.
 - p. Leave Project clean and ready for occupancy.

3.2 REPAIR OF THE WORK

- A. Complete repair and restoration operations before requesting inspection for determination of Substantial Completion.
- B. Repair or remove and replace defective construction. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment. Where damaged or worn items cannot be repaired or restored, provide replacements. Remove and replace operating components that cannot be repaired. Restore damaged construction and permanent facilities used during construction to specified condition.
 - 1. Remove and replace chipped, scratched, and broken glass, reflective surfaces, and other damaged transparent materials.
 - 2. Touch up and otherwise repair and restore marred or exposed finishes and surfaces. Replace finishes and surfaces that already show evidence of repair or restoration.
 - a. Do not paint over "UL" and other required labels and identification, including mechanical and electrical nameplates. Remove paint applied to required labels and identification.
 - 3. Replace parts subject to operating conditions during construction that may impede operation or reduce longevity.
 - 4. Replace burned-out bulbs, bulbs noticeably dimmed by hours of use, and defective and noisy starters in fluorescent and mercury vapor fixtures to comply with requirements for new fixtures.

END OF SECTION 01 77 00

SECTION 01 78 23 - OPERATION AND MAINTENANCE DATA

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes administrative and procedural requirements for preparing operation and maintenance manuals, including the following:
 - 1. Operation and maintenance documentation directory.
 - 2. Emergency manuals.
 - 3. Operation manuals for systems, subsystems, and equipment.
 - 4. Product maintenance manuals.
 - 5. Systems and equipment maintenance manuals.

1.2 CLOSEOUT SUBMITTALS

- A. Manual Content: Operations and maintenance manual content is specified in individual Specification Sections to be reviewed at the time of Section submittals. Submit reviewed manual content formatted and organized as required by this Section.
 - 1. Architect will comment on whether content of operations and maintenance submittals are acceptable.
 - 2. Where applicable, clarify and update reviewed manual content to correspond to revisions and field conditions.
- B. Format: Submit operations and maintenance manuals in the following format:
 - 1. PDF electronic file. Assemble each manual into a composite electronically indexed file. Submit on digital media acceptable to Architect.
 - a. Name each indexed document file in composite electronic index with applicable item name. Include a complete electronically linked operation and maintenance directory.
 - b. Enable inserted reviewer comments on draft submittals.
 - 2. Three paper copies. Include a complete operation and maintenance directory. Enclose title pages and directories in clear plastic sleeves. Architect will return one copy.

PART 2 - PRODUCTS

2.1 REQUIREMENTS FOR EMERGENCY, OPERATION, AND MAINTENANCE MANUALS

- A. Directory: Prepare a single, comprehensive directory of emergency, operation, and maintenance data and materials, listing items and their location to facilitate ready access to desired information.
- B. Organization: Unless otherwise indicated, organize each manual into a separate section for each system and subsystem, and a separate section for each piece of equipment not part of a system. Each manual shall contain the following materials, in the order listed:
 - 1. Title page.
 - 2. Table of contents.
 - 3. Manual contents.
- C. Title Page: Include the following information:
 - 1. Subject matter included in manual.
 - 2. Name and address of Project.
 - 3. Name and address of Owner.

4. Date of submittal.
 5. Name and contact information for Contractor.
 6. Names and contact information for major consultants to the Architect that designed the systems contained in the manuals.
 7. Cross-reference to related systems in other operation and maintenance manuals.
- D. Table of Contents: List each product included in manual, identified by product name, indexed to the content of the volume, and cross-referenced to Specification Section number in Project Manual.
- E. Manual Contents: Organize into sets of manageable size. Arrange contents alphabetically by system, subsystem, and equipment. If possible, assemble instructions for subsystems, equipment, and components of one system into a single binder.
- F. Manuals, Electronic Files: Submit manuals in the form of a multiple file composite electronic PDF file for each manual type required.
1. Electronic Files: Use electronic files prepared by manufacturer where available. Where scanning of paper documents is required, configure scanned file for minimum readable file size.
 2. File Names and Bookmarks: Enable bookmarking of individual documents based on file names. Name document files to correspond to system, subsystem, and equipment names used in manual directory and table of contents. Group documents for each system and subsystem into individual composite bookmarked files, then create composite manual, so that resulting bookmarks reflect the system, subsystem, and equipment names in a readily navigated file tree. Configure electronic manual to display bookmark panel on opening file.
- G. Manuals, Paper Copy: Submit manuals in the form of hard copy, bound and labeled volumes.
1. Binders: Heavy-duty, three-ring, vinyl-covered, post-type binders, in thickness necessary to accommodate contents, sized to hold 8-1/2-by-11-inch paper; with clear plastic sleeve on spine to hold label describing contents and with pockets inside covers to hold folded oversize sheets.
 - a. Identify each binder on front and spine, with printed title "OPERATION AND MAINTENANCE MANUAL," Project title or name, and subject matter of contents, and indicate Specification Section number on bottom of spine. Indicate volume number for multiple-volume sets.
 2. Dividers: Heavy-paper dividers with plastic-covered tabs for each section of the manual. Mark each tab to indicate contents. Include typed list of products and major components of equipment included in the section on each divider, cross-referenced to Specification Section number and title of Project Manual.
 3. Protective Plastic Sleeves: Transparent plastic sleeves designed to enclose diagnostic software storage media for computerized electronic equipment.
 4. Drawings: Attach reinforced, punched binder tabs on drawings and bind with text.
 - a. If oversize drawings are necessary, fold drawings to same size as text pages and use as foldouts.
 - b. If drawings are too large to be used as foldouts, fold and place drawings in labeled envelopes and bind envelopes in rear of manual. At appropriate locations in manual, insert typewritten pages indicating drawing titles, descriptions of contents, and drawing locations.

2.2 EMERGENCY MANUALS

- A. Content: Organize manual into a separate section for each of the following:
1. Type of emergency.
 2. Emergency instructions.
 3. Emergency procedures.

- B. Type of Emergency: Where applicable for each type of emergency indicated below, include instructions and procedures for each system, subsystem, piece of equipment, and component:
1. Fire.
 2. Flood.
 3. Gas leak.
 4. Water leak.
 5. Power failure.
 6. Water outage.
 7. System, subsystem, or equipment failure.
 8. Chemical release or spill.
- C. Emergency Instructions: Describe and explain warnings, trouble indications, error messages, and similar codes and signals. Include responsibilities of Owner's operating personnel for notification of Installer, supplier, and manufacturer to maintain warranties.
- D. Emergency Procedures: Include the following, as applicable:
1. Instructions on stopping.
 2. Shutdown instructions for each type of emergency.
 3. Operating instructions for conditions outside normal operating limits.
 4. Required sequences for electric or electronic systems.
 5. Special operating instructions and procedures.

2.3 OPERATION MANUALS

- A. Content: In addition to requirements in this Section, include operation data required in individual Specification Sections and the following information:
1. System, subsystem, and equipment descriptions. Use designations for systems and equipment indicated on Contract Documents.
 2. Performance and design criteria if Contractor is delegated design responsibility.
 3. Operating standards.
 4. Operating procedures.
 5. Operating logs.
 6. Wiring diagrams.
 7. Control diagrams.
 8. Piped system diagrams.
 9. Precautions against improper use.
 10. License requirements including inspection and renewal dates.
- B. Descriptions: Include the following:
1. Product name and model number. Use designations for products indicated on Contract Documents.
 2. Manufacturer's name.
 3. Equipment identification with serial number of each component.
 4. Equipment function.
 5. Operating characteristics.
 6. Limiting conditions.
 7. Performance curves.
 8. Engineering data and tests.
 9. Complete nomenclature and number of replacement parts.
- C. Operating Procedures: Include the following, as applicable:
1. Startup procedures.
 2. Equipment or system break-in procedures.
 3. Routine and normal operating instructions.
 4. Regulation and control procedures.

5. Instructions on stopping.
6. Normal shutdown instructions.
7. Seasonal and weekend operating instructions.
8. Required sequences for electric or electronic systems.
9. Special operating instructions and procedures.

- D. Systems and Equipment Controls: Describe the sequence of operation, and diagram controls as installed.
- E. Piped Systems: Diagram piping as installed, and identify color-coding where required for identification.

2.4 PRODUCT MAINTENANCE MANUALS

- A. Content: Organize manual into a separate section for each product, material, and finish. Include source information, product information, maintenance procedures, repair materials and sources, and warranties and bonds, as described below.
- B. Source Information: List each product included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual.
- C. Product Information: Include the following, as applicable:
1. Product name and model number.
 2. Manufacturer's name.
 3. Color, pattern, and texture.
 4. Material and chemical composition.
 5. Reordering information for specially manufactured products.
- D. Maintenance Procedures: Include manufacturer's written recommendations and the following:
1. Inspection procedures.
 2. Types of cleaning agents to be used and methods of cleaning.
 3. List of cleaning agents and methods of cleaning detrimental to product.
 4. Schedule for routine cleaning and maintenance.
 5. Repair instructions.
- E. Repair Materials and Sources: Include lists of materials and local sources of materials and related services.
- F. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.

2.5 SYSTEMS AND EQUIPMENT MAINTENANCE MANUALS

- A. Content: For each system, subsystem, and piece of equipment not part of a system, include source information, manufacturers' maintenance documentation, maintenance procedures, maintenance and service schedules, spare parts list and source information, maintenance service contracts, and warranty and bond information, as described below.
- B. Source Information: List each system, subsystem, and piece of equipment included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual.

- C. Manufacturers' Maintenance Documentation: Manufacturers' maintenance documentation including the following information for each component part or piece of equipment:
 - 1. Standard maintenance instructions and bulletins.
 - 2. Drawings, diagrams, and instructions required for maintenance, including disassembly and component removal, replacement, and assembly.
 - 3. Identification and nomenclature of parts and components.
 - 4. List of items recommended to be stocked as spare parts.
- D. Maintenance Procedures: Include the following information and items that detail essential maintenance procedures:
 - 1. Test and inspection instructions.
 - 2. Troubleshooting guide.
 - 3. Precautions against improper maintenance.
 - 4. Disassembly; component removal, repair, and replacement; and reassembly instructions.
 - 5. Aligning, adjusting, and checking instructions.
 - 6. Demonstration and training video recording, if available.
- E. Maintenance and Service Schedules: Include service and lubrication requirements, list of required lubricants for equipment, and separate schedules for preventive and routine maintenance and service with standard time allotment.
- F. Spare Parts List and Source Information: Include lists of replacement and repair parts, with parts identified and cross-referenced to manufacturers' maintenance documentation and local sources of maintenance materials and related services.
- G. Maintenance Service Contracts: Include copies of maintenance agreements with name and telephone number of service agent.
- H. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.

PART 3 - EXECUTION

3.1 MANUAL PREPARATION

- A. Emergency Manual: Assemble a complete set of emergency information indicating procedures for use by emergency personnel and by Owner's operating personnel for types of emergencies indicated.
- B. Product Maintenance Manual: Assemble a complete set of maintenance data indicating care and maintenance of each product, material, and finish incorporated into the Work.
- C. Operation and Maintenance Manuals: Assemble a complete set of operation and maintenance data indicating operation and maintenance of each system, subsystem, and piece of equipment not part of a system.
- D. Manufacturers' Data: Where manuals contain manufacturers' standard printed data, include only sheets pertinent to product or component installed. Mark each sheet to identify each product or component incorporated into the Work. If data include more than one item in a tabular format, identify each item using appropriate references from the Contract Documents. Identify data applicable to the Work and delete references to information not applicable.

- E. Drawings: Prepare drawings supplementing manufacturers' printed data to illustrate the relationship of component parts of equipment and systems and to illustrate control sequence and flow diagrams. Coordinate these drawings with information contained in record Drawings to ensure correct illustration of completed installation.
 - 1. Do not use original project record documents as part of operation and maintenance manuals.
- F. Comply with Section 01 77 00 "Closeout Procedures" for schedule for submitting operation and maintenance documentation.

END OF SECTION 01 78 23

SECTION 01 78 39 - PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes administrative and procedural requirements for project record documents, including the following:
 - 1. Record Drawings.
 - 2. Record Specifications.
- B. Related Requirements:
 - 1. Section 01 78 23 "Operation and Maintenance Data" for operation and maintenance manual requirements.

1.2 CLOSEOUT SUBMITTALS

- A. Record Drawings: Comply with the following:
 - 1. Number of Copies: Submit copies of record Drawings as follows:
 - a. Final Submittal:
 - 1) Submit PDF electronic files of scanned record prints and **one** set(s) of prints.
 - 2) Print each drawing, whether or not changes and additional information were recorded.

PART 2 - PRODUCTS

2.1 RECORD DRAWINGS

- A. Record Prints: Maintain one set of marked-up paper copies of the Contract Drawings and Shop Drawings, incorporating new and revised Drawings as modifications are issued.
 - 1. Preparation: Mark record prints to show the actual installation where installation varies from that shown originally. Require individual or entity who obtained record data, whether individual or entity is Installer, subcontractor, or similar entity, to provide information for preparation of corresponding marked-up record prints.
 - a. Give particular attention to information on concealed elements that would be difficult to identify or measure and record later.
 - b. Record data as soon as possible after obtaining it.
 - c. Record and check the markup before enclosing concealed installations.
 - 2. Mark the Contract Drawings and Shop Drawings completely and accurately. Use personnel proficient at recording graphic information in production of marked-up record prints.
 - 3. Mark record sets with erasable, red-colored pencil. Use other colors to distinguish between changes for different categories of the Work at same location.
 - 4. Note Addenda, Construction or Work Change Directive numbers, alternate numbers, Change Order numbers, and similar identification, where applicable.

2.2 MISCELLANEOUS RECORD SUBMITTALS

- A. Assemble miscellaneous records required by other Specification Sections for miscellaneous record keeping and submittal in connection with actual performance of the Work. Bind or file miscellaneous records and identify each, ready for continued use and reference.

- B. Format: Submit miscellaneous record submittals as PDF electronic file or scanned PDF electronic file(s) of marked-up miscellaneous record submittals.

PART 3 - EXECUTION

3.1 RECORDING AND MAINTENANCE

- A. Recording: Maintain one copy of each submittal during the construction period for project record document purposes. Post changes and revisions to project record documents as they occur; do not wait until end of Project.
- B. Maintenance of Record Documents and Samples: Store record documents and Samples in the appropriate location apart from the Contract Documents used for construction. Do not use project record documents for construction purposes. Maintain record documents in good order and in a clean, dry, legible condition, protected from deterioration and loss.

END OF SECTION 01 78 39

SECTION 03 30 00 - CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes cast-in-place concrete, including formwork, reinforcement, concrete materials, mixture design, placement procedures, and finishes.

1.2 DEFINITIONS

- A. Cementitious Materials: Portland cement alone or in combination with one or more of the following: blended hydraulic cement, fly ash, slag cement, other pozzolans, and silica fume; materials subject to compliance with requirements.
- B. W/C Ratio: The ratio by weight of water to cementitious materials.

1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.
 - 1. Before submitting design mixtures, review concrete design mixture and examine procedures for ensuring quality of concrete materials. Require representatives of each entity directly concerned with cast-in-place concrete to attend, including the following:
 - a. Contractor's superintendent.
 - b. Ready-mix concrete manufacturer.
 - c. Concrete Subcontractor.
 - 2. Review special inspection and testing and inspecting agency procedures for field quality control, concrete finishes and finishing, cold- and hot-weather concreting procedures, curing procedures, construction contraction and isolation joints, forms and form removal limitations, shoring and reshoring procedures, vapor-retarder installation, anchor rod and anchorage device installation tolerances, steel reinforcement installation, concrete repair procedures, concrete flatness and levelness requirements, and concrete protection.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Design Mixtures: For each concrete mixture. Submit alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.
 - 1. Indicate amounts of mixing water to be withheld for later addition at Project site.
- C. Shop Drawings:
 - 1. For Steel Reinforcement: Placing Drawings that detail fabrication, bending, and placement. Include bar sizes, lengths, material, grade, bar schedules, stirrup spacing, bent bar diagrams, bar arrangement, splices and laps, mechanical connections, tie spacing, hoop spacing, and supports for concrete reinforcement.
 - 2. Construction Joint Layout: Indicate proposed construction joints required to construct the structure. Indicate phasing plan of pours to meet curing requirements specified.
 - a. Location of construction joints is subject to approval of the Architect.
 - 3. Indicate locations and types of waterstops
- D. Samples:

1. Expansion Joint Filler: Submit two (2) representative samples, 6 inches x 12 inches.
2. Waterstops: Submit two 6 inch strips, complete with "quick-release" papers.
3. Concrete Inserts: Submit for approval showing construction and finish specified.
4. Mechanical Anchors: Including expansion anchors, heavy duty sleeve anchors, and sleeve anchors. Submit two (2) samples of each respective type and size proposed if requested by Architect/Engineer.
5. Adhesive Anchors: Submit two (2) samples of each respective size proposed If requested by Architect/Engineer.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

B. Product Data (Mechanical and Adhesive Anchors): Submit manufacturer's product specifications with recommended design values, physical characteristics, installation instructions, ICC-ES Report(s) and necessary calculations to evidence compliance with these specifications.

C. Material Certificates: For each of the following, signed by manufacturers:

1. Cementitious materials.
2. Admixtures.
3. Form materials and form-release agents.
4. Steel reinforcement and accessories.
5. Curing compounds.
6. Floor and slab treatments.
7. Adhesives.
8. Semirigid joint filler.
9. Joint-filler strips.
10. Repair materials.
11. Vapor retarders

D. Material Test Reports: For the following, from a qualified testing agency:

1. Aggregates: Include service record data indicating absence of deleterious expansion of concrete due to alkali aggregate reactivity.

E. Field quality-control reports.

F. Contractor shall submit to the Engineer and the enforcing agency, for acceptance, a quality control or inspection plan that addresses all inspection issues.

G. Minutes of preinstallation conference.

H. Design calculations for Post-Installed Anchors where/if substitution is proposed from requirements shown on Drawings. Include seal/signature of Engineer responsible for design and licensed to practice in jurisdiction of Project.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: A qualified installer who employs on Project personnel qualified as ACI-certified Flatwork Technician and Finisher and a supervisor who is an ACI-certified Concrete Flatwork Technician.

- B. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.
- C. Each type product covered under this Section shall be produced by single manufacturer unless otherwise specified.
- D. Manufacturer shall have not less than five (5) years successful production of product. Submit evidence if requested by Architect/Engineer.
- E. Mechanical Anchor and Adhesive Anchor Installer Qualifications:
 - 1. Qualification: Post-installed anchors/dowels shall be installed by personnel having minimum of 3 years experience performing similar installations and having applicable certificate or other evidence of previous training from anchor product manufacturer, subject to approval of Architect/Engineer.
 - 2. Training (As Alternate to Above Qualification): Conduct training (with manufacturer or manufacturer's representative) for installer(s) on project. Training to consist of review of complete installation process for drilled-in anchors, to include but not limited to: hole drilling process/bits; hole preparation/cleaning; adhesive dispenser/injection technique(s); rebar dowel preparation; and proof loading/torqueing.
 - 3. Maintain Qualification/Training records on site. Subject to Testing Agency and/or Architect/Engineer review on request.
- F. Testing Agency Qualifications: An independent agency, acceptable to authorities having jurisdiction.
 - 1. Personnel conducting field tests shall be qualified as ACI Concrete Field Testing Technician, Grade 1, according to ACI CP-1 or an equivalent certification program.
 - 2. Personnel performing laboratory tests shall be ACI-certified Concrete Strength Testing Technician. Testing agency laboratory supervisor shall be an ACI-certified Concrete Laboratory Testing Technician, Grade II.

1.7 PRECONSTRUCTION TESTING

- A. Preconstruction Testing Service: Engage a qualified testing agency to perform preconstruction testing on concrete mixtures.

1.8 PROPOSED SUBSTITUTIONS

- A. Substitution of products or modifications of details, if proposed by Contractor, shall be submitted for approval in sketch form prior to submission of shop drawings, and such substitutions shall be made only when approved by Architect, and at no additional cost to Owner. Total amount of credit, if any, shall be stated in writing with submission.
- B. Substitution of drilled-in anchors for cast-in-place anchors, or alternate type drilled-in anchors for specified type, where indicated, shall not be made without advance proposed substitution and Architect/Engineer's approval.
- C. Corrections for conflicts or inaccuracies that result in change from Structural Drawings or final approved shop drawing details shall be submitted in sketch form for approval. Such substitutions or corrections shall be made only when approved by Architect.
- D. Where drilled-in anchors must be substituted for specified anchors due to mis-placement or other reason, Contractor shall be responsible for design/re-design and cost for design/re-design. Assume "cracked" concrete unless otherwise advised in writing by Architect/Engineer. Refer to paragraph 1.6.H above.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Steel Reinforcement: Deliver, store, and handle steel reinforcement to prevent bending and damage. Avoid damaging coatings on steel reinforcement.
- B. Waterstops: Store waterstops under cover to protect from moisture, sunlight, dirt, oil, and other contaminants
- C. Deliver materials to site at such intervals to ensure uninterrupted progress of work.
- D. Storage of materials:
 - 1. Store materials to permit easy access for inspection and identification.
 - 2. Store materials in accordance with manufacturer's recommendations.
 - 3. Note: Adhesive cartridges and capsules have special requirements for temperature/sunlight exposure and shelf life.

1.10 FIELD CONDITIONS

- A. Cold-Weather Placement: Comply with ACI 306.1 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.
 - 1. When average high and low temperature is expected to fall below 40 deg F for three successive days, maintain delivered concrete mixture temperature within the temperature range required by ACI 301.
 - 2. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
 - 3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mixture designs.
- B. Hot-Weather Placement: Comply with ACI 301 and as follows:
 - 1. Maintain concrete temperature below 90 deg F at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
 - 2. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade uniformly moist without standing water, soft spots, or dry areas.

PART 2 - PRODUCTS

2.1 CONCRETE, GENERAL

- A. ACI Publications: Comply with the following unless modified by requirements in the Contract Documents:
 - 1. ACI 301.
 - 2. ACI 117.
 - 3. ACI 306.1.

2.2 FORM-FACING MATERIALS

- A. Smooth-Formed Finished Concrete: Form-facing panels that provide continuous, true, and smooth concrete surfaces. Furnish in largest practicable sizes to minimize number of joints.
 - 1. Plywood, metal, or other approved panel materials.

2. Exterior-grade plywood panels, suitable for concrete forms, complying with DOC PS 1, and as follows:
 - a. High-density overlay, Class 1 or better.
 - b. Medium-density overlay, Class 1 or better; mill-release agent treated and edge sealed.
 - c. Structural 1, B-B or better; mill oiled and edge sealed.
 - d. B-B (Concrete Form), Class 1 or better; mill oiled and edge sealed.
 3. Overlaid Finnish birch plywood.
- B. Rough-Formed Finished Concrete: Plywood, lumber, metal, or another approved material. Provide lumber dressed on at least two edges and one side for tight fit.
- C. Chamfer Strips: Wood, metal, PVC, or rubber strips, 3/4 by 3/4 inch, minimum.
- D. Rustication Strips: Wood, metal, PVC, or rubber strips, kerfed for ease of form removal.
- E. Form-Release Agent: Commercially formulated form-release agent that does not bond with, stain, or adversely affect concrete surfaces and does not impair subsequent treatments of concrete surfaces.
1. Formulate form-release agent with rust inhibitor for steel form-facing materials.
- F. Form Ties: Factory-fabricated, removable or snap-off glass-fiber-reinforced plastic or metal form ties designed to resist lateral pressure of fresh concrete on forms and to prevent spalling of concrete on removal.
1. Furnish units that leave no corrodible metal closer than 1 inch to the plane of exposed concrete surface.
 2. Furnish ties that, when removed, leave holes no larger than 1 inch in diameter in concrete surface.
 3. Furnish ties with integral water-barrier plates to walls indicated to receive dampproofing or waterproofing.

2.3 STEEL REINFORCEMENT

- A. Reinforcing Bars: ASTM A 615/A 615M, Grade 60, deformed.
- B. Low-Alloy-Steel Reinforcing Bars: ASTM A 706/A 706M, deformed.
- C. Epoxy-Coated Reinforcing Bars: ASTM A 615/A 615M, Grade 60, deformed bars, ASTM A 775/A 775M, epoxy coated, with less than 2 percent damaged coating in each 12-inch bar length.
- D. Plain-Steel Wire: ASTM A 1064/A 1064M, as drawn.
- E. Plain-Steel Welded-Wire Reinforcement: ASTM A 1064/A 1064M, plain, fabricated from as-drawn steel wire into flat sheets.
- F. Epoxy-coated welded-wire reinforcement: ASTM A 884/A8419, Class A coated, Type 1, plain steel.

2.4 REINFORCEMENT ACCESSORIES

- A. Joint Dowel Bars: ASTM A 615/A 615M, Grade 60, plain-steel bars, cut true to length with ends square and free of burrs.

- B. Epoxy-Coated Joint Dowel Bars: ASTM A 615/A 615M, Grade 60, plain-steel bars, ASTM A 775/A 775M epoxy coated.
- C. Epoxy Repair Coating: Liquid, two-part, epoxy repair coating; compatible with epoxy coating on reinforcement and complying with ASTM A 775/A 775M.
- D. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded-wire reinforcement in place. Manufacture bar supports from steel wire, plastic, or precast concrete according to CRSI's "Manual of Standard Practice," of greater compressive strength than concrete and as follows:
 - 1. For concrete surfaces exposed to view, where legs of wire bar supports contact forms, use CRSI Class 1 plastic-protected steel wire or CRSI Class 2 stainless-steel bar supports.
 - 2. For epoxy-coated reinforcement, use epoxy-coated or other dielectric-polymer-coated wire bar supports.

2.5 CONCRETE MATERIALS

- A. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant, obtain aggregate from single source, and obtain admixtures from single source from single manufacturer.
- B. Cementitious Materials:
 - 1. Portland Cement: ASTM C 150/C 150M, Type I, gray.
 - 2. Fly Ash: ASTM C 618, Class F or C.
 - 3. Slag Cement: ASTM C 989/C 989M, Grade 100 or 120.
 - 4. Silica Fume: ASTM C 1240, amorphous silica.
- C. Normal-Weight Aggregates: ASTM C 33/C 33M, Class 4S coarse aggregate or better, graded. Provide aggregates from a single source with documented service record data of at least 10 years' satisfactory service in similar applications and service conditions using similar aggregates and cementitious materials.
 - 1. Maximum Coarse-Aggregate Size: 1-1/2 inches nominal. Limit maximum aggregate size to 1 inch at 4 inch thick slab.
 - 2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.
- D. Air-Entraining Admixture: ASTM C 260/C 260M.
- E. Chemical Admixtures: Certified by manufacturer to be compatible with other admixtures and that do not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.
 - 1. Water-Reducing Admixture: ASTM C 494/C 494M, Type A.
 - 2. Retarding Admixture: ASTM C 494/C 494M, Type B.
 - 3. Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type D.
 - 4. High-Range, Water-Reducing Admixture: ASTM C 494/C 494M, Type F.
 - 5. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type G.
 - 6. Plasticizing and Retarding Admixture: ASTM C 1017/C 1017M, Type II.
- F. Water: ASTM C 94/C 94M and potable.

2.6 WATERSTOPS

- A. Self-Expanding Butyl Strip Waterstops: Manufactured rectangular or trapezoidal strip, butyl rubber with sodium bentonite or other hydrophilic polymers, for adhesive bonding to concrete, 3/4 by 1 inch.

2.7 VAPOR RETARDERS

- A. Sheet Vapor Retarder: ASTM E 1745, Class A, except with maximum water-vapor permeance of 0.03. Include manufacturer's recommended adhesive or pressure-sensitive tape.
- B. Description: Prefabricated, flexible, lightweight material manufactured from raw or virgin polyethylene or polyolefin resins (post-consumer, recycled resins are not permitted); not less than 15 mil (0.4 mm) thick.
 - 1. Manufacturers and Products:
 - a. Barrier-Bac; Inteplast Group; VB-350
 - b. ISI Building Products; Viper VaporCheck II 15.
 - c. Poly-America, L.P; Husky Yellow Guard 15-mil.
 - d. Raven Industries, Inc; VaporBlock 15.
 - e. Reef Industries, Inc; Griffolyn 15-mil Green.
 - f. W.R. Meadows, Inc; Perminator, 15-mil.

2.8 CURING MATERIALS

- A. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. when dry.
- B. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.
- C. Water: Potable.
- D. Liquid Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B, for interior work; Type 2 White Pigmented for exterior work, unless other type acceptable to Architect. Moisture loss not more than 0.055 gr/sq cm. when applied at 200 sq. ft./gal.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Anti-Hydro International, Inc. A-H 3 Way Sealer
 - b. Conspec Marketing & Manufacturing Co., Inc. Conspec #1
 - c. Dayton Superior. J-20 Acrylic Cure
 - d. Euclid Chemical Company (The); an RPM company. Encocure
 - e. Kaufman Products, Inc. Sure Cure
 - f. W.R. Meadows, Inc. CS-309
 - g. Sonneborn-Chemrex Inc. Kure & Seal

2.9 RELATED MATERIALS

- A. Expansion- and Isolation-Joint-Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber.
- B. Semirigid Joint Filler: Two-component, semirigid, 100 percent solids, epoxy resin with a Type A shore durometer hardness of 80 in accordance with ASTM D2240.

2.10 REPAIR MATERIALS

- A. Repair Underlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/8 inch and that can be feathered at edges to match adjacent floor elevations.
 - 1. Cement Binder: ASTM C 150/C 150M, portland cement or hydraulic or blended hydraulic cement as defined in ASTM C 219.
 - 2. Primer: Product of underlayment manufacturer recommended for substrate, conditions, and application.

3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch or coarse sand as recommended by underlayment manufacturer.
 4. Compressive Strength: Not less than 4100 psi at 28 days when tested according to ASTM C 109/C 109M.
- B. Repair Overlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/4 inch and that can be filled in over a scarified surface to match adjacent floor elevations.
1. Cement Binder: ASTM C 150/C 150M, portland cement or hydraulic or blended hydraulic cement as defined in ASTM C 219.
 2. Primer: Product of topping manufacturer recommended for substrate, conditions, and application.
 3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch or coarse sand as recommended by topping manufacturer.
 4. Compressive Strength: Not less than 5000 psi at 28 days when tested according to ASTM C 109/C 109M.

2.11 CONCRETE MIXTURES, GENERAL

- A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, according to ACI 301.
1. Use a qualified independent testing agency for preparing and reporting proposed mixture designs based on laboratory trial mixtures.
- B. Cementitious Materials: Limit percentage, by weight, of cementitious materials other than portland cement in concrete as follows:
1. Fly Ash: 20 percent.
 2. Where floor finish Conc-1, fly ash material not allowed.
- C. Limit water-soluble, chloride-ion content in hardened concrete to 0.15 percent by weight of cement.
- D. Admixtures: Use admixtures according to manufacturer's written instructions.
1. Use water-reducing high-range, water-reducing, or plasticizing admixture in concrete, as required, for placement and workability.
 2. Use water-reducing and -retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.

2.12 CONCRETE MIXTURES FOR BUILDING ELEMENTS

- A. Footings: Normal-weight concrete.
1. Minimum Compressive Strength: 4000psi at 28 days.
 2. Maximum W/C Ratio: 0.45.
 3. Slump Limit: 4 inches 8 inches for concrete with verified slump of 2 to 4 inches before adding high-range water-reducing admixture or plasticizing admixture, plus or minus 1 inch.
 4. Air Content: 5.5 percent, plus or minus 1.5 percent at point of delivery for 1-1/2-inch nominal maximum aggregate size.
- B. Foundation Walls and Piers: Normal-weight concrete.
1. Minimum Compressive Strength: 4000 psi at 28 days.
 2. Maximum W/C Ratio: 0.40.
 3. Slump Limit: 4 inches 8 inches for concrete with verified slump of 2 to 4 inches before adding high-range water-reducing admixture or plasticizing admixture, plus or minus 1 inch.
 4. Air Content: 5.5 percent, plus or minus 1.5 percent at point of delivery for 1-1/2-inch nominal maximum aggregate size.

- C. Slabs-on-Grade and suspended slabs (including exterior aprons at overhead doors): Normal-weight concrete.
 - 1. Minimum Compressive Strength: 4000 psi for interior and 4500 psi for exterior at 28 days.
 - 2. Maximum W/C Ratio: 0.44.
 - 3. Minimum Cementitious Materials Content: 520 lb/cu. yd.
 - 4. Slump Limit: 4 inches, plus or minus 1 inch.
 - 5. Air Content: At exterior slabs 6 percent, plus or minus 1.5 percent at point of delivery for 1-inch nominal maximum aggregate size.
 - 6. Air Content: Do not allow air content of trowel-finished interior floors to exceed 3 percent.

2.13 CONCRETE MIXTURES FOR SITE ELEMENTS

- A. Frost slabs, mixing pad, curbs and gutters, walks, dumpster ramp/pad, exterior curbs, catch-basin collars, drives: Normal-weight concrete.
 - 1. Minimum Compressive Strength: 4500psi at 28 days.
 - 2. Maximum W/C Ratio: 0.45.
 - 3. Slump Limit: 3 inches verified slump, plus or minus 1 inch; otherwise 4 inches to 8 inches when adding high-range water-reducing admixture or plasticizing admixture.
 - 4. Air Content: 6 percent, plus or minus 1.5 percent at point of delivery for 1-inch nominal maximum aggregate size.

2.14 FABRICATING REINFORCEMENT

- A. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."

2.15 CONCRETE MIXING

- A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94/C 94M, and furnish batch ticket information.
 - 1. When air temperature is between 85 and 90 deg F, reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F, reduce mixing and delivery time to 60 minutes.

PART 3 - EXECUTION

3.1 FORMWORK INSTALLATION

- A. Design, erect, shore, brace, and maintain formwork, according to ACI 301, to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until structure can support such loads.
- B. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117.
- C. Limit concrete surface irregularities, designated by ACI 347 as abrupt or gradual, as follows:
 - 1. Class A, 1/8 inch for smooth-formed finished surfaces.
 - 2. Class C, 1/2 inch and Class D, 1 inch for rough-formed finished surfaces.
- D. Construct forms tight enough to prevent loss of concrete mortar.
- E. Construct forms for easy removal without hammering or prying against concrete surfaces. Provide crush or wrecking plates where stripping may damage cast-concrete surfaces. Provide top forms for inclined surfaces steeper than 1.5 horizontal to 1 vertical.

1. Install keyways, reglets, recesses, and the like, for easy removal.
 2. Do not use rust-stained steel form-facing material.
- F. Set edge forms, bulkheads, and intermediate screed strips for slabs to achieve required elevations and slopes in finished concrete surfaces. Provide and secure units to support screed strips; use strike-off templates or compacting-type screeds.
- G. Provide temporary openings for cleanouts and inspection ports where interior area of formwork is inaccessible. Close openings with panels tightly fitted to forms and securely braced to prevent loss of concrete mortar. Locate temporary openings in forms at inconspicuous locations.
- H. Chamfer exterior corners and edges of permanently exposed concrete and in following locations:
1. Sill walls
 2. As indicated on drawings
- I. Form openings, chases, offsets, sinkages, keyways, reglets, blocking, screeds, and bulkheads required in the Work. Determine sizes and locations from trades providing such items.
- J. Clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and other debris just before placing concrete.
- K. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.
- L. Coat contact surfaces of forms with form-release agent, according to manufacturer's written instructions, before placing reinforcement.

3.2 EMBEDDED ITEM INSTALLATION

- A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
1. Install anchor rods, accurately located, to elevations required and complying with tolerances in Section 7.5 of AISC 303.
 2. Install reglets to receive waterproofing and to receive through-wall flashings in outer face of concrete frame at exterior walls, where flashing is shown at lintels, shelf angles, and other conditions.
 3. Install dovetail anchor slots in concrete structures as indicated.

3.3 REMOVING AND REUSING FORMS

- A. General: Formwork for sides of beams, walls, columns, and similar parts of the Work that does not support weight of concrete may be removed after cumulatively curing at not less than 50 deg F for 24 hours after placing concrete. Concrete has to be hard enough to not be damaged by form-removal operations, and curing and protection operations need to be maintained.
1. Leave formwork for beam soffits, joists, slabs, and other structural elements that support weight of concrete in place until concrete has achieved at least 70 percent of its 28-day design compressive strength.
 2. Remove forms only if shores have been arranged to permit removal of forms without loosening or disturbing shores.

- B. Clean and repair surfaces of forms to be reused in the Work. Split, frayed, delaminated, or otherwise damaged form-facing material are not acceptable for exposed surfaces. Apply new form-release agent.
- C. When forms are reused, clean surfaces, remove fins and laitance, and tighten to close joints. Align and secure joints to avoid offsets. Do not use patched forms for exposed concrete surfaces unless approved by Architect.

3.4 SHORING AND RESHORING INSTALLATION

- A. Comply with ACI 318 and ACI 301 for design, installation, and removal of shoring and reshoring.
- B. Plan sequence of removal of shores and reshore to avoid damage to concrete. Locate and provide adequate reshoring to support construction without excessive stress or deflection.

3.5 VAPOR-RETARDER INSTALLATION

- A. Sheet Vapor Retarders: Place, protect, and repair sheet vapor retarder according to ASTM E 1643 and manufacturer's written instructions.
 - 1. Lap joints 6 inches and seal with manufacturer's recommended tape.

3.6 STEEL REINFORCEMENT INSTALLATION

- A. General: Comply with CRSI's "Manual of Standard Practice" for fabricating, placing, and supporting reinforcement (reinforcing bars and welded-wire reinforcement).
 - 1. Do not cut or puncture vapor retarder. Repair damage and reseal vapor retarder before placing concrete.
- B. Clean reinforcement of loose rust and mill scale, earth, ice, and other foreign materials that reduce bond to concrete.
- C. Accurately position, support, and secure reinforcement against displacement. Locate and support reinforcement with bar supports to maintain minimum concrete cover. Do not tack weld crossing reinforcing bars.
- D. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.
- E. Install welded-wire reinforcement in longest practicable lengths on bar supports spaced to minimize sagging. Lap edges and ends of adjoining sheets at least one mesh spacing. Offset laps of adjoining sheet widths to prevent continuous laps in either direction. Lace overlaps with wire.
 - 1. Do not walk on or otherwise displace welded-wire reinforcement that has been positioned and supported.
 - 2. Do not attempt to pull welded-wire reinforcement up into plastic concrete after placement.
- F. Epoxy-Coated Reinforcement: Repair cut and damaged epoxy coatings with epoxy repair coating according to ASTM D 3963/D 3963M. Use epoxy-coated steel wire ties to fasten epoxy-coated steel reinforcement.

3.7 JOINTS

- A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.

- B. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.
1. Place joints perpendicular to main reinforcement. Continue reinforcement across construction joints unless otherwise indicated. Do not continue reinforcement through sides of strip placements of floors and slabs.
 2. Form keyed joints as indicated. Embed keys at least 1-1/2 inches into concrete.
 3. Locate horizontal joints in walls and columns at underside of floors, slabs, beams, and girders and at the top of footings or floor slabs.
 4. Space vertical joints in walls as indicated or at 25 feet maximum intervals where not indicated. Locate joints beside piers integral with walls, near corners, and in concealed locations where possible.
- C. Contraction Joints in Slabs-on-Grade: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of concrete thickness as follows:
1. Grooved Joints: Form contraction joints after initial floating by grooving and finishing each edge of joint to a radius of 1/8 inch. Repeat grooving of contraction joints after applying surface finishes. Eliminate groover tool marks on concrete surfaces.
 2. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch-wide joints into concrete when cutting action does not tear, abrade, or otherwise damage surface and before concrete develops random contraction cracks.
- D. Isolation Joints in Slabs-on-Grade: After removing formwork, install joint-filler strips at slab junctions with vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated.
1. Extend joint-filler strips full width and depth of joint, terminating flush with finished concrete surface unless otherwise indicated.
 2. Terminate full-width joint-filler strips not less than 1/2 inch or more than 1 inch below finished concrete surface where joint sealants, specified in Section 07 92 00 "Joint Sealants," are indicated.
 3. Install joint-filler strips in lengths as long as practicable. Where more than one length is required, lace or clip sections together.
- E. Doweled Joints: Install dowel bars and support assemblies at joints where indicated. Lubricate or asphalt coat one-half of dowel length to prevent concrete bonding to one side of joint.

3.8 WATERSTOP INSTALLATION

- A. Self-Expanding Strip Waterstops: Install in construction joints and at other locations indicated, according to manufacturer's written instructions, adhesive bonding, mechanically fastening, and firmly pressing into place. Install in longest lengths practicable.

3.9 CONCRETE PLACEMENT

- A. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections are completed.
- B. Do not add water to concrete during delivery, at Project site, or during placement unless approved by Architect.
- C. Before test sampling and placing concrete, water may be added at Project site, subject to limitations of ACI 301.
1. Do not add water to concrete after adding high-range water-reducing admixtures to mixture.

- D. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete is placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as indicated. Deposit concrete to avoid segregation.
 - 1. Deposit concrete in horizontal layers of depth not to exceed formwork design pressures and in a manner to avoid inclined construction joints.
 - 2. Consolidate placed concrete with mechanical vibrating equipment according to ACI 301.
 - 3. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations to rapidly penetrate placed layer and at least 6 inches into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity. At each insertion, limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing mixture constituents to segregate.
- E. Deposit and consolidate concrete for floors and slabs in a continuous operation, within limits of construction joints, until placement of a panel or section is complete.
 - 1. Consolidate concrete during placement operations, so concrete is thoroughly worked around reinforcement and other embedded items and into corners.
 - 2. Maintain reinforcement in position on chairs during concrete placement.
 - 3. Screed slab surfaces with a straightedge and strike off to correct elevations.
 - 4. Slope surfaces uniformly to drains where required and as indicated on drawings.
 - 5. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane, before excess bleedwater appears on the surface. Do not further disturb slab surfaces before starting finishing operations.

3.10 FINISHING FORMED SURFACES

- A. Rough-Formed Finish: As-cast concrete texture imparted by form-facing material with tie holes and defects repaired and patched. Remove fins and other projections that exceed specified limits on formed-surface irregularities.
 - 1. Apply to concrete surfaces not exposed to view.
- B. Smooth-Formed Finish: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch tie holes and defects. Remove fins and other projections that exceed specified limits on formed-surface irregularities.
 - 1. Apply to concrete surfaces exposed to view or to be covered with a coating or covering material applied directly to concrete.
- C. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces unless otherwise indicated.

3.11 FINISHING FLOORS AND SLABS

- A. General: Comply with ACI 302.1R recommendations for screeding, restraightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.
- B. Float Finish: Consolidate surface with power-driven floats or by hand floating if area is small or inaccessible to power-driven floats. Restraighten, cut down high spots, and fill low spots. Repeat float passes and restraightening until surface is left with a uniform, smooth, granular texture.
 - 1. Apply float finish to surfaces to receive trowel finish.

- C. Broom Finish: Apply a broom finish to exterior concrete slabs, steps, ramps, aprons, and elsewhere as indicated.
 - 1. Immediately after float finishing, slightly roughen trafficked surface by brooming with fiber-bristle broom perpendicular to main traffic route. Coordinate required final finish with Architect before application.

3.12 MISCELLANEOUS CONCRETE ITEM INSTALLATION

- A. Filling In: Fill in holes and openings left in concrete structures after work of other trades is in place unless otherwise indicated. Mix, place, and cure concrete, as specified, to blend with in-place construction. Provide other miscellaneous concrete filling indicated or required to complete the Work.

3.13 CONCRETE PROTECTING AND CURING

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and ACI 301 for hot-weather protection during curing.
- B. Evaporation Retarder: Apply evaporation retarder to unformed concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.
- C. Formed Surfaces: Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces. If forms remain during curing period, moist cure after loosening forms. If removing forms before end of curing period, continue curing for remainder of curing period.
- D. Unformed Surfaces: Begin curing immediately after finishing concrete. Cure unformed surfaces, including floors and slabs, concrete floor toppings, and other surfaces.
- E. Cure concrete according to ACI 308.1, by one or a combination of the following methods:
 - 1. Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials:
 - a. Water.
 - b. Continuous water-fog spray.
 - c. Absorptive cover, water saturated, and kept continuously wet. Cover concrete surfaces and edges with 12-inch lap over adjacent absorptive covers.
 - 2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or tears during curing period, using cover material and waterproof tape.
 - a. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive floor coverings.
 - b. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive penetrating liquid floor treatments.
 - c. Cure concrete surfaces to receive floor coverings with either a moisture-retaining cover or a curing compound that the manufacturer certifies does not interfere with bonding of floor covering used on Project.
 - 3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.

- a. Removal: After curing period has elapsed, remove curing compound without damaging concrete surfaces by method recommended by curing compound manufacturer unless manufacturer certifies curing compound does not interfere with bonding of floor covering used on Project.
- 4. Curing and Sealing Compound: Apply uniformly to floors and slabs indicated in a continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Repeat process 24 hours later and apply a second coat. Maintain continuity of coating and repair damage during curing period.

F. Concrete to cure for minimal of 7 days before adjacent pour to be completed.

3.14 JOINT FILLING

- A. Prepare, clean, and install joint filler according to manufacturer's written instructions.
 - 1. Defer joint filling until concrete has aged at least 60 days. Do not fill joints until construction traffic has permanently ceased.
- B. Remove dirt, debris, saw cuttings, curing compounds, and sealers from joints; leave contact faces of joints clean and dry.
- C. Install semirigid joint filler full depth in saw-cut joints and at least 2 inches deep in formed joints. Overfill joint and trim joint filler flush with top of joint after hardening.

3.15 CONCRETE SURFACE REPAIRS

- A. Defective Concrete: Repair and patch defective areas when approved by Architect. Remove and replace concrete that cannot be repaired and patched to Architect's approval.
- B. Patching Mortar: Mix dry-pack patching mortar, consisting of 1 part portland cement to 2-1/2 parts fine aggregate passing a No. 16 sieve, using only enough water for handling and placing.
- C. Repairing Formed Surfaces: Surface defects include color and texture irregularities, cracks, spalls, air bubbles, honeycombs, rock pockets, fins and other projections on the surface, and stains and other discolorations that cannot be removed by cleaning.
 - 1. Immediately after form removal, cut out honeycombs, rock pockets, and voids more than 1/2 inch in any dimension to solid concrete. Limit cut depth to 3/4 inch. Make edges of cuts perpendicular to concrete surface. Clean, dampen with water, and brush-coat holes and voids with bonding agent. Fill and compact with patching mortar before bonding agent has dried. Fill form-tie voids with patching mortar or cone plugs secured in place with bonding agent.
 - 2. Repair defects on surfaces exposed to view by blending white portland cement and standard portland cement so that, when dry, patching mortar matches surrounding color. Patch a test area at inconspicuous locations to verify mixture and color match before proceeding with patching. Compact mortar in place and strike off slightly higher than surrounding surface.
 - 3. Repair defects on concealed formed surfaces that affect concrete's durability and structural performance as determined by Architect.
- D. Repairing Unformed Surfaces: Test unformed surfaces, such as floors and slabs, for finish and verify surface tolerances specified for each surface. Correct low and high areas. Test surfaces sloped to drain for trueness of slope and smoothness; use a sloped template.
 - 1. Repair finished surfaces containing defects. Surface defects include spalls, popouts, honeycombs, rock pockets, crazing and cracks in excess of 0.01 inch wide or that penetrate

to reinforcement or completely through unreinforced sections regardless of width, and other objectionable conditions.

2. After concrete has cured at least 14 days, correct high areas by grinding.
3. Correct localized low areas during or immediately after completing surface finishing operations by cutting out low areas and replacing with patching mortar. Finish repaired areas to blend into adjacent concrete.
4. Correct other low areas scheduled to receive floor coverings with a repair underlayment. Prepare, mix, and apply repair underlayment and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface. Feather edges to match adjacent floor elevations.
5. Correct other low areas scheduled to remain exposed with a repair topping. Cut out low areas to ensure a minimum repair topping depth of 1/4 inch to match adjacent floor elevations. Prepare, mix, and apply repair topping and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface.
6. Repair defective areas, except random cracks and single holes 1 inch or less in diameter, by cutting out and replacing with fresh concrete. Remove defective areas with clean, square cuts and expose steel reinforcement with at least a 3/4-inch clearance all around. Dampen concrete surfaces in contact with patching concrete and apply bonding agent. Mix patching concrete of same materials and mixture as original concrete, except without coarse aggregate. Place, compact, and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.
7. Repair random cracks and single holes 1 inch or less in diameter with patching mortar. Groove top of cracks and cut out holes to sound concrete and clean off dust, dirt, and loose particles. Dampen cleaned concrete surfaces and apply bonding agent. Place patching mortar before bonding agent has dried. Compact patching mortar and finish to match adjacent concrete. Keep patched area continuously moist for at least 72 hours.

E. Perform structural repairs of concrete, subject to Architect's approval, using epoxy adhesive and patching mortar.

F. Repair materials and installation not specified above may be used, subject to Architect's approval.

3.16 FIELD QUALITY CONTROL

A. Special Inspections: Owner will engage a special inspector and qualified testing and inspecting agency to perform field tests and inspections and prepare test reports.

B. Testing Agency: Engage a qualified testing and inspecting agency to perform tests and inspections and to submit reports.

C. Inspections:

1. Steel reinforcement (reinforcing bars and weld-wire reinforcement placement and support) reinforcement shall be positioned, supported and secured prior to inspection.
2. Headed bolts and anchor rods.
3. Verification of use of required design mixture.
4. Concrete placement, including conveying and depositing.
5. Curing procedures and maintenance of curing temperature.
6. Verification of concrete strength before removal of shores and forms from beams and slabs.

D. Concrete Tests: Testing of composite samples of fresh concrete obtained according to ASTM C 172/C 172M shall be performed according to the following requirements:

1. Testing Frequency: Obtain one composite sample for each day's pour of each concrete mixture exceeding 5 cu. yd., but less than 25 cu. yd., plus one set for each additional 50 cu. yd. or fraction thereof.

- a. When frequency of testing provides fewer than five compressive-strength tests for each concrete mixture, testing shall be conducted from at least five randomly selected batches or from each batch if fewer than five are used.
 2. Slump: ASTM C 143/C 143M; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture. Perform additional tests when concrete consistency appears to change.
 3. Air Content: ASTM C 231/C 231M, pressure method, for normal-weight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
 4. Concrete Temperature: ASTM C 1064/C 1064M; one test hourly when air temperature is 40 deg F and below or 80 deg F and above, and one test for each composite sample.
 5. Compression Test Specimens: ASTM C 31/C 31M.
 - a. Cast and laboratory cure two sets of two standard cylinder specimens for each composite sample.
 6. Compressive-Strength Tests: ASTM C 39/C 39M; test one set of two laboratory-cured specimens at 7 days and one set of two specimens at 28 days.
 - a. Test one set of two field-cured specimens at 7 days and one set of two specimens at 28 days.
 - b. A compressive-strength test shall be the average compressive strength from a set of two specimens obtained from same composite sample and tested at age indicated.
 7. When strength of field-cured cylinders is less than 85 percent of companion laboratory-cured cylinders, Contractor shall evaluate operations and provide corrective procedures for protecting and curing in-place concrete.
 8. Strength of each concrete mixture will be satisfactory if every average of any three consecutive compressive-strength tests equals or exceeds specified compressive strength and no compressive-strength test value falls below specified compressive strength by more than 500 psi.
 9. Test results shall be reported in writing to Architect, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mixture proportions and materials, compressive breaking strength, and type of break for both 7- and 28-day tests.
 10. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Architect but will not be used as sole basis for approval or rejection of concrete.
 11. Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Architect. Testing and inspecting agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42/C 42M or by other methods as directed by Architect.
 12. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
 13. Correct deficiencies in the Work that test reports and inspections indicate do not comply with the Contract Documents.
- E. Measure floor and slab flatness and levelness according to ASTM E 1155 within 72 hours of finishing.

END OF SECTION 03 30 00

SECTION 04 43 13.16 - ADHERED STONE MASONRY VENEER

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Stone masonry adhered to concrete/CMU backup.

1.2 ACTION SUBMITTALS

- A. Product Data: For each variety of stone, stone accessory, and manufactured product.
- B. Samples:
 - 1. For each stone type indicated.
 - 2. For each color of mortar required.

1.3 FIELD CONDITIONS

- A. Protection of Stone Masonry: During construction, cover tops of walls, projections, and sills with waterproof sheeting at end of each day's work.
- B. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Comply with cold-weather construction requirements contained in TMS 602/ACI 530.1/ASCE 6.
 - 1. Cold-Weather Cleaning: Use liquid cleaning methods only when air temperature is 40 deg F and above and will remain so until masonry has dried.
- C. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in TMS 602/ACI 530.1/ASCE 6.

1.4 PERFORMANCE REQUIREMENTS

- A. Backup Wall System and installation method for manufactured stone veneer shall meet the requirements of ASTM C 1780—Standard Practice for Installation Methods for Adhered Manufactured Stone Masonry Veneer.

1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Manufacturer who is a current member of Masonry Veneer Manufacturers Association (MVMA) with a minimum of 5 years documented experience manufacturing and marketing all Manufactured Stone products of the type specified in this section.
- B. Installer Qualifications: Company with documented experience in installation of manufactured masonry of the type specified including at least five projects within a 400 mile (650km) radius of the Project.

PART 2 - PRODUCTS

2.1 CULTURED STONE

- A. Manufactured Stone Veneer Performance Requirements: Conforming to ASTM C 1670 and as follows:
1. Compressive Strength: Not less than 1800 psi (12.4 MPa) average for 5 specimens and not less than 2100 psi (14.4 MPa) for individual specimen when tested in accordance with ASTM C 39 & ASTM C 192.
 2. Bond Between Manufactured Masonry Unit, Mortar and Backing: Not less than 50 psi (345 kPa) when tested in accordance with ASTM C 482 using Type S mortar.
 3. Thermal Resistance: R-value of not less than 0.355 per inch (25.4 mm) of thickness when tested in accordance with ASTM C 177.
 4. Freeze/Thaw: No disintegration and less than 3 percent weight loss when tested in accordance with ASTM C 67.
 5. Water Absorption: Tested in accordance with UBC 15-5 9-22% depending on density value.
 6. Unit Weight: Not more than 15 psf (73 kg/m²) saturated.
 7. Surface Burning Characteristics: Not more than the following when tested in accordance with UL 723:
 - a. Flamespread: 25.
 - b. Smoke Development: 450.
 - c. UV Stable - Mineral oxide pigments.
- B. Varieties and Sources: Subject to compliance with requirements, provide the following:
1. Cultured Stone by Boral, Lake Shore – River Rock
 2. Dutch Quality – Michigan – River Rock
 3. Substitutions as approved.
- C. Dimensions and sizes to complement the existing stone base.

2.2 MORTAR MATERIALS

- A. Portland Cement: ASTM C150/C150M, Type I or Type II, except Type III may be used for cold-weather construction; natural color or white cement may be used as required to produce mortar color indicated.
1. Low-Alkali Cement: Not more than 0.60 percent total alkali when tested according to ASTM C114.
- B. Hydrated Lime: ASTM C207, Type S.
- C. Latex Additive: Manufacturer's standard water emulsion, serving as replacement for part or all of gaging water, of type specifically recommended by latex-additive manufacturer for use with field-mixed portland cement mortar bed, and not containing a retarder.
- D. Water: Potable.

2.3 EMBEDDED FLASHING MATERIALS

- A. Metal Flashing: Provide metal flashing complying with SMACNA's "Architectural Sheet Metal Manual" and as follows:
1. Stainless Steel: ASTM A240/A240M, Type 304, 0.016 inch thick.
 2. Fabricate continuous flashings in sections 96 inches long minimum, but not exceeding 12 feet. Provide splice plates at joints of formed, smooth metal flashing.

3. Fabricate metal sealant stops from stainless steel. Extend at least 3 inches into wall and out to exterior face of wall. At exterior face of wall, bend metal back on itself for 3/4 inch and down into joint 1/4 inch to form a stop for retaining sealant backer rod.

B. Flexible Flashing: For flashing unexposed to the exterior, use one of the following unless otherwise indicated:

1. Rubberized-Asphalt Flashing: Composite flashing product consisting of a pliable, adhesive, rubberized-asphalt compound, bonded to a high-density, cross-laminated, polyethylene film to produce an overall thickness of not less than 0.030 inch.

2.4 MISCELLANEOUS MASONRY ACCESSORIES

A. Weep Products: Use the following unless otherwise indicated:

1. Mesh Weep Holes: Free-draining mesh; made from polyethylene strands, full width of head joint and 2 inches high by thickness of stone masonry; in color selected from manufacturer's standard. Lay horizontally at base of stone above flashing.

2.5 FABRICATION

A. Select stone to produce pieces of thickness, size, and shape indicated, including details on Drawings and pattern specified in "Setting Stone Masonry" Article.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Do not begin installation until substrates have been properly prepared in conformance with ASTM C 1780 for the backup wall system indicated on the Drawings.
- B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2 PREPARATION

3.3 Clean surfaces thoroughly prior to installation.

3.4 Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.5 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install manufactured stone masonry veneer in accordance with MVMA Installation Guide for Adhered Manufactured Stone Veneer, ASTM C 1780 and applicable Codes.
- C. Install/Apply Related Materials in accordance with type of substrate and manufactured stone veneer manufacture's installation instructions.
- D. General:
 1. Walls: Provide with Blended Color / Texture specified.
- E. Mortar Joints
 1. Style:

2. Wide joint to match existing visual look
3. Strike all grout joints flush.
4. Tool all grout joints.

F. Stone Direction:

1. Random placement

G. Seal all joints at wall openings and penetrations with a sealant approved for use with masonry products.

3.6 FIELD QUALITY CONTROL

A. Manufacturer's Field Services: Provide periodic site visits as requested by Architect. Report any discrepancies to the Contractor with copies to the Architect within 24 hours of each visit.

3.7 CLEANING

A. Clean manufactured masonry in accordance with manufacturer's installation instructions

3.8 PROTECTION

A. Protect finished work from rain and work on either side of the wall during and for 48 hours following installation.

B. Protect installed products until completion of project.

C. Clean prior to project closeout.

D. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION 04 43 13.16

SECTION 05 52 00 - METAL RAILINGS

PART 1 - GENERAL

1.1 SUMMARY

- A. Work Results:
 - 1. Provide exterior aluminum handrail systems.
- B. Principal Products:
 - 1. Aluminum handrail.
 - 2. Aluminum baluster.
 - 3. Aluminum post.

1.2 ADMINISTRATIVE REQUIREMENTS

- A. Preinstallation Conference: Conduct conference at Project site.
 - 1. Review methods and procedures related to railing system installation, including manufacturer's written instructions.
 - 2. Review railing system connection details and condition of other construction that affects railing system.

1.3 ACTION SUBMITTALS

- A. Product Data: Of Manufacturer's product lines for railings assembled from standard components.
 - 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
 - 2. Include rated capacities, furnished specialties, and accessories.
- B. Shop Drawings:
 - 1. Include plans, elevations, sections, and attachment details.
 - 2. Include details of equipment assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
- C. Samples for Verification: For each type of exposed finish..
 - 1. Sections of each distinctly different linear railing member, including handrails, top rails, posts, and balusters.
 - 2. Fittings and brackets.
 - 3. Assembled Samples of railing systems, made from full-size components, including top rail, post, handrail, and infill. Show method of finishing members at intersections. Samples need not be full height.
- D. Delegated-Design Submittal: For handrail systems, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For manufacturer and Installer.
- B. Sample Warranty: For manufacturer's warranty.

C. Welding Certificates.

1.5 CLOSEOUT SUBMITTALS

A. Cleaning Instructions.

1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications: A railings system manufacturer who is a member in good standing with PCI and AAMA.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Delivery and Acceptance Requirements: Deliver materials to site in manufacturer's original, unopened containers and packaging, with labels clearly identifying product name and manufacturer.

B. Storage and Handling Requirements:

1. Store and handle materials in accordance with manufacturer's instructions.
2. Keep materials in manufacturer's original, unopened containers and packaging until installation.
3. Store materials in clean, dry area.
4. Keep materials dry.
5. Protect materials and finish during storage, handling, and installation to prevent damage.

1.8 WARRANTY

A. Manufacturer's Warranty: Manufacturer agrees to repair or replace components of handrail system that fail in materials or workmanship within specified warranty period.

1. Warranty does not include the failures caused by the following:
 - a. Damage caused by faulty installation, or from improper application.
 - b. Damage attributable to fire, violent storms, earthquake or other Acts of God, accidents, vandalism, or other casualties, impact of objects, or exposure to atmospheric pollutants or conditions other than natural weather processes.
 - c. Any materials not supplied by railing system manufacturer.
 - d. Cost of installation or removal, freight, labor and similar costs.
 - e. Any incidental or consequential damages.
 - f. Installations where the atmosphere is influenced by bodies of salt water (or other contaminant conditions) must adhere to the railing system manufacturer's cleaning and maintenance guidelines.
2. Warranty Period: Lifetime Limited Warranty from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS, ALUMINUM RAILING SYSTEMS

A. Basis-of-Design Product Railing System: Subject to compliance with requirements, provide Digger Specialties, Inc.; Westbury® Aluminum Railing, Tuscany Series Style C10 or comparable product by one of the following:

1. Laurence, C. R. Co., Inc.
2. Key-Link Fencing & Railing, Inc.
3. Trex Company, Inc.

B. Basis-of-Design Product Handrail System: Subject to compliance with requirements, provide Digger Specialties, Inc.; Westbury® Aluminum Railing, Aluminum Continuous Handrail, Style CHR or comparable product by one of the following:

1. Laurence, C. R. Co., Inc.
2. Key-Link Fencing & Railing, Inc.
3. Trex Company, Inc.

C. Source Limitations: Obtain metal railing systems from single source from single manufacturer.

2.2 ALUMINUM HANDRAILS

A. Basis-of-Design Product: Subject to compliance with requirements, provide Digger Specialties, Inc.; Westbury® Aluminum Railing, Aluminum Continuous Handrail, Style CHR or comparable product by one of the following:

1. Laurence, C. R. Co., Inc.
2. Key-Link Fencing & Railing, Inc.
3. Trex Company, Inc.

2.3 PERFORMANCE REQUIREMENTS

A. Delegated Design: Engage a qualified professional engineer, as defined in Section 01 40 00 "Quality Requirements," to design railings, including attachment to building construction.

B. Structural Performance: Railings, including attachment to building construction, shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:

1. Handrails and Top Rails of Guards:
 - a. Uniform load of 50 lbf/ ft. applied in any direction.
 - b. Concentrated load of 200 lbf applied in any direction.
 - c. Uniform and concentrated loads need not be assumed to act concurrently.
2. Infill of Guards:
 - a. Concentrated load of 50 lbf applied horizontally on an area of 1 sq. ft..
 - b. Infill load and other loads need not be assumed to act concurrently.

C. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes.

1. Temperature Change: 120 deg F, ambient; 180 deg F.

D. Surface-Burning Characteristics: Comply with ASTM E 84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Flame-Spread Index: 35 or less.
2. Smoke-Developed Index: 50 or less.

E. Regulatory Requirements: Comply with applicable provisions in ICC A117.1.

2.4 ALUMINUM

A. Aluminum, General: Provide alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated, and with not less than the strength and durability properties of alloy and temper designated below for each aluminum form required.

B. Provide aluminum of the following alloys, according to ASTM B 221, as required to meeting performance requirements:

1. Posts: 6063-T6.

2. Balusters: 6063-T6.
3. Railings: 6005-T5
4. Plates: 6061-T6 or 6063-T6.

2.5 ACCESSORIES

- A. General: Provide manufacture's standard accessories as required for complete railing system as indicated on the drawings and as required to comply with performance requirements.
- B. Caps: Square, aluminum cap trim, size to correspond to specified posts.
 1. Type: Plain, low pyramidal (flat) cap.
 2. Approximate Dimensions: 2.25 inches wide by 1.00 inch high.
- C. Base Trim Sleeve: Aluminum base trim, size to correspond to specified posts, of pattern indicated on the Drawings.

2.6 FASTENERS

- A. General: Type 304 stainless-steel fasteners.
 1. Provide exposed fasteners with finish matching appearance, including color and texture, of railings.
- B. Fasteners for Anchoring Railings to Other Construction: Select fasteners of type, grade, and class required to produce connections suitable for anchoring railings to other types of construction indicated and capable of withstanding design loads.
- C. Fasteners for Interconnecting Railing Components:
 1. Provide concealed fasteners for interconnecting railing components and for attaching them to other work, unless otherwise indicated.
 2. Provide concealed fasteners for interconnecting railing components and for attaching them to other work, unless exposed fasteners are unavoidable or are the standard fastening method for railings indicated.
 3. Provide tamper-resistant flat-head machine screws for exposed fasteners unless otherwise indicated.
- D. Post-Installed Anchors: Torque-controlled expansion anchors or chemical anchors capable of sustaining, without failure, a load equal to 6 times the load imposed when installed in unit masonry and 4 times the load imposed when installed in concrete, as determined by testing according to ASTM E 488/E 488M, conducted by a qualified independent testing agency.

2.7 MISCELLANEOUS MATERIALS

- A. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187/D 1187M.
- B. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107/C 1107M. Provide grout specifically recommended by manufacturer for interior and exterior applications.
- C. Anchoring Cement: Factory-packaged, nonshrink, nonstaining, hydraulic-controlled expansion cement formulation for mixing with water at Project site to create pourable anchoring, patching, and grouting compound.
 1. Water-Resistant Product: At exterior locations provide formulation that is resistant to erosion from water exposure without needing protection by a sealer or waterproof coating and that is recommended by manufacturer for exterior use.

- D. Reinforcing: Aluminum extrusions and plates as required to comply with performance requirements.
- E. Shims: Stainless steel, ASTM A 666, Type 304.

2.8 FABRICATION

- A. General: Fabricate railings to comply with requirements indicated for design, dimensions, member sizes and spacing, details, finish, and anchorage, but not less than that required to support structural loads.
- B. Cut, drill, and punch aluminum cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.
- C. Fabricate connections that are exposed to weather in a manner that excludes water. Provide weep holes where water may accumulate.
- D. Form Changes in Direction as Follows:
 - 1. By bending to manufacturer's standard radius.
 - 2. By custom radius bends of radius indicated.
 - 3. Do not use prefabricated elbow insert fittings.
- E. For changes in direction made by bending, use jigs to produce uniform curvature for each repetitive configuration required. Maintain cross section of member throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of components.
- F. Provide wall returns at ends of wall-mounted handrails unless otherwise indicated. Close ends of returns unless clearance between end of rail and wall is 1/4 inch or less.
- G. Brackets, Flanges, Fittings, and Anchors: Provide wall brackets, flanges, miscellaneous fittings, and anchors to interconnect railing members to other work unless otherwise indicated.
 - 1. At brackets and fittings fastened to plaster or gypsum board partitions, provide crush-resistant fillers or other means to transfer loads through wall finishes to structural supports and prevent bracket or fitting rotation and crushing of substrate.
- H. Provide inserts and other anchorage devices for connecting railings to concrete or masonry work.
 - 1. Fabricate anchorage devices capable of withstanding loads imposed by railings as required to comply with Performance Requirements.
 - 2. Coordinate anchorage devices with supporting structure.
- I. For railing posts set in concrete, provide steel sleeves not less than 6 inches long with inside dimensions not less than 1/2 inch greater than outside dimensions of post, with metal plate forming bottom closure.

2.9 ALUMINUM FINISHES

- A. Powder-Coat Finish: AAMA 2604 except with a minimum dry film thickness of 1.5 mils. Comply with coating manufacturer's written instructions for cleaning, conversion coating, and applying and baking finish.
 - 1. Color and Gloss: Black Fine Texture.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrate,s where reinforced to receive anchors, to verify that locations of concealed reinforcements are clearly marked for Installer. Locate reinforcements and mark locations if not already done.
- B. Examine substrates and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- C. Prepare written report, endorsed by Installer, listing conditions detrimental to performance..
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

- A. Fit exposed connections together to form tight, hairline joints.
- B. Perform cutting, drilling, and fitting required for installing railings. Set railings accurately in location, alignment, and elevation; measured from established lines and levels and free of rack.
 - 1. Do not weld, cut, or abrade surfaces of railing components that are coated or finished after fabrication and that are intended for field connection by mechanical or other means without further cutting or fitting.
 - 2. Set posts plumb within a tolerance of 1/16 inch in 3 feet.
 - 3. Align rails so variations from level for horizontal members and variations from parallel with rake of steps and ramps for sloping members do not exceed .
- C. Control of Corrosion: Prevent galvanic action and other forms of corrosion by insulating metals and other materials from direct contact with incompatible materials.
 - 1. Coat, with a heavy coat of bituminous paint, concealed surfaces of aluminum that are in contact with grout, concrete, masonry, wood, or dissimilar metals.
- D. Adjust railings before anchoring to ensure matching alignment at abutting joints.
- E. Fastening to In-Place Construction: Use anchorage devices and fasteners where necessary for securing railings and for properly transferring loads to in-place construction.

3.3 RAILING CONNECTIONS

- A. Nonwelded Connections: Use mechanical or adhesive joints for permanently connecting railing components. Seal recessed holes of exposed locking screws using plastic cement filler colored to match finish of railings.
- B. Welded Connections: Use fully welded joints for permanently connecting railing components. Comply with requirements for welded connections in "Fabrication" Article whether welding is performed in the shop or in the field.
- C. Expansion Joints: Install expansion joints at locations indicated but not farther apart than required to accommodate thermal movement. Provide slip-joint internal sleeve extending 2 inches (50 mm) beyond joint on either side, fasten internal sleeve securely to one side, and locate joint within 6 inches (150 mm) of post.

3.4 ANCHORING POSTS

A. Form or core-drill holes not less than 5 inches (125 mm) deep and 3/4 inch (20 mm) larger than OD of post for installing posts in concrete. Clean holes of loose material, insert posts, and fill annular space between post and concrete with nonshrink, nonmetallic grout or anchoring cement, mixed and placed to comply with anchoring material manufacturer's written instructions.

B. Cover anchorage joint with flange of same metal as post, attached to post with set screws.

3.5 ATTACHING RAILINGS

A. Anchor railing ends at walls with round flanges anchored to wall construction and connected to railing ends using nonwelded connections.

B. Attach railings to wall with wall brackets.

C. Locate brackets as indicated or, if not indicated, at spacing required to support structural loads.
1. Maximum Spacing: 8 feet (2400 mm).

D. Secure wall brackets and railing end flanges to building construction as follows:

1. For concrete and solid masonry anchorage, use drilled-in expansion shields and hanger or lag bolts.
2. For wood stud partitions, use hanger or lag bolts set into studs or wood backing between studs. Coordinate with carpentry work to locate backing members.

3.6 ERECTION TOLERANCES

A. Set posts plumb within a tolerance of 1/16 inch in 3 feet (2 mm in 1 m).

B. Align rails so variations from level for horizontal members and variations from parallel with rake of steps and ramps for sloping members do not exceed 1/4 inch in 12 feet (5 mm in 3 m).

3.7 ADJUSTING AND CLEANING

A. Adjust hardware to function smoothly, and lubricate as recommended by manufacturer.

B. Clean railing system by washing thoroughly with clean water and soap and rinsing with clean water.

3.8 PROTECTION

A. Protect finishes of railings from damage during construction period with temporary protective coverings approved by railing manufacturer. Remove protective coverings at time of Substantial Completion.

END OF SECTION

SECTION 06 10 00 - ROUGH CARPENTRY

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Framing with dimension lumber.
2. Wood blocking and nailers.
3. Wood-preserved-treated materials
4. Engineered wood products
5. Glue laminated wood beams.

B. Related Requirements:

1. Section 06 16 00 "Sheathing" for sheathing, subflooring, and underlayment.
2. Section 06 17 53 "Shop-Fabricated Wood Trusses" for wood trusses made from dimension lumber.

1.2 DEFINITIONS

A. Boards or Strips: Lumber of less than 2 inches nominal size in least dimension.

B. Dimension Lumber: Lumber of 2 inches nominal size or greater but less than 5 inches nominal size in least dimension.

C. Exposed Framing: Framing not concealed by other construction.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.

1. Include data for wood-preserved treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Indicate type of preservative used and net amount of preservative retained.
2. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.

1.4 INFORMATIONAL SUBMITTALS

A. Material Certificates: For dimension lumber specified to comply with minimum allowable unit stresses. Indicate species and grade selected for each use and design values approved by the ALSC Board of Review.

B. Evaluation Reports: For the following, from ICC-ES:

1. Wood-preserved-treated wood.
2. Engineered wood products
3. Power-driven fasteners.
4. Post-installed anchors.
5. Metal framing anchors.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Stack wood products flat with spacers beneath and between each bundle to provide air circulation. Protect wood products from weather by covering with waterproof sheeting, securely anchored. Provide for air circulation around stacks and under coverings.
- B. Follow manufacturers instructions for handling and storage of materials and systems.

PART 2 - PRODUCTS

2.1 WOOD PRODUCTS, GENERAL

- A. Lumber: DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, comply with the applicable rules of any rules-writing agency certified by the ALSC Board of Review. Grade lumber by an agency certified by the ALSC Board of Review to inspect and grade lumber under the rules indicated.
 - 1. Factory mark each piece of lumber with grade stamp of grading agency.
 - 2. Dress lumber, S4S, unless otherwise indicated.
- B. Maximum Moisture Content of Lumber: 19 percent unless otherwise indicated.
- C. Engineered Wood Products: Acceptable to authorities having jurisdiction and for which current model code research or evaluation reports exist that show compliance with building code in effect for Project.
 - 1. Allowable Design Stresses: Meet or exceed those indicated per manufacturer's published values determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency.

2.2 WOOD-PRESERVATIVE-TREATED LUMBER

- A. Preservative Treatment by Pressure Process: AWP A U1; Use Category UC2 for interior construction not in contact with ground, Use Category UC3b for exterior construction not in contact with ground, and Use Category UC4a for items in contact with ground.
 - 1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium. Do not use inorganic boron (SBX).
- B. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Do not use material that is warped or that does not comply with requirements for untreated material.
- C. Mark lumber with treatment quality mark of an inspection agency approved by the ALSC Board of Review.
- D. Application: Treat items indicated on Drawings, and the following:
 - 1. Wood cants, nailers, curbs, equipment support bases, blocking, stripping, and similar members in connection with roofing, flashing, vapor barriers, and waterproofing.
 - 2. Wood sills, sleepers, blocking, and similar concealed members in contact with masonry or concrete.
 - 3. Wood floor or wall plates that are installed over concrete walls or slabs-on-grade.

2.3 DIMENSION LUMBER FRAMING

- A. General: Of grades indicated according to the American Lumber Standards Committee National Grading Rule provisions of the grading agency indicated.
- B. Load-Bearing Partitions: No. 2 grade; studs.
 - 1. Application: Exterior and interior walls.
 - 2. Species:
 - a. Southern pine; SPIB.
 - b. Douglas fir-larch; WCLIB or WWPA.
 - c. Hem-fir; WCLIB or WWPA.
- C. Load-Bearing Partitions: No. 2 grade; bottom plates.
 - 1. Application: Exterior and interior walls.
 - 2. Species:
 - a. Southern pine; SPIB.
- D. Load-Bearing Partitions: select grade; top plates.
 - 1. Application: Exterior and interior walls.
 - 2. Species:
 - a. Southern pine; SPIB.
 - b. Douglas fir-larch; WCLIB or WWPA.
 - c. Hem-fir; WCLIB or WWPA.
- E. Headers, Joists, Rafters, Bracing and Other Framing Not Listed Above: No. 2 grade.
 - 1. Species:
 - a. Southern pine; SPIB.
 - b. Douglas fir-larch; WCLIB or WWPA.
 - c. Hem-fir; WCLIB or WWPA.

2.4 ENGINEERED WOOD PRODUCTS

- A. Laminated-Veneer Lumber: Composite of wood veneers with grain primarily parallel to member lengths, manufactured with exterior-type adhesive complying with ASTM D 2559. Allowable design values determined according to ASTM D 5456.
 - 1. Manufacturers:
 - a. Louisiana Pacific
 - b. Weyerhaeuser
 - c. Boise Cascade Corporation
 - 2. Extreme Fiber Stress in Bending, Edgewise: 3100 psi for 12-inch nominal-depth members.
 - 3. Modulus of Elasticity, Edgewise: 2,000,000 psi .
- B. Rim Boards: Performance-rated product complying with APA PRR-401.
 - 1. Material: Composite panels.
 - 2. Thickness and Grade: 1 1/2-inch Timberstrand rim board.
 - 3. Trademark: Factory mark with APA trademark indicating thickness, grade, and compliance with APA standard.
- C. Wood Joists: Performance-rated product complying with APA PRI-400
 - 1. Materials: LVL Flange members, web material shall be equivalent to Performance Plus OSB.
 - 2. Size: As indicated on drawings.
 - 3. Trademark: Factory mark with APA trademark indicating thickness, grade, and compliance with APA standard.

- D. Parallel Strand Lumber (PSL)
 - 1. Extreme Fiber Stress F_D : 2900 psi.
 - 2. Shear Stress: 290 psi.
 - 3. $E = 2,000,000$ psi.

2.5 GLUE LAMINATED WOOD BEAMS

- A. Manufacturer: Anthony Forest Products Co.
 - 1. Power Beam, size as indicated on drawings.
- B. Properties:
 - 1. Deflection is limited to $L/360$ for Live Load and $L/240$ for Total Load

2.6 MISCELLANEOUS LUMBER

- A. General: Provide miscellaneous lumber indicated and lumber for support or attachment of other construction, including the following:
 - 1. Blocking.
 - 2. Nailers.
- B. Dimension Lumber Items: No. 2 grade lumber of any of the following species:
 - 1. Southern pine; SPIB.
 - 2. Spruce-pine-fir; NLGA.
 - 3. Hem-fir; WCLIB or WWPA.
 - 4. Douglas fir-larch; WCLIB or WWPA
- C. For blocking and nailers used for attachment of other construction, select and cut lumber to eliminate knots and other defects that will interfere with attachment of other work.

2.7 FASTENERS

- A. General: Fasteners shall be of size and type indicated and shall comply with requirements specified in this article for material and manufacture.
 - 1. Where rough carpentry is exposed to weather, in ground contact, pressure-preservative treated, or in area of high relative humidity, provide fasteners with hot-dip zinc coating complying with ASTM A 153/A 153M or Type 304 stainless steel.
- B. Nails, Brads, and Staples: ASTM F 1667.
- C. Power-Driven Fasteners: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC70.
- D. Post-Installed Anchors: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC01 ICC-ES AC58 ICC-ES AC193 or ICC-ES AC308 as appropriate for the substrate.
 - 1. Material: Carbon-steel components, hot dipped galvanized to comply with ASTM A 153.
 - 2. Material: Stainless steel with bolts and nuts complying with ASTM F 593 and ASTM F 594, Alloy Group 2.

2.8 METAL FRAMING ANCHORS

- A. Allowable design loads, as published by manufacturer, shall meet or exceed those of products of manufacturers listed. Manufacturer's published values shall be determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed

by a qualified independent testing agency. Framing anchors shall be punched for fasteners adequate to withstand same loads as framing anchors.

- B. Galvanized-Steel Sheet: Hot-dip, zinc-coated steel sheet complying with ASTM A 653/A 653M, G60 coating designation.
 - 1. Use for interior locations unless otherwise indicated.
- C. Hot-Dip, Heavy-Galvanized Steel Sheet: ASTM A 653/A 653M; structural steel (SS), high-strength low-alloy steel Type A (HSLAS Type A), or high-strength low-alloy steel Type B (HSLAS Type B); G185 coating designation; and not less than 0.036 inch thick.
 - 1. Use for wood-preserved-treated lumber and where indicated.
- D. Stainless-Steel Sheet: ASTM A 666, Type 304 or Type 316.
 - 1. Use for exterior locations and where indicated.
- E. Truss Tie-Downs (Hurricane or Seismic Ties): Bent strap tie for fastening roof trusses to wall studs below as indicated on Drawings. Tie fits over bottom chord of truss and fastens to both sides of truss, face of top plates, and face of stud below.
- F. Hold-Downs: Brackets for bolting to wall studs and securing to foundation walls with anchor rod with threaded rods and designed with first of two bolts placed seven bolt diameters from end of studs.
 - 1. Bolt Diameter: 7/8 inch.
 - 2. Width: 3-1/2 inches.
 - 3. Body Thickness: 0.239 inch.
 - 4. Base Thickness: 0.239 inch.

2.9 MISCELLANEOUS MATERIALS

- A. Sill-Sealer Gaskets: Closed-cell neoprene foam, 1/4 inch thick, selected from manufacturer's standard widths to suit width of sill members indicated.
- B. Flexible Flashing: Composite, self-adhesive, flashing product consisting of a pliable, butyl rubber or rubberized-asphalt compound, bonded to a high-density polyethylene film, aluminum foil, or spunbonded polyolefin to produce an overall thickness of not less than 0.025 inch.
- C. Glue for wood construction shall conform to APA specification AFG-0.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Framing Standard: Comply with AF&PA's WCD 1, "Details for Conventional Wood Frame Construction," unless otherwise indicated.
- B. Framing with Engineered Wood Products: Install to comply with manufacturer's written instructions.
- C. Comply with applicable recommendations contained in APA Form No. E30K, "APA Design/Construction Guide: Residential & Commercial," for types of structural-use panels and applications indicated.
 - 1. Comply with "Code Plus" provisions in above-referenced guide.

- D. Set rough carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit rough carpentry accurately to other construction. Locate nailers, blocking, and similar supports to comply with requirements for attaching other construction.
- E. Install plywood backing panels by fastening to studs; coordinate locations with utilities requiring backing panels. Install fire-retardant-treated plywood backing panels with classification marking of testing agency exposed to view.
- F. Install metal framing anchors to comply with manufacturer's written instructions. Install fasteners through each fastener hole.
- G. Install sill sealer gasket to form continuous seal between sill plates and foundation walls.
- H. Do not splice structural members between supports unless otherwise indicated.
- I. Provide blocking and framing as indicated and as required to support facing materials, fixtures, specialty items, and trim.
- J. Sort and select lumber so that natural characteristics do not interfere with installation or with fastening other materials to lumber. Do not use materials with defects that interfere with function of member or pieces that are too small to use with minimum number of joints or optimum joint arrangement.
- K. Comply with AWPA M4 for applying field treatment to cut surfaces of preservative-treated lumber.
 - 1. Use copper naphthenate.
- L. Where wood-preservative-treated lumber is installed adjacent to metal decking, install continuous flexible flashing separator between wood and metal decking.
- M. Securely attach rough carpentry work to substrate by anchoring and fastening as indicated, complying with the following:
 - 1. Table 2304.10.1, "Fastening Schedule," in Michigan Building Code (MBC).
 - 2. ICC-ES evaluation report for fastener.
- N. Use steel common nails unless otherwise indicated. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections between members. Install fasteners without splitting wood. Drive nails snug but do not countersink nail heads unless otherwise indicated.
- O. For exposed work, arrange fasteners in straight rows parallel with edges of members, with fasteners evenly spaced, and with adjacent rows staggered.
 - 1. Use common nails unless otherwise indicated. Drive nails snug but do not countersink nail heads.

3.2 WOOD BLOCKING, AND NAILER INSTALLATION

- A. Install where indicated and where required for attaching other work. Form to shapes indicated and cut as required for true line and level of attached work. Coordinate locations with other work involved.
- B. Attach items to substrates to support applied loading. Recess bolts and nuts flush with surfaces unless otherwise indicated.

3.3 WALL AND PARTITION FRAMING INSTALLATION

- A. General: Provide single bottom plate and double top plates using members of 2-inch nominal thickness whose widths equal that of studs, except single top plate may be used for non-load-bearing partitions. Fasten plates to supporting construction unless otherwise indicated.
 - 1. For exterior walls, provide 2-by-6-inch nominal-size wood studs spaced 16 inches o.c. unless otherwise indicated.
 - 2. Provide continuous horizontal blocking at midheight of partitions more than 96 inches high, using members of 2-inch nominal thickness and of same width as wall or partitions.
- B. Construct corners and intersections with three or more studs.
- C. Frame openings with multiple studs and headers. Provide nailed header members of thickness equal to width of studs. Support headers on jamb studs.
 - 1. For non-load-bearing partitions, provide double-jamb studs and headers not less than 4-inch nominal depth for openings 48 inches and less in width, 6-inch nominal depth for openings 48 to 72 inches in width, 8-inch nominal depth for openings 72 to 120 inches in width, and not less than 10-inch nominal depth for openings 10 to 12 feet in width, unless otherwise noted.
 - 2. For load-bearing walls, provide double-jamb king studs for openings 60 inches and less in width, and triple-jamb king studs for wider openings. Provide headers of depth indicated.

END OF SECTION 06 10 00

SECTION 06 16 00 - SHEATHING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:

- 1. Wall sheathing.
- 2. Roof sheathing.
- 3. Subflooring.

- B. Related Requirements:

- 1. Section 07 25 00 "Weather Barriers" for water-resistive barrier applied over wall sheathing.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.

- 1. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated plywood complies with requirements. Indicate type of preservative used and net amount of preservative retained.
- 2. For products receiving waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.

1.4 INFORMATIONAL SUBMITTALS

- A. Evaluation Reports: For the following, from ICC-ES:

- 1. Wood-preservative-treated plywood.

1.5 QUALITY ASSURANCE

- A. Testing Agency Qualifications: For testing agency providing classification marking for fire-retardant-treated material, an inspection agency acceptable to authorities having jurisdiction that periodically performs inspections to verify that the material bearing the classification marking is representative of the material tested.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Stack panels flat with spacers beneath and between each bundle to provide air circulation. Protect sheathing from weather by covering with waterproof sheeting, securely anchored. Provide for air circulation around stacks and under coverings.

PART 2 - PRODUCTS

2.1 WOOD PANEL PRODUCTS

- A. Emissions: Products shall meet the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
- B. Thickness: As needed to comply with requirements specified, but not less than thickness indicated.
- C. Factory mark panels to indicate compliance with applicable standard.

2.2 PRESERVATIVE-TREATED PLYWOOD

- A. Preservative Treatment by Pressure Process: AWP A U1; Use Category UC2 for interior construction not in contact with ground, Use Category UC3b for exterior construction not in contact with ground, and Use Category UC4a for items in contact with ground.
 - 1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium.
- B. Mark plywood with appropriate classification marking of an inspection agency acceptable to authorities having jurisdiction.
- C. Application: Treat items indicated on Drawings and plywood in contact with masonry or concrete or used with roofing, flashing, vapor barriers, and waterproofing.

2.3 WALL SHEATHING

- A. Plywood Sheathing: Either DOC PS 1 or DOC PS 2, Exposure 1 sheathing.
 - 1. Span Rating: Not less than 24/16.
 - 2. Nominal Thickness: Not less than 5/8 inch.

2.4 ROOF SHEATHING

- A. Plywood Sheathing: Either DOC PS 1 or DOC PS 2, Exposure 1 sheathing.
 - 1. Span Rating: Not less than 24/0.
 - 2. Nominal Thickness: Not less than 5/8 inch.

2.5 SUBFLOORING AND UNDERLAYMENT

- A. Plywood Subflooring: Either DOC PS 1 or DOC PS 2, Exposure 1 single-floor panels or sheathing with tongue and groove edges.
 - 1. Span Rating: Not less than 24/16.
 - 2. Nominal Thickness: Not less than 3/4 inch.

2.6 FASTENERS AND GLUE

- A. General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.
- B. Nails, Brads, and Staples: ASTM F 1667.

- C. Power-Driven Fasteners: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC70.
- D. Screws for Fastening Sheathing to Wood Framing: ASTM C 1002.
- E. Screws for Fastening Wood Structural Panels to Cold-Formed Metal Framing: ASTM C 954, except with wafer heads and reamer wings, length as recommended by screw manufacturer for material being fastened.
- F. Glue for wood construction shall comply with APA specification AFG-01.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Do not use materials with defects that impair quality of sheathing or pieces that are too small to use with minimum number of joints or optimum joint arrangement. Arrange joints so that pieces do not span between fewer than three support members.
- B. Cut panels at penetrations, edges, and other obstructions of work; fit tightly against abutting construction unless otherwise indicated.
- C. Securely attach to substrate by fastening as indicated. If not indicated comply with the following:
 - 1. Table 2304.10.1, "Fastening Schedule," in the Michigan Building Code.
 - 2. ICC-ES evaluation report for fastener.
 - 3. At attachment of subfloor to floor framing, provide a continuous bead of glue to each floor framing member prior to placing the subfloor panel.
- D. Use common wire nails unless otherwise indicated. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections. Install fasteners without splitting wood.
- E. Coordinate wall and roof sheathing installation with flashing and joint-sealant installation so these materials are installed in sequence and manner that prevent exterior moisture from passing through completed assembly.
- F. Coordinate sheathing installation with installation of materials installed over sheathing so sheathing is not exposed to precipitation or left exposed at end of the workday when rain is forecast.

3.2 WOOD STRUCTURAL PANEL INSTALLATION

- A. General: Comply with applicable recommendations in APA Form No. E30, "Engineered Wood Construction Guide," for types of structural-use panels and applications indicated.
- B. Fastening Methods: Fasten panels as indicated below:
 - 1. Subflooring:
 - a. Glue and nail to wood framing.
 - b. Space panels 1/8 inch apart at edges and ends.
 - 2. Wall and Roof Sheathing:
 - a. Nail to wood framing.
 - b. Space panels 1/8 inch apart at edges and ends.

END OF SECTION 06 16 00

SECTION 06 17 53 - SHOP-FABRICATED WOOD TRUSSES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Wood roof trusses.
 - 2. Wood truss bracing.
 - 3. Metal truss accessories.

1.2 DEFINITIONS

- A. Metal-Plate-Connected Wood Trusses: Planar structural units consisting of metal-plate-connected members fabricated from dimension lumber and cut and assembled before delivery to Project site.

1.3 ACTION SUBMITTALS

- A. Product Data: For metal-plate connectors, metal truss accessories, and fasteners.
- B. Shop Drawings: Show fabrication and installation details for trusses.
 - 1. Show location, pitch, span, camber, configuration, and spacing for each type of truss required.
 - 2. Indicate sizes, stress grades, and species of lumber.
 - 3. Indicate locations of permanent bracing required to prevent buckling of individual truss members due to design loads.
 - 4. Indicate locations, sizes, and materials for permanent bracing required to prevent buckling of individual truss members due to design loads.
 - 5. Indicate type, size, material, finish, design values, orientation, and location of metal connector plates.
 - 6. Show splice details and bearing details.
- C. Delegated-Design Submittal: For metal-plate-connected wood trusses indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer registered in Michigan responsible for their preparation.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For metal connector-plate manufacturer, professional engineer, and fabricator.
- B. Material Certificates: For dimension lumber specified to comply with minimum specific gravity. Indicate species and grade selected for each use and specific gravity.
- C. Product Certificates: For metal-plate-connected wood trusses, signed by officer of truss-fabricating firm.
- D. Evaluation Reports: For the following, from ICC-ES:
 - 1. Metal-plate connectors.
 - 2. Metal truss accessories.

1.5 QUALITY ASSURANCE

- A. Metal Connector-Plate Manufacturer Qualifications: A manufacturer that is a member of TPI and that complies with quality-control procedures in TPI 1 for manufacture of connector plates.
 - 1. Manufacturer's responsibilities include providing professional engineering services needed to assume engineering responsibility.
 - 2. Engineering Responsibility: Preparation of Shop Drawings and comprehensive engineering analysis by a qualified professional engineer.
- B. Fabricator Qualifications: Shop that participates in a recognized quality-assurance program, complies with quality-control procedures in TPI 1, and involves third-party inspection by an independent testing and inspecting agency acceptable to Architect and authorities having jurisdiction.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Handle and store trusses to comply with recommendations in SBCA BCSI, "Building Component Safety Information: Guide to Good Practice for Handling, Installing, Restraining, & Bracing Metal Plate Connected Wood Trusses."
 - 1. Store trusses flat, off of ground, and adequately supported to prevent lateral bending.
 - 2. Protect trusses from weather by covering with waterproof sheeting, securely anchored.
 - 3. Provide for air circulation around stacks and under coverings.
- B. Inspect trusses showing discoloration, corrosion, or other evidence of deterioration. Discard and replace trusses that are damaged or defective.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified professional engineer, as defined in Section 01 40 00 "Quality Requirements," to design metal-plate-connected wood trusses.
- B. Structural Performance: Metal-plate-connected wood trusses shall be capable of withstanding design loads within limits and under conditions indicated. Comply with requirements in TPI 1 unless more stringent requirements are specified below.
 - 1. Design Loads: As indicated.
 - 2. Maximum Deflection under Design Loads:
 - a. Roof Trusses: Vertical deflection of 1/240 of span for total load, 1/360 of span for live load and/or snow load.
- C. Comply with applicable requirements and recommendations of TPI 1, TPI DSB, and SBCA BCSI.
- D. Wood Structural Design Standard: Comply with applicable requirements in AF&PA's "National Design Specifications for Wood Construction" and its "Supplement."

2.2 DIMENSION LUMBER

- A. Lumber: DOC PS 20 and applicable rules of any rules-writing agency certified by the American Lumber Standard Committee (ALSC) Board of Review. Provide lumber graded by an agency certified by the ALSC Board of Review to inspect and grade lumber under the rules indicated.
 - 1. Provide kiln dried lumber with 15 percent maximum moisture content at time of dressing.

- B. Permanent Bracing: Provide wood bracing that complies with requirements for miscellaneous lumber in Section 06 10 00 "Rough Carpentry."

2.3 METAL CONNECTOR PLATES

- A. General: Fabricate connector plates to comply with TPI 1.
- B. Hot-Dip Galvanized-Steel Sheet: ASTM A 653/A 653M; Structural Steel (SS), high-strength low-alloy steel Type A (HSLAS Type A), or high-strength low-alloy steel Type B (HSLAS Type B); G60 coating designation; and not less than 0.036 inch thick.

2.4 FASTENERS

- A. General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.
 - 1. Provide fasteners for use with metal framing anchors that comply with written recommendations of metal framing manufacturer.
- B. Nails, Brads, and Staples: ASTM F 1667.

2.5 METAL FRAMING ANCHORS AND ACCESSORIES

- A. Allowable design loads, as published by manufacturer, shall comply with or exceed those of products of manufacturers listed. Manufacturer's published values shall be determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency. Framing anchors shall be punched for fasteners adequate to withstand same loads as framing anchors.
- B. Galvanized-Steel Sheet: Hot-dip, zinc-coated steel sheet complying with ASTM A 653/A 653M, G60 coating designation.
 - 1. Use for interior locations unless otherwise indicated.
- C. Truss Tie-Downs: Bent strap tie for fastening roof trusses to wall studs below, 5 inches wide by 0.050 inch thick.
- D. Roof Truss Bracing/Spacers: U-shaped channels, 1-1/2 inches wide by 1 inch deep by 0.040 inch thick, made to fit between two adjacent trusses and accurately space them apart, and with tabs having metal teeth for fastening to trusses.

2.6 MISCELLANEOUS MATERIALS

- A. Galvanizing Repair Paint: SSPC-Paint 20, with dry film containing a minimum of 92 percent zinc dust by weight.

2.7 FABRICATION

- A. Cut truss members to accurate lengths, angles, and sizes to produce close-fitting joints.
- B. Fabricate metal connector plates to sizes, configurations, thicknesses, and anchorage details required to withstand design loads for types of joint designs indicated.
- C. Assemble truss members in design configuration indicated; use jigs or other means to ensure uniformity and accuracy of assembly, with joints closely fitted to comply with tolerances in TPI 1. Position members to produce design camber indicated.

1. Fabricate wood trusses within manufacturing tolerances in TPI 1.

D. Connect truss members by metal connector plates located and securely embedded simultaneously in both sides of wood members by air or hydraulic press.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install wood trusses only after supporting construction is in place and is braced and secured.

B. If trusses are delivered to Project site in more than one piece, assemble trusses before installing.

C. Hoist trusses in place by lifting equipment suited to sizes and types of trusses required, exercising care not to damage truss members or joints by out-of-plane bending or other causes.

D. Install and brace trusses according to TPI recommendations and as indicated.

E. Install trusses plumb, square, and true to line and securely fasten to supporting construction.

F. Space trusses as indicated; adjust and align trusses in location before permanently fastening.

G. Anchor trusses securely at bearing points; use metal truss tie-downs or floor truss hangers as applicable. Install fasteners through each fastener hole in metal framing anchors according to manufacturer's fastening schedules and written instructions.

H. Install and fasten permanent bracing during truss erection and before construction loads are applied. Anchor ends of permanent bracing where terminating at walls or beams.

I. Install wood trusses within installation tolerances in TPI 1.

J. Do not alter trusses in field. Do not cut, drill, notch, or remove truss members.

K. Replace wood trusses that are damaged or do not comply with requirements.

1. Damaged trusses may be repaired according to truss repair details signed and sealed by the qualified professional engineer responsible for truss design, when approved by Architect.

3.2 REPAIRS AND PROTECTION

A. Repair damaged galvanized coatings on exposed surfaces according to ASTM A 780/A 780M and manufacturer's written instructions.

3.3 FIELD QUALITY CONTROL

A. Special Inspections: Owner will engage a qualified special inspector to perform special inspections to verify that temporary installation restraint/bracing and the permanent individual truss member restraint/bracing are installed in accordance with the approved truss submittal package.

END OF SECTION 06 17 53

SECTION 06 40 23 - INTERIOR ARCHITECTURAL WOODWORK

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Interior standing and running trim.
2. Interior frames and jambs.
3. Interior stairs and railings.

B. Related Requirements:

1. Section 06 10 00 "Rough Carpentry" for wood furring, blocking, shims, and hanging strips required for installing interior architectural woodwork that are concealed within other construction before interior architectural woodwork installation and engineered lumber for framing of stairs.

1.2 COORDINATION

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

1.3 ACTION SUBMITTALS

A. Product Data: For the following:

1. Anchors.
2. Adhesives.

B. Samples for Verification: For the following:

1. Lumber and Panel Products: 5 inches wide by 12 inches long for lumber and 12 by 12 inches for panels, for each type of molding and panel type.

1.4 INFORMATIONAL SUBMITTALS

- ##### A. Qualification Data: For Installer.

1.5 QUALITY ASSURANCE

- ##### A. Installer's Qualifications: Employs skilled workers who install products similar to those required for this Project and whose products have a record of successful in-service performance.

1.6 DELIVERY, STORAGE, AND HANDLING

- ##### A. Do not deliver interior architectural woodwork until painting and similar finish operations that might damage woodwork have been completed in installation areas.
- ##### B. Store woodwork in installation areas or in areas where environmental conditions comply with requirements specified in "Field Conditions" Article.

1.7 FIELD CONDITIONS

- A. Environmental Limitations: Do not deliver or install interior architectural woodwork until building is enclosed, wet-work is complete, and HVAC system is operating and maintaining temperature and relative humidity at levels designed for building occupants for the remainder of the construction period.
- B. Field Measurements: Where interior architectural woodwork is indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication.
 - 1. Locate concealed framing, blocking, and reinforcements that support woodwork by field measurements before being concealed by construction.
- C. Established Dimensions: Where interior architectural woodwork is indicated to fit to other construction, establish dimensions for areas where woodwork is to fit. Provide allowance for trimming at site, and coordinate construction to ensure that actual dimensions correspond to established dimensions.

1.8 COORDINATION

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

PART 2 - PRODUCTS

2.1 INTERIOR FINISH CARPENTRY

- A. Boards for painted finish
 - 1. Wood Species: S4S kiln dried Poplar.
 - 2. Grade: Select.

2.2 INTERIOR WOOD STAIRS AND RAILINGS

- A. Wood for Opaque Finish:
 - 1. Species: Any closed-grain hardwood.
 - 2. Wood Moisture Content: 5 to 10 percent.
- B. Finishes for Stair Parts:
 - 1. Treads: Opaque.
 - 2. Risers: Opaque.
 - 3. Handrails: Opaque.
- C. Handrail Brackets: Cast nickel-silver with wall flange drilled for exposed anchor and with support arm for screwing to underside of rail. Size to provide 1-1/2-inch clearance between handrail and face of wall.

2.3 HARDWOOD SHEET MATERIALS

- A. Composite Wood and Agrifiber Products:
 - 1. Medium-Density Fiberboard (MDF): ANSI A208.2, Grade 130.

2.4 MISCELLANEOUS MATERIALS

- A. Anchors: Select material, type, size, and finish required for each substrate for secure anchorage.
 - 1. Provide metal expansion sleeves or expansion bolts for post-installed anchors.
 - 2. Use nonferrous-metal or hot-dip galvanized anchors and inserts at inside face of exterior walls and at floors.
- B. Installation Adhesive: Product recommended by fabricator for each substrate for secure anchorage.
 - 1. Adhesives shall have a VOC content of 70 g/L or less.
 - 2. Adhesive shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

2.5 FABRICATION

- A. Fabricate interior architectural woodwork to dimensions, profiles, and details indicated.
 - 1. Ease edges to radius indicated for the following:
 - a. Edges of Solid-Wood (Lumber) Members: 1/16 inch unless otherwise indicated.
 - b. Edges of Rails and Similar Members More Than 3/4 Inch Thick: 1/8 inch.
- B. Stairs: Cut rough carriages to accurately fit treads and risers.
 - 1. Glue treads to risers, and glue and nail treads and risers to carriages.
 - 2. Fabricate stairs with treads and risers no more than 1/8 inch from indicated position and no more than 1/16 inch out of relative position for adjacent treads and risers.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Before installation, condition interior architectural woodwork to humidity conditions in installation areas for not less than 72 hours prior to beginning of installation.

3.2 INSTALLATION

- A. Scribe and cut interior architectural woodwork to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.
- B. Anchor interior architectural woodwork to anchors or blocking built in or directly attached to substrates.
 - 1. Secure with countersunk, concealed fasteners and blind nailing.
 - 2. Use fine finishing nails or finishing screws for exposed fastening, countersunk and filled flush with interior architectural woodwork.
- C. Standing and Running Trim:
 - 1. Install with minimum number of joints possible, using full-length pieces (from maximum length of lumber available) to greatest extent possible.
 - 2. Do not use pieces less than 96 inches long, except where shorter single-length pieces are necessary.
 - 3. Scarf running joints and stagger in adjacent and related members.
 - 4. Fill gaps, if any, between top of base and wall with latex sealant, painted to match wall.

5. Install standing and running trim with no more variation from a straight line than 1/8 inch in 96 inches.

D. Stairs: Securely anchor carriages to supporting substrates.

1. Install stairs with treads and risers no more than 1/8 inch from indicated position.
2. Secure with countersunk, concealed fasteners and blind nailing.
3. Use fine finishing nails or finishing screws for exposed fastening, countersunk and filled flush with wood surface.

E. Railings:

1. Install rails with no more than 1/8 inch in 96-inch variation from a straight line.
2. Wall Rails: Support rails on wall brackets securely fastened to wall framing.
 - a. Space rail brackets not more than 4'-0' o.c.

3.3 REPAIR

- A. Repair damaged and defective interior architectural woodwork, where possible, to eliminate functional and visual defects[and to result in interior architectural woodwork being in compliance with requirements of Architectural Woodwork Standards for the specified grade].

- B. Where not possible to repair, replace defective woodwork.

- C. Field Finish: See Section 09 91 23 "Interior Painting" for final finishing of installed interior architectural woodwork not indicated to be shop finished.

3.4 CLEANING

- A. Clean interior architectural woodwork on exposed and semiexposed surfaces.

END OF SECTION 06 40 23

SECTION 07 14 16 - COLD FLUID-APPLIED WATERPROOFING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Polyurethane waterproofing.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include details for substrate joints and cracks, sheet flashings, penetrations, inside and outside corners, tie-ins with adjoining waterproofing, and other termination conditions.

1.3 INFORMATIONAL SUBMITTALS

- A. Sample warranty.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by waterproofing manufacturer.

1.5 WARRANTY

- A. Manufacturer's Special Warranty: Manufacturer agrees to repair or replace waterproofing that fails in materials or workmanship within specified warranty period.
 - 1. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Product provided by this Section shall be a water-based, rubberized asphalt emulsion which rapidly cures in place to provide a seamless waterproofing membrane.
- B. Product shall be solvent free, have VOC content of not more than 30 grams per liter and shall be free of noxious odors.
- C. Product, when applied at minimum 0.060 inch (60 mils) cured thickness, shall meet the following requirements:

REQUIREMENT	RESULT	TEST METHOD
Water Vapor Perme-	Not more than 0.1 Perm	ASTM E-96, Method B
Tensile Elongation	Not less than 500 per-cent	ASTM D-412
Low Temperature Flexibility	No cracking, 180 degree bend over 1-inch man-drel at minus 20 degrees	ASTM D 1970

Low-Temperature Crack Bridging	Withstand 10 cycles at minus 15 degrees F	ASTM C 836
Peel adhesion on HDPE film, concrete and concrete block	Not less than 10 lb per inch of width OR substrate failure	ASTM D 903
Pull adhesion on concrete and concrete block	Not less than 16 lb per square inch	ASTM D 4541

2.2 PRODUCTS

- A. Basis-of-Design Product: Subject to compliance with requirements, provide Carlisle Coatings & Waterproofing Inc; or comparable product by one of the following:
1. BASF Corporation.
 2. CETCO, a Minerals Technologies company.
 3. Tremco Incorporated
- B. Spray-Grade: Barricoat-S pourable consistency, water-based, polymer-modified asphalt
- C. Roller-Grade: Barricoat-R paste consistency, water-based, polymer-modified asphalt.

2.3 AUXILIARY MATERIALS

- A. Co-Spray: Barricure™ chloride-free liquid concentrate.
- B. Transition Membrane: 60 mil thickness self-adhering waterproofing membrane strips provided in rolls of various widths. Select either:
1. MiraDRI 860 Strips
 2. MiraDRI 861 Strips
- C. Reinforcing Fabric: DCH Reinforcing Fabric woven, white polyester provided in rolls of various widths.
- D. Contact Adhesive, select any:
1. CCW-702 OR CCW-702 LV Solvent-Based
 2. CCW-702 WB Water-Based
- E. Mastic, select either:
1. LM 800 XL solvent-based synthetic rubber
 2. CCW-704 solvent-based rubberized asphalt
- F. Fill Compound, select either:
1. CCW-703 V Trowel-Grade Polyurethane, 2-part
 2. CCW-201 Non-Slump Polyurethane, 2-part

- G. Aerosol Contact Adhesive: CAV-GRIP™
- H. Drainage Composite: MiraDRAIN® as recommended by Manufacturer for the Project.
- I. Perimeter Drainage System: MiraDRAIN - HC®
- J. Protection Board: CCW Protection Board V
- K. Joint Sealant, select either:
 - 1. CCW-201 non-sag, 2-part polyurethane
 - 2. Product by others as approved by Manufacturer. Shall conform to ASTM C 920 Type 1 or 2, Grade NS, Class 25 or 50.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Before any waterproofing work is started, the waterproofing applicator shall thoroughly examine all surfaces for any deficiencies. Should any deficiencies exist, the [Architect] [Owner] [Contractor] shall be notified in writing and corrections made.
- B. Concrete shall be cured for a minimum of three days.
- C. Condition of Concrete Surfaces:
 - 1. The concrete surfaces shall be of sound structural grade, minimum of 2500 PSI compressive strength, and shall have a continuous surface, free of fins, ridges, voids or entrained air holes.
 - 2. Concrete shall be cured by water during method. Curing compounds must be of the pure sodium silicate type and be approved by the manufacturer's representative or pass ASTM D 4263.
 - 3. Control joints and/or expansion joints shall have been properly installed at strategic points throughout the field of the deck to control cracking caused by deflection and shrinkage.
 - 4. Voids, rock pockets and excessively rough surfaces shall be repaired with approved non-shrink grout or ground to match the unrepaired areas.
- D. Condition of Concrete Masonry Unit (CMU) Surfaces:
 - 1. Mortar joints shall be struck flush to face of concrete block.
 - 2. Voids and holes greater than ½ inch across shall be filled with mortar or non-shrink grout.
 - 3. Cracks, gaps and joints exceeding ¼ inch width shall be filled with mortar or non-shrink grout.
 - 4. Surface irregularities exceeding ¼ inch in height or sharp to touch shall be ground smooth or made flush.
 - 5. If surfaces cannot be made smooth to the satisfaction of the Architect, they shall be covered with a parge coat, typically consisting of one part cement to three parts sand, over area to receive fluid-applied waterproofing.
 - 6. Mortar droppings shall be removed from surfaces.

- E. Rough gaps around mechanical, electrical and similar penetrations shall be filled with non-shrink grout, mortar, Joint Sealant or Fill Compound and struck flush.
- F. Surfaces shall be sound, dry and free of oil, grease, form release agents, dirt or other contaminants.
- G. Honeycomb in concrete shall be filled with non-shrink grout or Fill Compound.

3.2 SURFACE PREPARATION

- A. Prepare areas to receive Transition Membrane with Contact Adhesive. Contact Adhesive shall be provided at recommended coverage rate and visible for 1 inch minimum beyond edge of installed Transition Membrane.
- B. Install Transition Membrane according to Manufacturer's instructions in literature.
- C. Encapsulate Reinforcing Fabric as follows: Coat substrate with approximately 30 wet mils of Roller Grade Product, lay fabric into wet surface, coat fabric with approximately 30 more wet mils of Roller Grade Product.
- D. Apply Transition Membrane or Reinforcing Fabric encapsulated in Roller- Grade Product according to Manufacturers instructions and drawings in the following areas:
 - 1. Cold joints
 - 2. Cracks
 - 3. Expansion joints
 - 4. Control joints
 - 5. Inside/outside corners and other change in plane
 - 6. Mechanical/electrical penetrations
 - 7. Transition to different substrate.

3.3 INSTALLATION

- A. Allow materials used during surface preparation to cure fully before applying Product.
- B. Spray-Grade Product: Dispense in tandem with Co-Spray according to instructions in Manufacturer's literature.
- C. Roller-Grade Product: Apply according to instructions in Manufacturer's literature
- D. Cured membrane thickness shall measure a minimum of 0.060 inch (60 mils).
- E. Provide complete coverage without pinholes or voids. Apply greater thickness of Product as necessary to provide continuous coating over rough surfaces and irregularities.
- F. Allow Product to dry completely before application of Protection Board, Board Insulation or Drainage Composite.

3.4 SCHEDULE

- A. Seal penetrations made through installed Product according to Manufacturer's instructions and drawings.

- B. Protection Board installed after Product: Attach to surface of Product with Aerosol Contact Adhesive.
- C. Drainage Composite installed after Product: Install with fabric side facing soil and connect to Perimeter Drainage System according to Manufacturer's instructions and drawings. Use Aerosol Contact adhesive, to attach Drainage Composite to surface of Product or to surface of board insulation overlying Product.
- D. Backfill to permanently secure Drainage Composite, Board Insulation and Protection Board.
- E. Avoid damaging Product and Accessories during backfill.

3.5 REPAIR AND PROTECTION

- A. Protect from damage during application and remainder of construction period
- B. Inspect before covering. Repair or replace damaged material according to Manufacturer's instructions and drawings
- C. Product and Accessories are not designed for permanent exposure. Cover with Drainage Composite, Protection Board or Board Insulation and backfill as soon as schedule allows.
- D. Outdoor exposure of installed Product shall not exceed 30 days.

END OF SECTION 07 14 16

SECTION 07 21 00 - THERMAL INSULATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:

1. Extruded polystyrene foam-plastic board.
2. Glass-fiber blanket.
3. Loose-fill insulation.

- B. Related Requirements:

1. Section 09 29 00 "Gypsum Board" for sound attenuation blanket used as acoustic insulation.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.

1.4 INFORMATIONAL SUBMITTALS

- A. Product Test Reports: For each product, for tests performed by a qualified testing agency.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Protect insulation materials from physical damage and from deterioration due to moisture, soiling, and other sources. Store inside and in a dry location. Comply with manufacturer's written instructions for handling, storing, and protecting during installation.

- B. Protect foam-plastic board insulation as follows:

1. Do not expose to sunlight except to necessary extent for period of installation and concealment.
2. Protect against ignition at all times. Do not deliver foam-plastic board materials to Project site until just before installation time.
3. Quickly complete installation and concealment of foam-plastic board insulation in each area of construction.

PART 2 - PRODUCTS

2.1 EXTRUDED POLYSTYRENE FOAM-PLASTIC BOARD

- A. Extruded Polystyrene Board, Type IV: ASTM C 578, Type IV, 25-psi minimum compressive strength; unfaced; maximum flame-spread and smoke-developed indexes of 25 and 450, respectively, per ASTM E 84.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

- a. DiversiFoam Products; CertiFoam
- b. Dow Chemical Company (The).; STYROFOARM Brand SM

- c. Owens Corning; FOAMULAR

2.2 GLASS-FIBER BLANKET

- A. Glass-Fiber Blanket, Unfaced: ASTM C 665, Type I; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively, per ASTM E 84; passing ASTM E 136 for combustion characteristics.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. CertainTeed Corporation.
 - b. Johns Manville; a Berkshire Hathaway company.
 - c. Knauf Insulation;
 - d. Owens Corning.
- B. Glass-Fiber Blanket, Polypropylene-Scrim-Kraft Faced ASTM C 665, Type II (nonreflective faced), Class A (faced surface with a flame-spread index of 25 or less); Category 1 (membrane is a vapor barrier).
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. CertainTeed Corporation.
 - b. Johns Manville; a Berkshire Hathaway company.
 - c. Knauf Insulation.;
 - d. Owens Corning.

2.3 LOOSE-FILL INSULATION

- A. Cellulosic-Fiber Loose-Fill Insulation: ASTM C739, chemically treated for flame-resistance, processing, and handling characteristics.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. GreenFiber, INS765LD
 - b. Hamilton Manufacturing Inc.
 - c. Nu-Wool Co., Inc.
 - 2. Material Description:
 - a. Manufactured from recycled newspapers.
 - b. Post-Consumer Recycled Content: 85 percent minimum.
 - c. Fibers: Treated with boric acid additives to create permanent flame resistance: flame-spread index of 25 or less
 - d. Fungicide Additive:
 - 1) EPA registered.
 - 2) Makes insulation resistant to mold growth.
 - e. Dry Dense pack product.

2.4 ACCESSORIES

- A. Insulation for Miscellaneous Voids:
 - 1. Glass-Fiber Insulation: ASTM C 764, Type II, loose fill; with maximum flame-spread and smoke-developed indexes of 5, per ASTM E 84.
 - 2. Spray Polyurethane Foam Insulation: ASTM C 1029, Type II, closed cell, with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively, per ASTM E 84.
- B. Adhesive for Bonding Insulation: Product compatible with insulation and air and water barrier materials, and with demonstrated capability to bond insulation securely to substrates without damaging insulation and substrates.

- C. Eave Ventilation Troughs: Preformed, rigid fiberboard or plastic sheets designed and sized to fit between roof framing members and to provide ventilation between insulated attic spaces and vented eaves.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Clean substrates of substances that are harmful to insulation, including removing projections capable of puncturing insulation or vapor retarders, or that interfere with insulation attachment.

3.2 INSTALLATION, GENERAL

- A. Comply with insulation manufacturer's written instructions applicable to products and applications.
- B. Install insulation that is undamaged, dry, and unsoiled and that has not been left exposed to ice, rain, or snow at any time.
- C. Extend insulation to envelop entire area to be insulated. Fit tightly around obstructions and fill voids with insulation. Remove projections that interfere with placement.
- D. Provide sizes to fit applications and selected from manufacturer's standard thicknesses, widths, and lengths. Apply single layer of insulation units unless multiple layers are otherwise shown or required to make up total thickness or to achieve R-value.

3.3 INSTALLATION OF FOUNDATION WALL INSULATION

- A. Butt panels together for tight fit.
- B. Adhesive Installation: Install with adhesive or press into tacky dampproofing according to manufacturer's written instructions.

3.4 INSTALLATION OF INSULATION IN EXISTING CONSTRUCTION

- A. Loose-Fill Insulation in existing wall cavities: Apply according to ASTM C 1015 and manufacturer's written instructions. Level horizontal applications to uniform thickness as indicated, lightly settle to uniform density, but do not compact excessively.
 - 1. For cellulosic-fiber loose-fill insulation, comply with CIMA's Bulletin #2, "Standard Practice for Installing Cellulose Insulation."
 - 2. Blow-in insulation, do not use wet spray application.

3.5 INSTALLATION OF INSULATION IN FRAMED CONSTRUCTION

- A. Blanket Insulation: Install in cavities formed by framing members according to the following requirements:
 - 1. Use insulation widths and lengths that fill the cavities formed by framing members. If more than one length is required to fill the cavities, provide lengths that will produce a snug fit between ends.
 - 2. Place insulation in cavities formed by framing members to produce a friction fit between edges of insulation and adjoining framing members.

3. Maintain 3-inch clearance of insulation around recessed lighting fixtures not rated for or protected from contact with insulation.
 4. For wall cavities where cavity heights exceed 96 inches, support unfaced blankets mechanically and support faced blankets by taping flanges of insulation to flanges of metal studs.
 5. Attics: Install eave ventilation troughs between roof framing members in insulated attic spaces at vented eaves. Provide 1" minimum clear between insulation and sheathing.
 6. For wood-framed construction, install blankets according to ASTM C 1320 and as follows:
 - a. With faced blankets having stapling flanges, lap blanket flange over flange of adjacent blanket to maintain continuity of vapor retarder once finish material is installed over it.
 7. Vapor-Retarder-Faced Blankets: Tape joints and ruptures in vapor-retarder facings, and seal each continuous area of insulation to ensure airtight installation.
 - a. Exterior Walls and attics: Set units with facing placed toward interior of construction.
- B. Miscellaneous Voids: Install insulation in miscellaneous voids and cavity spaces where required to prevent gaps in insulation using the following materials:
1. Glass-Fiber Insulation: Compact to approximately 40 percent of normal maximum volume equaling a density of approximately 2.5 lb/cu. ft..
 2. Spray Polyurethane Insulation: Apply according to manufacturer's written instructions.
- C. Loose-Fill Insulation: Apply according to ASTM C 1015 and manufacturer's written instructions. Level horizontal applications to uniform thickness as indicated, lightly settle to uniform density, but do not compact excessively.
1. For cellulosic-fiber loose-fill insulation, comply with CIMA's Bulletin #2, "Standard Practice for Installing Cellulose Insulation."
- D. Spray-Applied Cellulosic Insulation: Apply spray-applied insulation according to manufacturer's written instructions. Do not apply insulation until installation of pipes, ducts, conduits, wiring, and electrical outlets in walls is completed and windows, electrical boxes, and other items not indicated to receive insulation are masked. After insulation is applied, make flush with face of studs by using method recommended by insulation manufacturer.
1. Attics: Install eave ventilation troughs between roof framing members in insulated attic spaces at vented eaves.

3.6 PROTECTION

- A. Protect installed insulation from damage due to harmful weather exposures, physical abuse, and other causes. Provide temporary coverings or enclosures where insulation is subject to abuse and cannot be concealed and protected by permanent construction immediately after installation.

END OF SECTION 07 21 00

SECTION 07 25 00 - WEATHER BARRIERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Weather barrier membrane.
 - 2. Seam Tape
 - 3. Fasteners
 - 4. Flashing

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. For building wrap, include data on air and water-vapor permeance based on testing according to referenced standards.
 - 2. Provide system details including flashing of penetrations, joint requirements and edge termination conditions.

1.4 INFORMATIONAL SUBMITTALS

- A. Design Data, Test Reports: Provide manufacturer test reports indicating product compliance with indicated requirements.

PART 2 - PRODUCTS

2.1 WATER-RESISTIVE BARRIER

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Dow Chemical Company (The); WEATHERMATE Plus.
 - 2. DuPont Safety and Construction; Tyvek CommercialWrap
 - 3. The Henry Company; WeatherSmart Commercial
 - 4. TYPAR; Metrowrap.
- B. Performance Characteristics:
 - 1. Air Penetration: 0.003 cfm/ft² at 75 Pa, when tested in accordance with ASTM E2178. Type I per ASTM E1677. ≤0.04 cfm/ft² at 75 Pa, when tested in accordance with ASTM E2357.
 - 2. Water Vapor Transmission: 28 perms, when tested in accordance with ASTM E96, Method B.
 - 3. Water Penetration Resistance: Minimum 280 cm when tested in accordance with AATCC Test Method 127.
 - 4. Basis Weight: Minimum 2.7 oz/yd², when tested in accordance with TAPPI Test Method T-410.
 - 5. Air Resistance: Air infiltration at >1500 seconds, when tested in accordance with TAPPI Test Method T-460.

6. Tensile Strength: Minimum 38/35 lbs/in., when tested in accordance with ASTM D882, Method A.
7. Tear Resistance: 12/10 lbs., when tested in accordance with ASTM D1117.
8. Surface Burning Characteristics: Class A, when tested in accordance with ASTM E84. Flame Spread: 10, Smoke Developed: 10.

2.2 ACCESSORIES

A. ACCESSORIES

B. Seam Tape: As recommended by the weather barrier manufacturer.

C. Fasteners:

1. Nail Caps: #4 nails with large 1-inch plastic cap fasteners, or 1-inch plastic cap staples with leg length sufficient to achieve a minimum penetration of 5/8-inch into the wood stud.

D. Sealants

1. Provide sealants that comply with ASTM C920, elastomeric polymer sealant to maintain watertight conditions.
2. Products: Sealants recommended by the weather barrier manufacturer.

E. Adhesives:

1. Provide adhesive recommended by weather barrier manufacturer.
2. Products: Adhesives recommended by the weather barrier manufacturer.

F. Primers:

1. Provide flashing manufacturer recommended primer to assist in adhesion between substrate and flashing.
 - a. Products: Primers recommended by the flashing manufacturer.

G. Flashing

1. Flexible membrane flashing materials for openings and penetrations recommended by manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify substrate and surface conditions are in accordance with weather barrier manufacturer recommended tolerances prior to installation of weather barrier and accessories.

3.2 INSTALLATION – WEATHER BARRIER

A. Install weather barrier over exterior face of exterior wall substrate in accordance with manufacturer recommendations.

B. Install weather barrier prior to installation of windows and doors.

C. Start weather barrier installation at a building corner, leaving 6-12 inches of weather barrier extended beyond corner to overlap.

D. Install weather barrier in a horizontal manner starting at the lower portion of the wall surface with subsequent layers installed in a shingling manner to overlap lower layers. Maintain weather barrier plumb and level.

- E. Sill Plate Interface: Extend lower edge of weather barrier over sill plate interface 3-6 inches. Secure to foundation with elastomeric sealant as recommended by weather barrier manufacturer.
- F. Door Openings: Extend weather barrier completely over openings.
- G. Overlap weather barrier
 - 1. Exterior corners: minimum 12 inches.
 - 2. Seams: minimum 6 inches.
- H. Weather Barrier Attachment: over sheathing with water-resistive barrier as follows:
 - 1. Attach weather barrier to studs through exterior sheathing. Secure using weather barrier manufacturer recommend fasteners, space 12-18 inches vertically on center along stud line, and 24 inch on center, maximum horizontally.

3.3 SEAMING

- A. Seal seams of weather barrier with seam tape at all vertical and horizontal overlapping seams.
- B. Seal any tears or cuts as recommended by weather barrier manufacturer.

END OF SECTION 07 25 00

SECTION 07 31 13 - ASPHALT SHINGLES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Asphalt shingles.
 - 2. Ridge cap shingles
 - 3. Underlayment.
 - 4. Ridge vents.
 - 5. Metal flashing and trim.

1.3 DEFINITION

- A. Roofing Terminology: See ASTM D 1079 and glossary of NRCA's "The NRCA Roofing and Waterproofing Manual" for definitions of terms related to roofing work in this Section.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Samples: For each exposed product and for each color and texture specified.
 - 1. Asphalt Shingles: Full size.
 - 2. Ridge Cap Shingles: Full size.
 - 3. Ridge Vent: 12-inch-long Sample.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Product Data:
 - 1. Include manufacturer's printed product information indicating material characteristics, performance criteria and product limitations.
 - 2. Include manufacturer's specification and installation instructions for the asphalt shingle system and sheet underlayment system, indicating required preparation and installation procedures.
- C. Evaluation Reports: For synthetic underlayment, from ICC-ES or other testing and inspecting agency acceptable to authorities having jurisdiction, indicating that product is suitable for intended use under applicable building codes.
- D. Sample Warranty: For manufacturer's warranty.

1.6 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For asphalt shingles to include in maintenance manuals.

1.7 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Asphalt Shingles: 100 sq. ft. of each type, in unbroken bundles.

1.8 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Provide all primary roofing products, including shingles, underlayment, leak barrier, and ventilation, by a single manufacturer.
- B. Installer Qualifications: An authorized representative who is trained and approved by manufacturer.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Store roofing materials in a dry, well-ventilated location protected from weather, sunlight, and moisture according to manufacturer's written instructions.
- B. Store underlayment rolls on end on pallets or other raised surfaces. Do not double stack rolls.
- C. Protect unused roofing materials from weather, sunlight, and moisture when left overnight or when roofing work is not in progress.
- D. Handle, store, and place roofing materials in a manner to prevent damage to roof deck or structural supporting members.

1.10 FIELD CONDITIONS

- A. Environmental Limitations: Install self-adhering sheet underlayment within the range of ambient and substrate temperatures recommended in writing by manufacturer.

1.11 WARRANTY

- A. Manufacturer's Warranty: Manufacturer agrees to repair or replace asphalt shingles that fail within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Manufacturing defects.
 - 2. Material Warranty Period: 25 years from date of Substantial Completion, nonprorated.
 - 3. Wind-Speed Warranty Period: Asphalt shingles will resist blow-off or damage caused by wind speeds of up to 60 mph for 15 years from date of Substantial Completion.
 - 4. Workmanship Warranty Period: 5 years from date of Substantial Completion.
- B. Roofing Installer's Warranty: On warranty form at end of this Section, signed by Installer, in which Installer agrees to repair or replace components of asphalt-shingle roofing that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Period: Two years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. General: Perform all work under this Section in strict accordance with the References, manufacturer's published specifications for asphalt shingles and for the sheet underlayment and best practices of the industry, to achieve a complete roofing and flashing installation.
- B. Exterior Fire-Test Exposure: Provide asphalt shingles and related roofing materials identical to those of assemblies tested for Class A fire resistance according to ASTM E 108 or UL 790 by Underwriters Laboratories or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify products with appropriate markings of applicable testing agency.
- C. Wind Resistance: Provide asphalt shingles and related roofing materials tested for Class A, D or F tested in accordance with ASTM D3161 or Class D,G or H tested in accordance with ASTM D7158.

2.2 GLASS-FIBER-REINFORCED ASPHALT SHINGLES

- A. Laminated-Strip Asphalt Shingles: ASTM D 3462/D 3462M, laminated, multi-ply overlay construction, glass-fiber reinforced, mineral-granule surfaced, and self-sealing.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. CertainTeed Corporation; XT-25
 - b. GAF.; Royal Sovereign
 - c. IKO Industries Inc.; Marathon Plus AR
 - 2. Algae Resistance: Granules resist algae discoloration.
 - 3. Impact Resistance: UL 2218, Class 4.
 - 4. ASTM D 7158, Class H.
 - 5. Color and Blends: Basis of Design: IKO Dual Grey..
- B. Ridge Shingles: Manufacturer's standard units to match asphalt shingles.

2.3 UNDERLAYMENT MATERIALS

- A. Self-Adhering Sheet Underlayment, Granular Surfaced: ASTM D 1970/D 1970M, minimum of 40-mil-thick sheet; glass-fiber-mat-reinforced, SBS-modified asphalt; mineral-granule surfaced; with release backing; cold applied.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. CertainTeed Corporation: WinterGuard
 - b. GAF, WeatherWatch
 - c. IKO Industries Inc: ArmourGard

2.4 RIDGE VENTS

- A. Rigid Ridge Vent: Rigid section high-density polypropylene or other UV-stabilized plastic ridge vent for use under ridge shingles, designed to allow the passage of hot air from attics while prohibiting snow infiltration.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. CertainTeed Corporation: WinterGuard
 - b. GAF, Cobra Snow Country or Cobra Snow Country Advanced
 - c. Cor-A-Vent, Inc.: V300
 - 2. Minimum Net Free Area: 9 SQ IN/FOOT.

- 3. Enhanced snow screen

2.5 ACCESSORIES

- A. Asphalt Roofing Cement: ASTM D 4586, Type II, asbestos free.
- B. Roofing Nails: Standard round wire type roofing nails, corrosion resistant; hot dipped zinc coated steel, aluminum or chromated steel; minimum 3/8 inch head diameter; minimum 11 gage shank diameter; shank to be of sufficient length to penetrate through roof sheathing or 3/4 inch into solid wood, plywood or non-veneer wood decking.
- C. Stack Flashings: Galvanized flange and neoprene boot, Oatey or approved equal.

2.6 METAL FLASHING AND TRIM

- A. General: Comply with requirements in Section 07 62 00 "Sheet Metal Flashing and Trim."
 - 1. Sheet Metal:
 - a. 0.032-inch aluminum sheet, complying with ASTM B 209
- B. Fabricate sheet metal flashing and trim to comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, metal, and other characteristics of the item.
 - 1. Drip Edges: Fabricate in lengths not exceeding 10 feet with 2-inch roof-deck flange and 1-1/2-inch fascia flange with 3/8-inch drip at lower edge.
- C. Vent Pipe Flashings: ASTM B 749, Type L51121, at least 1/16 inch thick. Provide lead sleeve sized to slip over and turn down into pipe, soldered to skirt at slope of roof, and extending at least 4 inches from pipe onto roof.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
 - 1. Examine roof sheathing to verify that sheathing joints are supported by framing and blocking or metal clips and that installation is within flatness tolerances.
 - 2. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and completely anchored; and that provisions have been made for flashings and penetrations through asphalt shingles.
- B. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 UNDERLAYMENT INSTALLATION

- A. General: Comply with underlayment manufacturer's written installation instructions applicable to products, referenced standards, or drawings indicated unless more stringent requirements apply. More stringent requirements shall take precedence.
- B. Self-Adhering Sheet Underlayment: Install, wrinkle free, on roof deck. Comply with low-temperature installation restrictions of underlayment manufacturer if applicable. Install lapped in

direction that sheds water. Lap sides not less than 3-1/2 inches. Lap ends not less than 6 inches staggered 24 inches between courses. Roll laps with roller. Cover underlayment within seven days.

1. Install in single layer on roof.

3.3 METAL FLASHING INSTALLATION

- A. General: Install metal flashings and other sheet metal to comply with requirements in Section 07 62 00 "Sheet Metal Flashing and Trim."
 1. Install metal flashings according to recommendations in ARMA's "Residential Asphalt Roofing Manual" and NRCA's "NRCA Guidelines for Asphalt Shingle Roof Systems."
- B. Rake Drip Edges: Install rake drip-edge flashings over underlayment and fasten to roof deck.
- C. Eave Drip Edges: Install eave drip-edge flashings below underlayment and fasten to roof sheathing.
- D. Pipe Flashings: Form flashing around pipe penetrations and asphalt shingles. Fasten and seal to asphalt shingles as recommended by manufacturer.

3.4 ASPHALT-SHINGLE INSTALLATION

- A. General: Install asphalt shingles according to manufacturer's written instructions, recommendations in ARMA's "Residential Asphalt Roofing Manual," and recommendations in NRCA's "NRCA Guidelines for Asphalt Shingle Roof Systems."
- B. Install starter strip along lowest roof edge, consisting of an asphalt-shingle strip with self-sealing strip face up at roof edge.
 1. Extend asphalt shingles 1/2 inch over fascia at eaves and rakes.
 2. Install starter strip along rake edge.
- C. Install first and remaining courses of asphalt shingles stair-stepping diagonally across roof deck with manufacturer's recommended offset pattern at succeeding courses, maintaining uniform exposure.
- D. Install asphalt shingles by single-strip column or racking method, maintaining uniform exposure. Install full-length first course followed by cut second course, repeating alternating pattern in succeeding courses.
- E. Ridge Vents: Install continuous ridge vents over asphalt shingles according to manufacturer's written instructions. Fasten with roofing nails of sufficient length to penetrate sheathing.
- F. Ridge Shingles: Maintain same exposure of cap shingles as roofing shingle exposure. Lap cap shingles at ridges to shed water away from direction of prevailing winds. Fasten with roofing nails of sufficient length to penetrate sheathing.
 1. Fasten ridge cap asphalt shingles to cover ridge vent without obstructing airflow.

3.5 ROOFING INSTALLER'S WARRANTY

- A. WHEREAS **<Insert name>** of **<Insert address>**, herein called the "Roofing Installer," has performed roofing and associated work ("the work") on the following project:
1. Owner: **<Insert name of Owner>**.
 2. Address: **<Insert address>**.
 3. Building Name/Type: **<Insert information>**.
 4. Address: **<Insert address>**.
 5. Area of the Work: **<Insert information>**.
 6. Acceptance Date: **<Insert date>**.
 7. Warranty Period: **<Insert time>**.
 8. Expiration Date: **<Insert date>**.
- B. AND WHEREAS Roofing Installer has contracted (either directly with Owner or indirectly as a subcontractor) to warrant the work against leaks and faulty or defective materials and workmanship for designated Warranty Period,
- C. NOW THEREFORE Roofing Installer hereby warrants, subject to terms and conditions herein set forth, that during Warranty Period he will, at his own cost and expense, make or cause to be made such repairs to or replacements of the work as are necessary to correct faulty and defective work and as are necessary to maintain the work in a watertight condition.
- D. This Warranty is made subject to the following terms and conditions:
1. Specifically excluded from this Warranty are damages to the work and other parts of the building, and to building contents, caused by:
 - a. Lightning;
 - b. Peak gust wind speed exceeding 130 mph;
 - c. Fire;
 - d. Failure of roofing system substrate, including cracking, settlement, excessive deflection, deterioration, and decomposition;
 - e. Faulty construction of parapet walls, copings, chimneys, skylights, vents, equipment supports, and other edge conditions and penetrations of the work;
 - f. Vapor condensation on bottom of roofing; and
 - g. Activity on roofing by others, including construction contractors, maintenance personnel, other persons, and animals, whether authorized or unauthorized by Owner.
 2. When the work has been damaged by any of foregoing causes, Warranty shall be null and void until such damage has been repaired by Roofing Installer and until cost and expense thereof have been paid by Owner or by another responsible party so designated.
 3. Roofing Installer is responsible for damage to the work covered by this Warranty but is not liable for consequential damages to building or building contents resulting from leaks or faults or defects of the work.
 4. During Warranty Period, if Owner allows alteration of the work by anyone other than Roofing Installer, including cutting, patching, and maintenance in connection with penetrations, attachment of other work, and positioning of anything on roof, this Warranty shall become null and void on date of the alterations, but only to the extent the alterations affect the work covered by this Warranty. If Owner engages Roofing Installer to perform the alterations, Warranty shall not become null and void unless Roofing Installer, before starting the alterations, notified Owner in writing, showing reasonable cause for claim, that the alterations would likely damage or deteriorate the work, thereby reasonably justifying a limitation or termination of this Warranty.
 5. During Warranty Period, if original use of roof is changed and it becomes used for, but was not originally specified for, a use or service more severe than originally specified, this Warranty shall become null and void on date of the change, but only to the extent the change affects the work covered by this Warranty.

6. Owner shall promptly notify Roofing Installer of observed, known, or suspected leaks, defects, or deterioration and shall afford reasonable opportunity for Roofing Installer to inspect the work and to examine evidence of such leaks, defects, or deterioration.
7. This Warranty is recognized to be the only warranty of Roofing Installer on the work and shall not operate to restrict or cut off Owner from other remedies and resources lawfully available to Owner in cases of roofing failure. Specifically, this Warranty shall not operate to relieve Roofing Installer of responsibility for performance of the work according to requirements of the Contract Documents, regardless of whether Contract was a contract directly with Owner or a subcontract with Owner's General Contractor.

E. IN WITNESS THEREOF, this instrument has been duly executed this **<Insert day>** day of **<Insert month>**, **<Insert year>**.

1. Authorized Signature: **<Insert signature>**.
2. Name: **<Insert name>**.
3. Title: **<Insert title>**.

END OF SECTION 07 31 13

SECTION 07 46 46 - FIBER-CEMENT SIDING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes fiber-cement siding, trim and soffit board.
- B. Pre finished alum. Accessories

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Samples: For fiber-cement siding and soffit including related accessories.

1.3 INFORMATIONAL SUBMITTALS

- A. Product certificates.
- B. Product test reports.
- C. Research/evaluation reports.
- D. Sample warranty.

1.4 CLOSEOUT SUBMITTALS

- A. Maintenance data.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: Minimum of 2 years experience with installation of similar products.

1.6 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace products that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Period: 15 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 FIBER-CEMENT SIDING

- A. General: ASTM C 1186, Type A, Grade II, fiber-cement board, noncombustible when tested according to ASTM E 136; with a flame-spread index of 25 or less when tested according to ASTM E 84.
 - 1. Basis of Design
 - a. James Hardie
 - 2. Approved Equals
 - a. Certain Teed
 - b. GAF Materials
 - c. LP Smartside

- B. Labeling: Provide fiber-cement siding that is tested and labeled according to ASTM C 1186 by a qualified testing agency acceptable to authorities having jurisdiction.
- C. Nominal Thickness: Not less than 5/16 inch.
- D. Siding Pattern: 8-1/4 inch with 7 inches exposure plank with smooth texture.
- E. Factory Finish: Arctic White.

2.2 FIBER-CEMENT TRIM

- A. General: ASTM C 1186, Type A, Grade II, fiber-cement board, noncombustible when tested according to ASTM E 136; with a flame-spread index of 25 or less when tested according to ASTM E 84.
 - 1. Basis of Design
 - a. James Hardie
 - 2. Approved Equals
 - a. Certain Teed
 - b. GAF Materials
 - c. LP Smartside
- B. Labeling: Provide fiber-cement siding that is tested and labeled according to ASTM C 1186 by a qualified testing agency acceptable to authorities having jurisdiction.
- C. Nominal Thickness: Not less than 3/4 inch.
- D. Trim Sizing:
 - 1. Windows and Doors: 5-1/2 inch plank, smooth finish.
 - 2. Corner, Skirt, Freize Trim: 7-1/4 inch plank, smooth finish.
- E. Factory Finish: Arctic White.

2.3 FIBER-CEMENT SOFFIT

- A. General: ASTM C 1186, Type A, Grade II, fiber-cement board, noncombustible when tested according to ASTM E 136; with a flame-spread index of 25 or less when tested according to ASTM E 84.
 - 1. Basis of Design
 - a. James Hardie
 - 2. Approved Equals
 - a. Certain Teed
 - b. GAF Materials
 - c. LP Smartside
- B. Nominal Thickness: Not less than 5/16 inch.
- C. Net-Free Area: 5 sq. in./lineal ft. (Where indicated on construction documents.)
- D. Pattern: 12-inchwide sheets with smooth finish.
- E. Join Condition: Moderate contact.
- F. Factory Finish: Arctic White.

2.4 ACCESSORIES

- A. Siding Accessories, General: Provide starter strips, edge trim, outside and inside corner caps, and other items as recommended by siding manufacturer for building configuration.
- B. Flashing: Provide concealed aluminum flashing and appropriate termination complying with manufacturer's recommendations and Section 07 62 00 "Sheet Metal Flashing and Trim" at window and door heads, inside and outside corners and where indicated.
 - 1. Finish for Aluminum Flashing: High-performance organic finish to match siding.
- C. Fasteners:
 - 1. For fastening to wood, use corrosion resistant siding nails of sufficient length to penetrate a minimum of 1/4 inch into substrate.
 - 2. For fastening fiber cement, use stainless-steel fasteners.
- D. Furring:
 - 1. Preservative treated wood furring as shown on drawings-depth and spacing indicated and as required to meet Fiber Cement Siding manufacturer's requirements..

PART 3 - EXECUTION

3.1 INSTALLATION

- A. General: Comply with manufacturer's written installation instructions applicable to products and applications indicated unless more stringent requirements apply.
 - 1. Install fasteners no more than 24 inches.
- B. Install joint sealants as specified in Section 07 92 00 "Joint Sealants" and to produce a weathertight installation.
- C. Seal, paint or prime all cut edges as required by manufacturer.
- D. Painting: Refer to Division 9. Use only 100% acrylic latex paints on Fiber Cement Panels. Fill all nail holes and touch up/fill gouges and defects prior to painting.
- E. Provide recommended clearances at adjacent surfaces and intersections

3.2 ADJUSTING AND CLEANING

- A. Remove damaged, improperly installed, or otherwise defective materials and replace with new materials complying with specified requirements.
- B. Clean finished surfaces according to manufacturer's written instructions and maintain in a clean condition during construction.

END OF SECTION 07 46 46

SECTION 07 62 00 - SHEET METAL FLASHING AND TRIM

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:

- 1. Formed sheet metal fabrications for walls and roofs.

- B. Related Requirements:

- 1. Section 06 10 00 "Rough Carpentry" for wood nailers and blocking.
 - 2. Section 07 31 13 "Asphalt Shingles" for installation of sheet metal flashing and trim integral with roofing.
 - 3. Section 07 46 46 "Fiber Cement Siding" for installation of sheet metal flashing and trim integral with siding.
 - 4. Section 07 92 00 "Joint Sealants"

1.3 COORDINATION

- A. Coordinate sheet metal flashing and trim layout and seams with sizes and locations of penetrations to be flashed, and joints and seams in adjacent materials.
- B. Coordinate sheet metal flashing and trim installation with adjoining roofing and wall materials, joints, and seams to provide leakproof, secure, and noncorrosive installation.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.

- 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each manufactured product and accessory.

- B. Samples for Verification: For each type of exposed finish.

- 1. Sheet Metal Flashing: 12 inches long by actual width of unit, including finished seam and in required profile. Include fasteners, cleats, clips, closures, and other attachments.
 - 2. Trim, Metal Closures, Joint Intersections, and Miscellaneous Fabrications: 12 inches long and in required profile. Include fasteners and other exposed accessories.
 - 3. Anodized Aluminum Samples: Samples to show full range to be expected for each color required.

1.5 INFORMATIONAL SUBMITTALS

- A. Certificates: Indicating compliance with specified finishing requirements, from applicator and contractor.

1.6 QUALITY ASSURANCE

- A. Fabricator Qualifications: Employs skilled workers who custom fabricate sheet metal flashing and trim similar to that required for this Project and whose products have a record of successful in-service performance.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Do not store sheet metal flashing and trim materials in contact with other materials that might cause staining, denting, or other surface damage. Store sheet metal flashing and trim materials away from uncured concrete and masonry.
- B. Protect strippable protective covering on sheet metal flashing and trim from exposure to sunlight and high humidity, except to extent necessary for period of sheet metal flashing and trim installation.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. General: Sheet metal flashing and trim assemblies shall withstand wind loads, structural movement, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Completed sheet metal flashing and trim shall not rattle, leak, or loosen, and shall remain watertight.
- B. Sheet Metal Standard for Flashing and Trim: Comply with NRCA's "The NRCA Roofing Manual" and SMACNA's "Architectural Sheet Metal Manual" requirements for dimensions and profiles shown unless more stringent requirements are indicated.
- C. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes to prevent buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
 - 1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

2.2 SHEET METALS

- A. General: Protect mechanical and other finishes on exposed surfaces from damage by applying strippable, temporary protective film before shipping.
- B. Use same finish on adjacent metal or components and exposed metal surfaces unless specified or shown otherwise.
- C. Aluminum Sheet: ASTM B 209, alloy as standard with manufacturer for finish required, with temper as required to suit forming operations and performance required; with smooth, flat surface.
 - 1. Exposed Coil-Coated Finish:
 - a. Two-Coat Fluoropolymer: AAMA 2605. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 - 2. Color: Match adjacent panel color unless noted otherwise.
 - a. All exposed to view portions of metal trim to be pre-finished.
 - 3. Concealed Finish: Pretreat with manufacturer's standard white or light-colored acrylic or polyester backer finish, consisting of prime coat and wash coat with minimum total dry film thickness of 0.5 mil.
- D. Stainless-Steel Sheet: ASTM A 240/A 240M, Type 304, dead soft, fully annealed; with smooth, flat surface.
 - 1. Finish: 2B (Matte).

2.3 MISCELLANEOUS MATERIALS

- A. General: Provide materials and types of fasteners, solder, protective coatings, sealants, and other miscellaneous items as required for complete sheet metal flashing and trim installation and as recommended by manufacturer of primary sheet metal unless otherwise indicated.
- B. Fasteners: Wood screws, annular threaded nails, self-tapping screws, self-locking rivets and bolts, and other suitable fasteners designed to withstand design loads and recommended by manufacturer of primary sheet metal or manufactured item.
 - 1. General: Blind fasteners or self-drilling screws, gasketed, with hex-washer head.
 - a. Exposed Fasteners: Heads matching color of sheet metal using plastic caps or factory-applied coating. Provide metal-backed EPDM or PVC sealing washers under heads of exposed fasteners bearing on weather side of metal.
 - b. Blind Fasteners: High-strength aluminum or stainless-steel rivets suitable for metal being fastened.
 - c. Spikes and Ferrules: Same material as gutter; with spike with ferrule matching internal gutter width.
 - 2. Fasteners for Aluminum Sheet: Aluminum or Series 300 stainless steel.
 - 3. Fasteners for Stainless-Steel Sheet: Series 300 stainless steel.
- C. Solder:
 - 1. For Stainless Steel: ASTM B 32,, with acid flux of type recommended by stainless-steel sheet manufacturer.
- D. Elastomeric Sealant: As specified in Section 07 92 00, JOINT SEALANTS for exterior locations.
- E. Bituminous Coating: Cold-applied asphalt emulsion according to ASTM D 1187, Type I

2.4 FABRICATION, GENERAL

- A. General: Custom fabricate sheet metal flashing and trim to comply with details shown and recommendations in cited sheet metal standard that apply to design, dimensions, geometry, metal thickness, and other characteristics of item required. Fabricate sheet metal flashing and trim in shop to greatest extent possible.
 - 1. Fabricate sheet metal flashing and trim in thickness or weight needed to comply with performance requirements, but not less than that specified for each application and metal.
 - 2. Obtain field measurements for accurate fit before shop fabrication.
 - 3. Form sheet metal flashing and trim to fit substrates without excessive oil canning, buckling, and tool marks; true to line, levels, and slopes; and with exposed edges folded back to form hems.
 - 4. Conceal fasteners and expansion provisions where possible. Do not use exposed fasteners on faces exposed to view.
- B. Jointing:
 - 1. In general, stainless steel joints, except expansion and contraction joints, shall be locked and soldered.
 - 2. Jointing of stainless steel over 0.45 mm (0.018 inch) thick shall be done by lapping, riveting and soldering.
 - 3. Joints shall conform to following requirements:
 - a. Flat-lock joints shall finish not less than 3/4 inch wide.
 - b. Lap joints subject to stress shall finish not less than one inch wide and shall be soldered and riveted.
 - c. Unsoldered lap joints shall finish not less than 4 inches wide.
 - 4. Flat and lap joints shall be made in direction of flow.
 - 5. Soldering:

- a. Pre tin both mating surfaces with solder for a width not less than 1 1/2 inches stainless steel
 - b. Treat in accordance with metal producers recommendations other sheet metal required to be soldered.
 - c. Completely remove acid and flux after soldering is completed.
- C. Expansion and Contraction Joints:
 - 1. Fabricate in accordance with the Architectural Sheet Metal Manual recommendations for expansion and contraction of sheet metal work in continuous runs.
 - 2. Space joints as shown or as specified.
 - 3. Space expansion and contraction joints for stainless steel at intervals not exceeding 24 feet.
 - 4. Space expansion and contraction joints for aluminum at intervals not exceeding 18 feet, except do not exceed 10 feet for gravel stops and fascia-cant systems.
 - 5. Fabricate slip-type or loose locked joints and fill with sealant unless otherwise specified.
 - 6. Fabricate joint covers of same thickness material as sheet metal served.
- D. Edge Strips or Continuous Cleats:
 - 1. Fabricate continuous edge strips where shown and specified to secure loose edges of the sheet metal work.
 - 2. Except as otherwise specified, fabricate edge strips of minimum 0.6 mm (0.024 inch) thick stainless steel, 1.25 mm (0.050 inch) thick aluminum.
 - 3. Use material compatible with sheet metal to be secured by the edge strip.
 - 4. Fabricate in 10 feet maximum lengths with not less than 3/4 inch loose lock into metal secured by edge strip.
 - 5. Fabricate Strips for fascia anchorage to extend below the supporting wood construction to form a drip and to allow the flashing to be hooked over the lower edge at least 3/4-inch.
 - 6. Fabricate anchor edge maximum width of 3 inches or of sufficient width to provide adequate bearing area to insure a rigid installation using 0.8 mm (0.031 inch) thick stainless steel, 1.6 mm (0.0625 inch) thick aluminum.
- E. Drips:
 - 1. Form drips at lower edge of sheet metal counter-flashings (cap flashings), fascias, gravel stops, wall copings, by folding edge back 1/2 inch and bending out 45 degrees from vertical to carry water away from the wall.
 - 2. Form drip to provide hook to engage cleat or edge strip for fastening for not less than 3/4 inch loose lock where shown.
- F. Edges:
 - 1. Edges of flashings concealed in masonry joints opposite drain side shall be turned up 2 inches to form dam, unless otherwise specified or shown otherwise.
 - 2. Finish exposed edges of flashing with a 1/4 inch hem formed by folding edge of flashing back on itself when not hooked to edge strip or cleat. Use 1/4 inch minimum penetration beyond wall face with drip for through-wall flashing exposed edge.
 - 3. All metal roof edges shall meet requirements of MBC, current edition.
- G. Metal Options:
 - 1. Where options are permitted for different metals use only one metal throughout.
 - 2. Stainless steel may be used in concealed locations for fasteners of other metals exposed to view.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, substrate, and other conditions affecting performance of the Work.
 - 1. Verify compliance with requirements for installation tolerances of substrates.
 - 2. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and securely anchored.
 - 3. Verify that air- or water-resistant barriers have been installed over sheathing or backing substrate to prevent air infiltration or water penetration.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

- A. General: Anchor sheet metal flashing and trim and other components of the Work securely in place, with provisions for thermal and structural movement. Use fasteners, solder, protective coatings, separators, sealants, and other miscellaneous items as required to complete sheet metal flashing and trim system.
 - 1. Install sheet metal flashing and trim true to line, levels, and slopes. Provide uniform, neat seams with minimum exposure of solder, welds, and sealant.
 - 2. Install sheet metal flashing and trim to fit substrates and to result in watertight performance. Verify shapes and dimensions of surfaces to be covered before fabricating sheet metal.
 - 3. Space cleats not more than 12 inches apart. Attach each cleat with at least two fasteners. Bend tabs over fasteners.
 - 4. Install exposed sheet metal flashing and trim with limited oil canning, and free of buckling and tool marks.
 - 5. Torch cutting of sheet metal flashing and trim is not permitted.
 - 6. Do not use graphite pencils to mark metal surfaces.
- B. Metal Protection: Where dissimilar metals contact each other, or where metal contacts pressure-treated wood or other corrosive substrates, protect against galvanic action or corrosion by painting contact surfaces with bituminous coating or by other permanent separation as recommended by sheet metal manufacturer or cited sheet metal standard.
 - 1. Coat concealed side of uncoated-aluminum and stainless-steel sheet metal flashing and trim with bituminous coating where flashing and trim contact wood, ferrous metal, or cementitious construction.
 - 2. Underlayment: Where installing sheet metal flashing and trim directly on cementitious or wood substrates, install underlayment and cover with slip sheet.
- C. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at maximum of 10 feet with no joints within 24 inches of corner or intersection.
 - 1. Form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with sealant concealed within joints.
- D. Fasteners: Use fastener sizes that penetrate wood blocking or sheathing not less than 1-1/4 inches for nails and not less than 3/4 inch for wood screws.
- E. Conceal fasteners and expansion provisions where possible in exposed work and locate to minimize possibility of leakage. Cover and seal fasteners and anchors as required for a tight installation.
- F. Seal joints as required for watertight construction.

1. Use sealant-filled joints unless otherwise indicated. Embed hooked flanges of joint members not less than 1 inch into sealant. Form joints to completely conceal sealant. When ambient temperature at time of installation is between 40 and 70 deg F, set joint members for 50 percent movement each way. Adjust setting proportionately for installation at higher ambient temperatures. Do not install sealant-type joints at temperatures below 40 deg F.
 2. Prepare joints and apply sealants to comply with requirements in Section 07 92 00 "Joint Sealants."
- G. Soldered Joints: Clean surfaces to be soldered, removing oils and foreign matter. Pre-tin edges of sheets with solder to width of 1-1/2 inches; however, reduce pre-tinning where pre-tinned surface would show in completed Work.
1. Do not use torches for soldering.
 2. Heat surfaces to receive solder, and flow solder into joint. Fill joint completely. Completely remove flux and spatter from exposed surfaces.
 3. Stainless-Steel Soldering: Tin edges of uncoated sheets, using solder for stainless steel and acid flux. Promptly remove acid flux residue from metal after tinning and soldering. Comply with solder manufacturer's recommended methods for cleaning and neutralization.

3.3 ROOF FLASHING INSTALLATION

- A. General: Install sheet metal flashing and trim to comply with performance requirements, sheet metal manufacturer's written installation instructions, and cited sheet metal standard. Provide concealed fasteners where possible, and set units true to line, levels, and slopes. Install work with laps, joints, and seams that are permanently watertight and weather resistant.
- B. Roof Edge Flashing: Anchor to resist uplift and outward forces according to recommendations in cited sheet metal standard unless otherwise indicated. Interlock bottom edge of roof edge flashing with continuous cleat anchored to substrate at staggered 3-inch centers.
- C. Pipe or Post Counterflashing: Install counterflashing umbrella with close-fitting collar with top edge flared for elastomeric sealant, extending minimum of 4 inches over base flashing. Install stainless-steel draw band and tighten.
- D. Roof-Penetration Flashing: Coordinate installation of roof-penetration flashing with installation of roofing and other items penetrating roof. Seal with butyl sealant and clamp flashing to pipes that penetrate roof.

3.4 WALL FLASHING INSTALLATION

- A. General: Install sheet metal wall flashing to intercept and exclude penetrating moisture according to cited sheet metal standard unless otherwise indicated. Coordinate installation of wall flashing with installation of wall-opening components such as windows, doors, and louvers.

3.5 MISCELLANEOUS FLASHING INSTALLATION

- A. Equipment Support Flashing: Coordinate installation of equipment support flashing with installation of roofing and equipment. Weld or seal flashing with elastomeric sealant to equipment support member.

3.6 ERECTION TOLERANCES

- A. Installation Tolerances: Shim and align sheet metal flashing and trim within installed tolerance of 1/4 inch in 20 feet on slope and location lines indicated on Drawings and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.

- B. Installation Tolerances: Shim and align sheet metal flashing and trim within installed tolerances specified in MCA's "Guide Specification for Residential Metal Roofing."

3.7 CLEANING AND PROTECTION

- A. Clean exposed metal surfaces of substances that interfere with uniform oxidation and weathering.
- B. Clean and neutralize flux materials. Clean off excess solder.
- C. Clean off excess sealants.
- D. Remove temporary protective coverings and strippable films as sheet metal flashing and trim are installed unless otherwise indicated in manufacturer's written installation instructions. On completion of sheet metal flashing and trim installation, remove unused materials and clean finished surfaces as recommended by sheet metal flashing and trim manufacturer. Maintain sheet metal flashing and trim in clean condition during construction.
- E. Replace sheet metal flashing and trim that have been damaged or that have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 07 62 00

SECTION 07 92 00 - JOINT SEALANTS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes: Joint sealants, backing materials, and supplementary items necessary for installation.

1.2 SUBMITTALS

- A. Product Data: Manufacturer's technical literature for each product and system indicated.
 - 1. Include manufacturer's specifications for materials, finishes, construction details, installation instructions, and recommendations for maintenance.
- B. Samples for Initial Selection: Where specified to provide sealant colors from manufacturer's standard and custom selections, provide manufacturer's color charts consisting of strips of cured sealants showing full range of colors available for each product exposed to view
- C. Samples for Verification Purposes: Samples for each kind and color of joint sealants in 1/2 in (12 mm) wide joints formed between two 6 in (150 mm) long strips of material matching appearance of exposed surfaces adjacent to joint sealants.
- D. Product Test Reports: Written reports based on evaluation of comprehensive tests performed by qualified testing agency indicating that each product complies with requirements.
- E. Field Quality Control Reports: Written report of testing and inspection required by "Field Quality Control" Article.
- F. Manufacturer's Project Acceptance Document: Certification by the manufacturer that its product(s) are approved, acceptable, suitable for use in specific locations, for specific details, and for applications indicated, specified, or required, and that a warranty will be issued.
- G. Qualification Data: For installer.
 - 1. For firms and persons specified in "Quality Assurance" to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of Architects and Owners, and other information specified.

1.3 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Manufacturer with not less than 10 years experience with successful production of products and systems similar to scope of this Project, with a record of successful in-service performance and completion of projects for a period of not less than 10 years and with sufficient production capability, facilities, and personnel to produce required Work.
- B. Installer Qualifications:
 - 1. Experience: Installer with not less than 10 years experience in performing specified Work similar to scope of this Project, with a record of successful in-service performance and completion of projects for a period of not less than 10 years, and with sufficient production capability, facilities and personnel, to produce required Work.
 - 2. Supervision: Installer shall maintain a competent supervisor who is at Project site during times specified Work is in progress that is experienced in installing systems similar to type and scope required.

3. Manufacturer Acceptance: Installer shall be certified, approved, licensed, or acceptable to manufacturer to install products.

C. Mock-Ups: Before beginning Work of this Section, install joint sealants in mock-ups of the various assemblies specified in other Sections indicated to receive joint sealants specified in this Section. Mock-ups shall include each form of product and color required to verify selections made under sample Submittals and to demonstrate aesthetic effects and qualities of materials and execution.

1.4 PROJECT CONDITIONS

- A. Ambient Conditions: Install joint sealants within range of ambient and substrate temperatures and moisture conditions as recommended by manufacturer. Protect substrates from environmental conditions that affect performance.
 1. Do not apply to a damp or wet substrate or during high humidity conditions including snow, rain, fog, or mist.
- B. Weather Conditions Limitation: Proceed with Work only when existing and forecasted weather conditions will permit installation according to manufacturer's instructions and warranty requirements.

1.5 COORDINATION

- A. Coordinate installation of products and systems with interfacing and adjoining construction to provide a successful installation without failure.

1.6 WARRANTY

- A. Manufacturer's Warranty for Urethane Sealants: Furnish manufacturer's written material warranty for a period of 5 years from date of Substantial Completion signed by an authorized representative using manufacturer's standard form agreeing to furnish materials required to repair or replace work which exhibits material defects caused by manufacture or design of product. "Defects" is defined to include but not limited to deterioration or failure to perform as required.
- B. Manufacturer's Warranty for Silicone Sealants: Furnish manufacturer's written material for a period of 20 years from date of Substantial Completion signed by an authorized representative using manufacturer's standard form agreeing to furnish materials required to repair or replace work which exhibits material defects caused by manufacture or design of product. "Defects" is defined to include but not limited to deterioration or failure to perform as required.
- C. Installer's Warranty: Furnish installer's written warranty for a period of 2 years from date of Substantial Completion signed by an authorized representative using installer's standard form agreeing to provide labor required to repair or replace work which exhibits workmanship defects. "Defects" is defined to include but not limited to deterioration or failure to perform as required.

PART 2 - PRODUCTS

2.1 MANUFACTURERS AND PRODUCTS

- A. Acceptable Manufacturers and Products: Subject to compliance with requirements of Contract Documents as judged by the Architect, provide product by one of manufacturers listed. If not

listed, submit as substitution according to Conditions of the Contract and Division 01 Section "Substitution Procedures".

2.2 MATERIALS, GENERAL

- A. Single Source Responsibility: Furnish each type of product from single manufacturer. Provide secondary materials only as recommended by manufacturer of primary materials.
- B. Compatibility: Joint sealants, backings, and other related materials shall be compatible with one another and with joint substrates under conditions of service and application, as demonstrated by joint sealant manufacturer based on testing and field experience.
- C. Volatile Organic Compounds (VOC) Content of Interior Sealants: Sealants and primers for use inside weatherproofing system shall comply with following limits for VOC content when calculated according to 40 CFR 59, Part 59, Subpart D (EPA Method 24):
 - 1. Elastomeric Sealants: 250 g/L.
 - 2. Primers for Non-Porous Substrates: 250 g/L.
 - 3. Primers for Porous Substrates: 775 g/L.
- D. Suitability for Contact with Food: Comply with authorities having jurisdiction for joints in repeated contact with food.

2.3 EXTERIOR ELASTOMERIC SEALANTS

- A. Exterior Pourable Urethane Sealant:
 - 1. Product Quality Standard: ASTM C 920, Type M, Grade P, Class 25, Use T.
 - 2. Description: Multi-component, pourable, moisture curing, polyurethane sealant; rated for incline when used on sloped surfaces.
 - 3. Joint Movement Capability: Plus 25 percent, minus 25 percent.
 - 4. Primers: Product provided by sealant manufacturer if required by conditions.
 - 5. Manufacturers and Products:
 - a. BASF; Sonolastic SL 2.
 - b. Pecora Corp.; Urexpam NR-200.
 - c. Sika Corp., Construction Products Div.; Sikaflex 2c SL.
 - d. Tremco Commercial Sealants & Waterproofing; THC-900/THC-901 or Vulkem 445SSL.
 - 6. Color: As selected by Architect from manufacturer's standard and custom colors.
- B. Exterior Non-sag Silicone Sealant:
 - 1. Product Quality Standard: ASTM C 920, Type S, Grade NS, Class 50 or 100/50.
 - 2. Description: Single component, non-sag, neutral cure, non-staining as determined by pre-construction stain testing, and non-bleeding, silicone sealant.
 - 3. Joint Movement Capability:
 - a. Class 50: Plus 50 percent, minus 50 percent.
 - b. Class 100/50: Plus 100 percent, minus 50 percent.
 - 4. Primers: Product provided by sealant manufacturer if required by conditions.
 - 5. Manufacturers and Products:
 - a. Class 50:
 - 1) Dow Corning; 795 Silicone Building Sealant.
 - 2) Momentive Performance Materials, GE Silicones; Silpruf SCS2000.
 - 3) Pecora Corp.; 864NST.
 - 4) Sika Corp., Construction Products Div.; Sikasil WS-295.
 - 5) Tremco Commercial Sealants & Waterproofing; Spectrem 3.
 - b. Class 100/50:
 - 1) Dow Corning; 790 Silicone Building Sealant.
 - 2) Momentive Performance Materials, GE Silicones; Silpruf LM SCS2700.
 - 3) Pecora Corp.; 890NST.

- 4) Sika Corp., Construction Products Div.; Sikasil WS-290.
- 5) Tremco Commercial Sealants & Waterproofing; Spectrem 1.
6. Color: As selected by Architect from manufacturer's standard and custom colors.

2.4 INTERIOR ELASTOMERIC SEALANTS

A. Interior Non-sag Silicone Sealant:

1. Product Quality Standard: ASTM C 920, Type S, Grade NS, Class 25.
2. Description: Single component, non-sag, moisture curing, silicone sealant specially formulated with fungicide for use in sanitary non-porous applications.
3. Manufacturers and Products:
 - a. Dow Corning; 786 Silicone Sealant.
 - b. Momentive Performance Materials, GE Silicones; Sanitary SCS1700.
 - c. Pecora Corp.; 898.
 - d. Sika Corp., Construction Products Div.; Sikasil GP
 - e. Tremco Commercial Sealants & Waterproofing; Tremsil 200.
4. Color: As selected by Architect from manufacturer's standard and custom colors.

B. Interior Non-sag Urethane Sealant:

1. Product Quality Standard: ASTM C 920, Type S, Grade NS, Class 25 or 35.
2. Description: Single component, non-sag, moisture curing, non-staining as determined by pre-construction stain testing if exposed, polyurethane sealant.
3. Joint Movement Capability: Plus 25 percent, minus 25 percent, or plus 35 percent, minus 35 percent.
4. Primers: Product provided by sealant manufacturer if required by conditions.
5. Manufacturers and Products:
 - a. BASF; Sonolastic NP 1.
 - b. Pecora Corp.; Dynatrol I-XL.
 - c. Sika Corp., Construction Products Div.; Sikaflex 1a or Sikaflex Textured Sealant.
 - d. Tremco Commercial Sealants & Waterproofing; Dymonic or Vulkem 116.
6. Color: As selected by Architect from manufacturer's standard and custom colors.

C. Interior Non-sag Acrylic Latex Sealant:

1. Product Quality Standard: ASTM C 834, Type and Grade as required by conditions.
2. Description: Single component, non-sag, moisture curing, general purpose, paintable, siliconized acrylic latex sealant.
3. Joint Movement Capability: Plus 7.5 percent, minus 7.5 percent
4. Manufacturers and Products:
 - a. BASF; MasterSeal NP 520.
 - b. Pecora Corp.; AC 20+.
 - c. Tremco Commercial Sealants & Waterproofing; Tremflex 834.
5. Color: As selected by Architect from manufacturer's standard and custom colors.

D. Color: As selected by Architect from manufacturer's standard and custom colors.

1. Description: Low pressure, one-component, expanding, closed-cell polyurethane insulating foam gap filler; applied with professional hand-held dispensing gun; CFC and HCFC free.
2. Performance Requirements: Class 1 Fire-Retardant per ASTM E 84.
3. Manufacturers and Products:
 - a. Convenience Products; Touch 'n Seal.
 - b. Dow Chemical Co.; Great Stuff Pro.
 - c. Fomo Products, Inc.; Handi-Foam.
 - d. RHH Foam Systems, Inc.; Versi-Tite
 - e. Tremco Commercial Sealant & Waterproofing; ExoAir LEF.

E. Acoustical Sealants: As specified in Division 09 Section "Gypsum Board".

2.5 JOINT SEALANT BACKING

A. Foam Backer Rods:

1. Product Quality Standard: ASTM C 1330, Type C, Type O, Type B.
2. Description: Extruded polyethylene, polyurethane, or polyolefin in either closed cell structure (Type C), open cell structure (Type O), or bicellular structure with surface skin (Type B) as defined by ASTM Terminology C 717.
3. Size: Diameter approximately 25 percent larger than joint width, unless otherwise directed by manufacturer.
4. Manufacturers and Products:
 - a. Type C:
 - 1) BASF; Sonneborn, Closed-Cell Backer Rod.
 - 2) Nomaco Inc.; Green Rod or HBR.
 - b. Type O:
 - 1) Backer Rod Mfg. Inc.; Denver Foam.
 - 2) Nomaco Inc.; Foam-Pak II.
 - c. Type B:
 - 1) BASF; Sonneborn, Soft Backer Rod.
 - 2) Nomaco Inc.; Dual-Rod or Sof-Rod.

B. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint-filler materials, or joint surfaces at back of joint where such adhesion would result in sealant failure. Provide self-adhesive tape where applicable.

2.6 ACCESSORIES

A. Cleaners for Non-porous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming joint substrates and adjacent non-porous surfaces in any way, and formulated to promote optimum adhesion of sealants to joint substrates.

B. Masking Tape: Non-staining, non-absorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Acceptance of Surfaces and Conditions: Examine substrate surfaces to receive products and systems and associated Work for compliance with requirements and other conditions affecting performance. Proceed only when unsatisfactory conditions have been corrected in a manner complying with Contract Documents. Starting Work within a particular area will be construed as acceptance of surface conditions.

3.2 INSTALLATION GENERAL

A. Installation Quality Standards: In addition to standards listed elsewhere, perform Work according to following, unless otherwise specified:

1. Respective manufacturer's written installation instructions.
2. Accepted submittals.
3. Contract Documents.

3.3 PREPARATION

- A. General: Comply with manufacturer's instructions, recommendations, and specifications for cleaning and surface preparation. Surfaces shall have no defects, contaminants, or errors which would result in poor or potentially defective installation or would cause latent defects in Work.
- B. Cleaning of Joints: Clean out joints immediately before installing joint backings and sealants to comply with joint sealant manufacturer's written instructions and following requirements:
 - 1. Remove foreign material that could interfere with adhesion of joint sealant, including, but not limited to, dust, paints (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer), old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.
 - 2. Clean porous joint substrate surfaces by brushing, grinding, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining after cleaning operations above by vacuuming or blowing out joints with oil-free compressed air.
 - 3. Remove laitance and form-release agents from concrete.
 - 4. Clean non-porous joint substrate surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants.
 - 5. Substrate material allowed by sealant's ASTM C 920 Use Classification.
- C. Joint Priming: Prime joint substrates where recommended by joint sealant manufacturer, or as indicated by prior experience, or as required by pre-construction compatibility and adhesion testing. Apply primer to comply with joint sealant manufacturer's written instructions. Confine primers to areas of joint sealant bond; do not allow spillage or migration onto adjoining surfaces.
- D. Masking Tape: Use masking tape where required to prevent contact of sealant or primer with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

3.4 INSTALLATION

- A. Joint Sealant Backings: Install type indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.
 - 1. Do not leave gaps between ends of sealant backings.
 - 2. Do not stretch, twist, puncture, or tear backings.
 - 3. Remove absorbent sealant backings that have become wet or damaged before sealant application and replace with dry materials.
 - 4. Install bond-breaker tape behind sealants where backings are not used between sealants and backs of joints.
- B. Joint Sealants: Install at same time as backings using proven techniques that comply with following:
 - 1. Place sealants so they directly contact and fully wet joint substrates.
 - 2. Completely fill recesses in each joint configuration.
 - 3. Produce uniform, cross sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.
 - 4. Use open cell backer rod at interior line of sealant for double sealed condition.
 - 5. Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified in subparagraphs below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.
 - a. Remove excess sealant from surfaces adjacent to joints.

- b. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
 - c. Use masking tape to protect surfaces adjacent to recessed tooled joints.
 - 6. Install joint sealants in accordance with ASTM C 1193 as applicable to materials, applications, conditions indicated, and with the following profile configurations:
 - a. Fillet: Figure 5.
 - b. Bridge: Figure 6.
 - c. Butt: Figure 8A (concave tooling), generally hour-glass shape with 2:1 width-to-depth ratio.
- C. Sprayed Foam Insulating Gap Filler: Apply sprayed foam insulating gap filler within exterior wall assemblies using professional hand-held dispensing gun in accordance with manufacturer's written instructions.
 - 1. Prior to installation of wall finish systems, apply sprayed foam insulating gap filler to gaps, cracks, cavities, openings, and voids in exterior wall back-up, including annular space around piping, ducts, conduits, wiring, and electrical outlets to seal off potential air drafts.
 - 2. After sprayed foam sealant is applied, make flush with face of adjacent wall by using method recommended by manufacturer.

3.5 CLEANING

- A. In-Progress Cleaning: Remove excess sealant or sealant smears adjacent to joints as Work progresses by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.

3.6 PROTECTION

- A. General Requirements: Protect during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealants immediately so installations with repaired areas are indistinguishable from original Work.

3.7 JOINT SEALANT SCHEDULE

- A. Exterior Elastomeric Sealant Applications:
 - 1. Exterior Pourable Urethane Sealant:
 - a. Moving joints in exterior concrete walks and drives.
 - 2. Exterior Non-sag Silicone Sealant:
 - a. Moving joints on exterior side of exterior walls.
- B. Interior Elastomeric Sealant Applications:
 - 1. Interior Non-sag Silicone Sealant:
 - a. Non-moving joints in moist or damp areas which are susceptible to mildew.
 - b. Non-moving joints in toilet rooms.
 - c. Non-moving joints in kitchens.
 - d. Non-moving joints in repeated contact with food.
 - 2. Interior Non-sag Urethane Sealant:
 - a. Building joints on interior side of exterior walls where joint movement is anticipated.
 - 3. Interior Non-sag Acrylic Latex Sealant:
 - a. Non-moving joints where another type of sealant is not otherwise specified or scheduled.
 - b. Minimal moving joints due to temperature change.

C. Sprayed Foam Insulating Gap Filler Applications:

1. Exterior non-moving gaps around windows, glazed aluminum walls, doors, and penetrations beneath weather-resistant coverings.
2. Interior non-moving gaps around windows, glazed aluminum walls, doors, and penetrations.

END OF SECTION 07 92 00

SECTION 08 14 00 - ENTRY DOORS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes entry doors.
- B. Related Requirements:
 - 1. Division 07 Section "Weather Barriers" for flashings and tie-in to weather barrier.
 - 2. Division 07 Section "Joint Sealants" for sealants.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Samples: For each exposed product and for each color and texture specified.

1.3 PERFORMANCE REQUIREMENTS

- A. Door Unit Air Leakage, ASTM E 283, 1.57 psf (25 mph): 0.30 cfm per square foot of frame or less.
- B. Door Unit Water Penetration: No water penetration through door unit when tested in accordance with ASTM E 331 with water applied at rate of 5 gallons per hour per square foot. Doors with standard sill shall have water resistance performance level up to 7.5 psf and low profile sill (ADA) shall have water resistance performance level of 0 psf.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Delivery: Deliver materials to site undamaged in manufacturer's or sales branch's original, unopened containers and packaging, with labels clearly identifying manufacturer and product name. Include installation instructions.
- B. Storage: Store materials in an upright position, off ground, under cover, and protected from weather, direct sunlight, and construction activities.
- C. Handling: Protect materials and finish during handling and installation to prevent damage.

1.5 WARRANTY

- A. Manufacturer's Warranty: Manufacturer and Installer agree to repair or replace components that fail(s) in materials or workmanship within specified warranty period.
 - 1. Warranty Period: 10 year(s) from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Basis-of-Design Product: Subject to compliance with requirements, provide Pella Corporation Architect Series or a comparable product by one of the following:
 - 1. Jeld-Wen
 - 2. ThermaTru

3. Kolbe
4. Marvin Windows & Doors

2.2 ENTRY DOORS

A. Entry Doors: Factory-assembled doors with outward-swing door panels installed in frames.

B. Frames:

1. Select softwood, water-repellent, preservative-treated with EnduraGuard® in accordance with WDMA I.S.-4. EnduraGuard includes water-repellency, three active fungicides and an insecticide applied to the head and jambs.
 - a. Interior Exposed Surfaces: Primed ready for site finishing with no visible fastener holes.
 - b. Exterior Surfaces: wood exterior primed pine.
2. Sills: Extruded aluminum.
 - a. Aluminum Sills with the following finishes: Bronze
 - b. ADA Approved.
3. Frame Dimensions:
 - a. Overall Frame Depth: 5-15/16 inches (150 mm).
 - b. Nail-fin Depth: 4-9/16 inches (116 mm).

C. Door Panels:

1. Fiberglass Door Panels:
 - a. 0.072-inch minimum fiberglass skin on exterior and interior surfaces with CFC-free injected foam insulating core.
 - b. Rails and Stiles: Wood top rails and stiles and wood plastic composite bottom rails secured with structural adhesive between skins at perimeter.
 - c. Fiberglass Grain: Smooth.
 - d. Lock Block: 12-inches or greater, solid wood.
 - e. Panel Thickness: 1-11/16 inches (43 mm).
2. Hardware Preparation
 - a. Factory prepared

D. Weather Strip:

1. Head: Dual-seal weatherstrip shall contact interior face and side of door panel and extruded leaf rain screen shall cover the exterior face of door panel.
2. Jambs: Dual-seal weatherstrip shall contact interior face and side of door panel.
3. Sill: Bristle rain screen at exterior face of door panel with bulb weatherstrip on threshold shall contact interior face of door panel.

2.3 GLAZING

A. Glazing:

1. Float Glass: ASTM C 1036, Quality 1.
 - a. Tempered Glass: ASTM C 1048.
 - b. ASTM E1300 compliant.
2. Type:
 - a. Tempered Insulating Glass: Multi-layer Low-E coated with argon, dual-seal insulating glass, installed into high-performance glazing frames.

2.4 GLAZING OPTIONS

A. Grilles-Between-the-Glass:

- a. Profile: 3/4-inch contoured.
- b. Aluminum Grills: Permanently installed between 2 panes of glass.
- c. pattern: Traditional.

- d. Finish: Factory pre-finished.
- e. Color: White

2.5 HARDWARE

- A. Hinges: Three (3) per door panel on 6' 8" and 7' 0" panel heights
 - 1. Type: 4-inch by 4-inch by 0.100-inch thick cold-rolled steel with Ball bearings and non-removal pin.
 - 2. Finish: US10B, oiled-rubbed bronze.
- B. Frames are prepared for hardware to match door panel boring
 - 1. Locking Hardware:
 - 2. Multi-point lock handle set hardware, with Schlage 5-pin configured keyway, is Oil-Rubbed Bronze.

2.6 TOLERANCES

- A. Doors shall accommodate the following opening tolerances:
 - 1. Vertical Dimensions Between High and Low Points: Plus 1/4 inch, minus 0 inch.
 - 2. Width Dimensions: Plus 1/4 inch, minus 0 inch.

2.7 FINISH

- A. Fiberglass Door Panels: Factory pre-finished, paint; color to match PT1.
- B. Door Frame Interior Finish: Factory-primed, 1 coat, ready for site finishing

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas to receive doors. Notify Architect of conditions that would adversely affect installation or subsequent use. Do not proceed with installation until unsatisfactory conditions are corrected.

3.2 INSTALLATION

- A. Install doors in accordance with manufacturer's instructions and approved shop drawings.
- B. Install doors to be weather-tight and freely operating.
- C. Maintain alignment with adjacent work.
- D. Secure assembly to framed openings, plumb and square, without distortion.
- E. Integrate door system installation with exterior weather-resistant barrier using flashing/sealant tape. Apply and integrate flashing/sealant tape with weather-resistant barrier using watershed principles in accordance with door manufacturer's instructions.
- F. Place interior seal around door perimeter to maintain continuity of building thermal and air barrier using backer rod and sealant or insulating-foam sealant.
- G. Seal door to exterior wall cladding with sealant and related backing materials at perimeter of assembly.

H. Leave doors closed.

3.3 CLEANING

A. Clean door frames and glass in accordance with Division 1 requirements.

B. Do not use harsh cleaning materials or methods that would damage finish.

C. Remove manufacturer's proprietary labels and visible markings.

3.4 PROTECTION

A. Protect installed doors to ensure that, except for normal weathering, doors will be without damage or deterioration at time of substantial completion.

END OF SECTION 08 14 00

SECTION 08 52 00 - WOOD WINDOWS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes aluminum-clad wood windows.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product, including installation instructions.
- B. Shop Drawings: Include plans, elevations, sections, hardware, accessories, insect screens, operational clearances, and details of installation, including anchor, flashing, and sealant installation.
- C. Samples: For each exposed product and for each color specified.

1.3 INFORMATIONAL SUBMITTALS

- A. Product test reports.
- B. Sample warranties.

1.4 WARRANTY

- A. Manufacturer's Warranty: Manufacturer agrees to repair or replace wood windows that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Period:
 - a. Window: 10 years from date of Substantial Completion.
 - b. Glazing Units: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 WINDOW PERFORMANCE REQUIREMENTS

- A. Product Standard: Comply with AAMA/WDMA/CSA 101/I.S.2/A440 for definitions and minimum standards of performance, materials, components, accessories, and fabrication unless more stringent requirements are indicated.
 - 1. Window Certification: WDMA certified with label attached to each window.
- B. Performance Class and Grade: AAMA/WDMA/CSA 101/I.S.2/A440 as follows:
 - 1. Minimum Performance Class: CW.
- C. Thermal Transmittance: NFRC 100 maximum whole-window U-factor of 0.30 Btu/sq. ft. x h x deg F.
- D. Window Unit Air Leakage, ASTM E 283, 1.57 psf (25 mph): 0.3 cfm per square foot of frame or less.
- E. Window Unit Water Penetration: No water penetration through window unit when tested in accordance with ASTM E 547, under static pressure of 7.5 psf (52 mph) after 4 cycles of 5 minutes each, with water being applied at a rate of 5 gallons per hour per square foot.

2.2 WOOD WINDOWS

A. Wood Windows:

1. Basis-of-Design Product: Subject to compliance with requirements, provide Pella Corporation; or comparable product by one of the following:
 - a. Jeld-Wen, Inc.
 - b. Kolbe & Kolbe Millwork Co., Inc.
 - c. Marvin Windows and Doors.

B. Operating Types: Double Hung.

C. Factory-Primed Wood Double-Hung Windows: Architect Series factory-assembled wood double-hung windows. Sash shall tilt to interior without removal for cleaning.

1. Frame:
 - a. Select wood, water-repellent, preservative-treated with EnduraGuard® in accordance with WDMA I.S.-4. EnduraGuard includes water-repellency, three active fungicides and an insecticide applied to the frame.
 - b. Overall Frame Depth: 4-3/8 inches (111 mm).
2. Sash:
 - a. Select wood, water-repellent, preservative-treated with EnduraGuard in accordance with WDMA I.S.-4. EnduraGuard includes water-repellency, three active fungicides and an insecticide applied to the sash.
 - b. Exterior Finish: Factory-Primed.
 - c. Corners: Mortised and tenoned, glued and secured with metal fasteners.
 - d. Operable sash tilt to interior for cleaning or removal.
3. Exterior finish: White to match.
4. Interior finish: factory primed.

D. Sash Thickness: 1-3/4 inches (44 mm).

1. Weather Stripping:
 - a. Water-stop santoprene wrapped foam at head and sill.
 - b. Thermal-plastic elastomer bulb with slip coating set into lower sash for tight contact at checkrail.
 - c. Vinyl-wrapped foam inserted into jambliner or jambliner components to seal to sides of sash.

2.3 GLAZING

A. Insulating-Glass Units: ASTM E2190.

1. Glass: ASTM C1036, Type 1, Class 1, q3.
 - a. Tint or Pattern: Clear or Obscure as indicated.
2. Lites: Two.
3. Filling: Fill space between glass lites with argon.
4. Low-E Coating: .

2.4 Hardware

A. Balances:

1. Block-and-tackle balances.
2. Balances are attached to frame and connected to sash with polyester cord.

B. Locking System:

1. Self-aligning sash lock factory-installed.
2. One installed on units with frame width less than 37 inches, 2 locks installed on units with frame width of 37 inches or greater.

C. Lock finish: Backed enamel, Oil-rubbed bronze.

2.5 OPTIONS

A. Insect Screens: Vivid View half.

1. Compliance: ASTM D 3656 and SMA 1201.
2. Screen Cloth: Vinyl-coated fiberglass, 21/17 mesh, with minimum 78 percent light transmissivity.
3. Set in aluminum frame fitted to inside of window. Complete with necessary hardware.
4. Screen Frame Finish: Baked enamel.

B. Grilles-Between-the-Glass:

1. Profile: 3/4 inch.
2. Contoured aluminum grilles installed between 2 panes of the sealed insulating glass.
3. Grille Color: White.

2.6 FABRICATION

A. Fabricate wood windows in sizes indicated. Include a complete system for installing and anchoring windows.

B. Glaze wood windows in the factory.

C. Weather strip each operable sash to provide weathertight installation.

D. Mullions: Provide mullions and cover plates, matching window units, complete with anchors for support to structure and installation of window units. Allow for erection tolerances and provide for movement of window units due to thermal expansion and building deflections. Provide mullions and cover plates capable of withstanding design wind loads of window units.

E. Complete fabrication, assembly, finishing, hardware application, and other work in the factory to greatest extent possible. Disassemble components only as necessary for shipment and installation. Allow for scribing, trimming, and fitting at Project site.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Comply with manufacturer's written instructions for installing windows, hardware, accessories, and other components. For installation procedures and requirements not addressed in manufacturer's written instructions, comply with installation requirements in ASTM E2112.

B. Install windows level, plumb, square, true to line, without distortion, anchored securely in place to structural support, and in proper relation to wall flashing and other adjacent construction to produce weathertight construction.

C. Adjust operating sashes and hardware for a tight fit at contact points and weather stripping for smooth operation and weathertight closure.

D. Clean exposed surfaces immediately after installing windows. Remove excess sealants, glazing materials, dirt, and other substances.

E. Remove and replace sashes if glass has been broken, chipped, cracked, abraded, or damaged during construction period.

END OF SECTION 08 52 00

SECTION 08 71 00 - DOOR HARDWARE

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Mechanical door hardware for the following:
 - a. Swinging doors.
 - b. Folding doors.
 - 2. Cylinders for door hardware specified in other Sections.

1.2 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.
 - 1. Review Owner installed vs contractor installed work.
 - 2. Review shop submittals and coordinated work by Owner
 - 3. Review finish selections for hardware
 - 4. Review refurbishment procedures and requirements for finishes

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Samples: For each exposed product in each finish specified.
- C. Door hardware schedule.
- D. Schedules shall be kept current with all changes to the project. If changes occur, project hardware schedules shall be maintained to reflect the changes as they are approved. Omitted items shall be deleted from openings, added and replaced items shall be included. Installation submittals shall be kept current as changes occur. Upon request, a complete updated hardware schedule shall be provided to the contractor. Supplemental submittals that include only the changed openings will not be acceptable.
- E. Prior to final payment, provide a record copy of hardware schedules, including all revisions and updates. All openings shall be listed to reflect final installed configuration only.

1.4 INFORMATIONAL SUBMITTALS

- A. Sample warranty.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance data.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: Supplier of products and an employer of workers trained and approved by product manufacturers and of an Architectural Hardware Consultant who is available during the course of the Work to consult Contractor, Architect, and Owner about door hardware and keying.
 - 1. Scheduling Responsibility: Preparation of door hardware and keying schedule.

- B. Items of hardware not definitely specified herein but necessary for completion of the work shall be provided. Such items shall be of type and quality suitable to the service required and comparable to the adjacent hardware. Where size and shape of members is such as to prevent the use of types specified, hardware shall be furnished of suitable types having as nearly as practicable the same operation and quality as the type specified. Sizes shall be adequate for the service required.
- C. Include such nuances as strike type, strike lip length, raised barrel hinges, mounting brackets, blade stop spacers, special templates, fasteners, shims, and coordination between conflicting products. All doors shall be provided with a stop.

1.7 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace components of door hardware that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Period: Three years from date of Substantial Completion unless otherwise indicated below:
 - a. Manual Closers: Ten years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Means of Egress Doors: Latches do not require more than 15 lbf to release the latch. Locks do not require use of a key, tool, or special knowledge for operation.
- B. Accessibility Requirements: For door hardware on doors in an accessible route, comply with the ANSI A117.1 – 2009 edition.

2.2 SCHEDULED DOOR HARDWARE

- A. Provide products for each door that comply with requirements indicated in Part 2 and door hardware schedule.
 - 1. Door hardware is scheduled in Part 3.

2.3 HINGES

- A. Hinges: BHMA A156.1. Provide template-produced hinges.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by the following:
 - a. Hager Companies.
 - b. Ives.
 - c. Stanley.
 - 2. Out-swinging exterior and interior door hinges shall have non-removable pins.
 - 3. Number of hinges: 3 for doors up to 90" high; provide 1 additional hinge for each additional 30" in height or fraction thereof.
 - 4. Provide steel for interior doors and stainless steel for exterior doors (unless otherwise noted); with specified plated finish.
 - 5. Hinge Types:
 - a. For interior doors 36 inches wide and less: Standard duty ball bearing, .134 ga.; 4-1/2 x 4-1/2.
 - b. For interior doors over 36 inches wide: Heavy weight ball bearing, 5 x 4-1/2, .190 ga., 4 bearing.
 - c. For all exterior doors (unless otherwise noted in hardware sets): Heavy weight ball bearing, 5 x 4-1/2, .190 ga., 4 bearing.

2.4 MECHANICAL LOCKS AND LATCHES

- A. Lock Functions: As indicated in door hardware schedule.
- B. Lock Throw: Comply with testing requirements for length of bolts required for labeled fire doors, and as follows:
 - 1. Bored Locks: Minimum 1/2-inch latchbolt throw.
- C. Lock Backset: 2-3/4 inches unless otherwise indicated. Field verify backset requirements for existing doors.
- D. Strikes: Provide manufacturer's standard strike for each lock bolt or latchbolt complying with requirements indicated for applicable lock or latch and with strike box and curved lip extended to protect frame; finished to match lock or latch.
 - 1. Flat-Lip Strikes: For locks with three-piece antifriction latchbolts, as recommended by manufacturer.
 - 2. Extra-Long-Lip Strikes: For locks used on frames with applied wood casing trim.
 - 3. Aluminum-Frame Strike Box: Manufacturer's special strike box fabricated for aluminum framing.
 - 4. Rabbet Front and Strike: Provide on locksets for rabbeted meeting stiles.
- E. Mortise Locks: BHMA A156.13; Grade 1; Series 1000.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Corbin Russwin.
 - b. No alternate manufacturers will be accepted without architect's written approval prior to bid.

2.5 LOCK CYLINDERS AND KEYING

- A. Lock Cylinders: Manufacturer's Standard Lock Cylinders: BHMA A156.5, Grade 1.
- B. Cylinders: Manufacturer's standard non-removable core cylinder, constructed from brass or bronze, stainless steel, or nickel silver, and complying with the following:
 - 1. Provide cylinders for storefront doors and other locking doors that do not require other hardware.
 - 2. Manufacturers:
 - a. Prep for Corbin Russwin.
 - b. Provided and installed by owner.

2.6 OPERATING TRIM

- A. Operating Trim: BHMA A156.6; Oil rubbed bronze (US10B/613) unless otherwise indicated.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by the following:
 - a. Hager Companies.
 - b. Ives.
 - c. Rockwood Manufacturing Company.
 - d. Sargent

2.7 SURFACE CLOSERS

- A. Surface Closers: BHMA A156.4; rack-and-pinion hydraulic type with adjustable sweep and latch speeds controlled by key-operated valves and forged-steel main arm. Comply with manufacturer's written instructions for size of door closers depending on size of door, exposure to weather, and

anticipated frequency of use. Provide factory-sized closers, adjustable to meet field conditions and requirements for opening force.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. LCN.
 - b. No alternate manufacturers will be accepted without architect's written approval prior to bid.

2.8 MECHANICAL STOPS AND HOLDERS

A. Wall- and Floor-Mounted Stops: BHMA A156.16.

1. Manufacturers: Subject to compliance with requirements, provide products by the following:
 - a. Hager Companies.
 - b. Ives.
 - c. Rockwood Manufacturing Company.

2.9 OVERHEAD STOPS AND HOLDERS

A. Overhead Stops and Holders: BHMA A156.8.

1. Manufacturers: Subject to compliance with requirements, provide products by the following:
 - a. Glynn Johnson.
 - b. Rixson.
 - c. Sargent.

2.10 DOOR GASKETING

A. Door Gasketing: BHMA A156.22; with resilient or flexible seal strips that are easily replaceable and readily available from stocks maintained by manufacturer.

1. Manufacturers: Subject to compliance with requirements, provide products by the following:
 - a. Hager Companies.
 - b. National Guard Products.
 - c. Zero.

2.11 THRESHOLDS

A. Thresholds: BHMA A156.21; fabricated to full width of opening indicated.

1. Manufacturers: Subject to compliance with requirements, provide products by the following:
 - a. Hager Companies.
 - b. National Guard Products.
 - c. Zero.

2.12 EXIT DEVICES AND AUXILIARY ITEMS

A. Exit Devices and Auxiliary Items: BHMA A156.3.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Precision.
 - b. Sargent
 - c. VonDuprin

2.13 AUXILIARY DOOR HARDWARE

A. Auxiliary Hardware: BHMA A156.16.

1. Manufacturers: Subject to compliance with requirements, provide products by the following:
 - a. Hager Companies.

- b. Ives.
- c. Rockwood Manufacturing Company.

2.14 FINISHES

- A. Provide finishes complying with BHMA A156.18.
- B. Typical finish, UNO: US10B.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Mounting Heights: Mount door hardware units at heights to comply with the following unless otherwise indicated or required to comply with governing regulations.
 - 1. Standard Steel Doors and Frames: ANSI/SDI A250.8.
 - 2. Custom Steel Doors and Frames: HMMA 831.
 - 3. Wood Doors: DHI's "Recommended Locations for Architectural Hardware for Wood Flush Doors."
- B. Install each door hardware item to comply with manufacturer's written instructions. Where cutting and fitting are required to install door hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation of surface protective trim units with finishing work. Do not install surface-mounted items until finishes have been completed on substrates involved.
- C. Hinges: Install types and in quantities indicated in door hardware schedule, but not fewer than the number recommended by manufacturer for application indicated or one hinge for every 30 inches of door height, whichever is more stringent, unless other equivalent means of support for door, such as spring hinges or pivots, are provided.
- D. Thresholds: Set thresholds for exterior doors and other doors indicated in full bed of sealant complying with requirements specified in Section 07 92 00 "Joint Sealants."
- E. Stops: Provide floor stops for doors unless wall or other type stops are indicated in door hardware schedule. Do not mount floor stops where they will impede traffic.
- F. Perimeter Gasketing: Apply to head and jamb, forming seal between door and frame.
 - 1. Do not notch perimeter gasketing to install other surface-applied hardware.
- G. Door Bottoms: Apply to bottom of door, forming seal with threshold when door is closed.

3.2 HARDWARE RESTORATION

- A. Where hardware sets indicate "Refurbish", carry out the following:
 - 1. Strip and repaint surfaces (including strikes, mortise edge plates, keyhole escutcheons, knob escutcheons; do not repaint ceramic knobs.)
 - 2. Clean and adjust mechanical components.
 - 3. Adjust, replace missing screws.
 - 4. Adjust knobs and set screws, replace mismatched set screws.
 - 5. Tighten loose screws.
 - 6. Adjust/reset strikes.
 - 7. Restore to full function.

8. Where strike pockets are deteriorated or screw anchorage is unsound, reinforce strike pockets with wood dutchman infills.

3.3 ADJUSTING

- A. Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.

3.4 DOOR HARDWARE SCHEDULE

SET 01

REMOVE CHAIN LOCK AND EXISTING DEADBOLT.
BALANCE OF EXISTING HISTORIC HARDWARE TO REMAIN. REFURBISH.
DO NOT REPAINT INTERIOR KNOB.
DEADBOLT: SARGENT 485

SET 02

EXISTING HISTORIC HARDWARE TO REMAIN. REFURBISH.
DEADBOLT: SARGENT 485

SET 03

EXISTING HISTORIC HARDWARE TO REMAIN. REFURBISH.
DO NOT REPAINT CERAMIC OR CHROME KNOBS
DEADBOLT: SARGENT 485

SET 04

EXISTING HISTORIC HARDWARE TO REMAIN. REFURBISH. DO NOT REPAINT CERAMIC KNOBS.
REINSTALL LOOSE/SHIFTED VERTICAL BOLTS

SET 05

EA	HINGES	AS SPECIFIED
1	EA STOREROOM	SARGENT, 10 LINE, ANSI F82 FUNCTION, Y LEVER, L ROSE, FINISH: 10B
1	EA WALL STOP	ROCKWOOD 404
1	EA CLOSER	SARGENT, 351 P10, FINISH 613
	SILENCERS	

SET 06

EA	HINGES	AS SPECIFIED
1	EA PASSAGE	SARGENT, 10 LINE, ANSI F75 FUNCTION, Y LEVER, L ROSE, FINISH: 10B
1	EA WALL STOP	ROCKWOOD 404
	SILENCERS	

SET 07

EA	HINGES	AS SPECIFIED
1	EA PRIVACY	SARGENT, 10 LINE, ANSI F76 FUNCTION, Y LEVER, L ROSE, FINISH: 10B
1	EA FLOOR STOP	ROCKWOOD 441CU
	SILENCERS	

SET 08

EA	HINGES	AS SPECIFIED
1 EA	RIM EXIT DEVICE	VON DUPRIN 55 SERIES, 5575L MORTISE LOCK EXIT DEVICE, 12 LEVER, 375L TRIM
1 EA	CYLINDER	MORTISE 3215
1 EA	CLOSER	INTERIOR MOUNT, LCN 1460-72 TOP JAMB (PUSH SIDE) INTERIOR MOUNT, SLIM-LINE PASTIC COVER REGULAR ARM
1 EA	OVERHEAD STOP	GLYNN-JOHNSON - 100
1 EA	SEAL	PEMKO S104 SILICONE KERF-IN WEATHERSTRIP
1 EA	SWEEP	PEMKO 29326DNB
1 EA	THRESHOLD	ZERO INTERNATIONAL 545B (BRONZE, ORB FINISH)

END OF SECTION 08 71 00

SECTION 09 29 00 - GYPSUM BOARD

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Interior gypsum board.

1.2 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.
 - 1. Review methods and procedures related to gypsum board installation including, but not limited to, the following:
 - a. Review installation methods over existing plaster conditions
 - b. Review finishing requirements for final applied finish
 - c. Review special detail conditions at existing building for final approval
 - d. Review requirements for mock-ups

1.3 QUALITY ASSURANCE

- A. Mockups: Build mockups of at least 100 sq. ft (One wall surface min.). in surface area to demonstrate aesthetic effects and to set quality standards for materials and execution:
 - 1. Build mockups for the following:
 - a. At wallcovering
 - b. At each painted surface sheen.
 - 2. Simulate finished lighting conditions for review of mockups.
 - 3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.

1.5 QUALITY ASSURANCE

- A. Industry Standard: Comply with applicable requirements of GA-210 "Application and Finishing of Gypsum Boards" by the Gypsum Association, except where more detailed or more stringent requirements are indicated including recommendations of the manufacturer.

1.6 DELIVERY, STORAGE AND HANDLING

- A. Store materials inside under cover and keep them dry and protected against weather, condensation, direct sunlight, construction traffic, and other potential causes of damage. Stack panels flat and supported on risers on a flat platform to prevent sagging.

1.7 FIELD CONDITIONS

- A. Environmental Limitations: Comply with ASTM C 840 requirements or gypsum board manufacturer's written instructions, whichever are more stringent.
- B. Do not install paper-faced gypsum panels until installation areas are enclosed and conditioned.
- C. Do not install panels that are wet, moisture damaged, and mold damaged.

1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

PART 2 - PRODUCTS

2.1 GYPSUM BOARD, GENERAL

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 1. American Gypsum
 2. CertainTeed
 3. Georgia-Pacific
 4. National Gypsum Company
 5. USG Corporation
- B. Size: Provide maximum lengths and widths available that will minimize joints in each area and that correspond with support system indicated.

2.2 INTERIOR GYPSUM BOARD

- A. Gypsum Wallboard: ASTM C 1396/C 1396M.
 1. Thickness: As indicated
 2. Long Edges: Tapered.
- B. Gypsum Ceiling Board: ASTM C 1396/C 1396M.
 1. Thickness: As indicated
 2. Long Edges: Tapered.
- C. Lightweight Gypsum Board:
 1. Material Quality Standard: ASTM C 1396 / C 1396M.
 2. Description: High strength board, gypsum core, with paper surfacing on face and backsides; tapered long edges; formulated to be lighter in weight.
 3. Thickness: 1/2 in thick.
 4. Manufacturers and Products:
 - a. American Gypsum: LIGHTRoc
 - b. CertainTeed Corporation; Easi-Lite Lightweight Gypsum Board
 - c. Georgia Pacific: ToughRock Span 24 Lite-Weight Board
 - d. National Gypsum Company; Gold Bond High Strength LTE Gypsum Board
 - e. United States Gypsum Company (USG); Sheetrock Brand UltraLight
- D. Impact-Resistant Gypsum Board: ASTM C 1396/C 1396M gypsum board, tested according to ASTM C 1629/C 1629M.
 1. Core: 5/8 inch
 2. Surface Abrasion: ASTM C 1629/C 1629M, meets or exceeds Level 2 requirements.
 3. Indentation: ASTM C 1629/C 1629M, meets or exceeds Level 2 requirements.
 4. Soft-Body Impact: ASTM C 1629/C 1629M, meets or exceeds Level 2 requirements.
 5. Hard-Body Impact: ASTM C 1629/C 1629M, meets or exceeds Level 2 requirements according to test in Annex A1.
 6. Long Edges: Tapered.
 7. Mold Resistance: ASTM D 3273, score of 10 as rated according to ASTM D 3274.
- E. Mold and Moisture-Resistant Paper-Faced Gypsum Board:

1. Material Quality Standard: ASTM C 1396 / C 1396M, Type X.
2. Description: Enhanced moisture-resistant, noncombustible gypsum core, with moisture-resistant paper surfacing on face, back and long edges; tapered long edges; score of 10 according to ASTM D 3273;
3. Thickness: 5/16 in thick.
4. Manufacturers and Products:
 - a. National Gypsum Company; Gold Bond XP Gypsum Board.

2.3 TRIM ACCESSORIES

- A. Interior Trim: ASTM C 1047.
1. Material: Galvanized or aluminum-coated steel sheet or rolled zinc.
 2. Shapes:
 - a. Cornerbead.
 - b. LC-Bead: J-shaped; exposed long flange receives joint compound.
 - c. L-Bead: L-shaped; exposed long flange receives joint compound.
 - d. Expansion (control) joint.

2.4 JOINT TREATMENT MATERIALS

- A. General: Comply with ASTM C 475/C 475M.
- B. Joint Tape:
1. Paper Tape: Nominal 2 in (50 mm) wide cross-fibered paper tape with finish suitable for bonding, creased in center for easy folding, and compatible with joint compound.
 2. Mesh Tape: Nominal 2 in (50 mm) wide self-adhering 10-by-10 fiberglass mesh tape.
- C. Joint Compound:
1. Setting-Type: Job-mixed powder for mixing with water, chemical-hardening compound; includes taping types.
 2. Drying-Type: Ready-mixed or job-mixed powder for mixing with water, air-drying, vinyl based compounds; includes taping, topping, and all-purpose types.

2.5 AUXILIARY MATERIALS

- A. General: Provide auxiliary materials that comply with referenced installation standards and manufacturer's written instructions.
- B. Laminating Adhesive: Adhesive or joint compound recommended for directly adhering gypsum panels to continuous substrate.
- C. Steel Drill Screws: ASTM C 1002 unless otherwise indicated.
1. Use screws complying with ASTM C 954 for fastening panels to steel members from 0.033 to 0.112 inch thick.
 2. For fastening cementitious backer units, use screws of type and size recommended by panel manufacturer.
- D. Sound-Attenuation Blankets: ASTM C 665, Type I (blankets without membrane facing) produced by combining thermosetting resins with mineral fibers manufactured from glass, slag wool, or rock wool.
1. Fiberglass Sound Attenuation Blankets:
 - a. Material Quality Standard: ASTM C 665, Type I.
 - b. Description: Unfaced blankets produced by bonding inorganic glass fibers with a thermosetting binder; free of formaldehyde.
 - c. Surface Burning Characteristics: According to ASTM E 84/NFPA 255/UL 723:

- 1) Flame Spread: Class A – no greater than 25.
 - 2) Smoke Developed: No greater than 50.
 - d. Thickness: Not less than 2-1/2 in (62 mm), unless otherwise indicated.
 - e. Manufacturers and Products:
 - 1) CertainTeed Corporation; CertaPro AcoustaTherm Batts.
 - 2) Johns Manville Building Insulation Div.; Sound Control Batts.
 - 3) Knauf Fiber Glass; QuietTherm.
 - 4) Owens Corning; Sound Attenuation Batts.
 - 5) Basis of Design: Johns Manville; Sound Control Batts, Formaldehyde Free.
- E. Mineral Wool Sound Attenuation Blankets:
1. Material Quality Standard: ASTM C 665, Type I.
 2. Description: Unfaced mineral-fiber blanket insulation produced by combining mineral fibers of rock or slag with thermosetting resins.
 3. Surface Burning Characteristics: According to ASTM E 84/NFPA 255/UL 723:
 - a. Flame Spread: Class A – no greater than 25.
 - b. Smoke Developed: No greater than 50.
 4. Thickness: Not less than 3 in (75 mm), unless otherwise indicated.
 5. Density: Not less than nominal 2.5 pounds per cubic foot.
 6. Manufacturers:
 - a. Fibrex Insulations, Inc.
 - b. Rock Wool Manufacturing Co.
 - c. Roxul.
 - d. Thermafiber LLC.
- F. Acoustical Sealant: Manufacturer's standard nonsag, paintable, nonstaining latex sealant complying with ASTM C 834. Product effectively reduces airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E 90.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Hilti, Inc; CP-506
 - b. Owens Corning; QuietZone Acoustic Sealant
 - c. Pecora Corporation.; AIS-919
 - d. USG Corporation; Sheetrock Brand Acoustical Sealant
- G. Interior Surfacing Compound
1. Level 5 Primer and Surfer: Latex based compound containing polyvinyl acetate (PVA) polymer that can be spray or roller applied to change a Level 4 finish to a Level 5 finish.
 - a. Manufacturers and Products:
 - 1) CertainTeed Corporation; ProRoc Level V Wall and Ceiling Primer/Surfer.
 - 2) United States Gypsum Company (USG); Sheetrock Brand Tuff-Hide Primer-Surfer.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas and substrates including welded hollow-metal frames and support framing, with Installer present, for compliance with requirements and other conditions affecting performance of the Work.
- B. Examine panels before installation. Reject panels that are wet, moisture damaged, and mold damaged.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 APPLYING AND FINISHING PANELS, GENERAL

A. Comply with ASTM C 840.

B. Install ceiling panels across framing to minimize the number of abutting end joints and to avoid abutting end joints in central area of each ceiling. Stagger abutting end joints of adjacent panels not less than one framing member.

C. Install panels with face side out. Butt panels together for a light contact at edges and ends with not more than 1/16 inch of open space between panels. Do not force into place.

D. Locate edge and end joints over supports, except in ceiling applications where intermediate supports or gypsum board back-blocking is provided behind end joints. Do not place tapered edges against cut edges or ends. Stagger vertical joints on opposite sides of partitions. Do not make joints other than control joints at corners of framed openings.

E. Form control and expansion joints with space between edges of adjoining gypsum panels.

F. Cover both faces of support framing with gypsum panels in concealed spaces (above ceilings, etc.), except in chases braced internally.

1. Unless concealed application is indicated or required for sound, fire, air, or smoke ratings, coverage may be accomplished with scraps of not less than 8 sq. ft. in area.
2. Fit gypsum panels around ducts, pipes, and conduits.
3. Where partitions intersect structural members projecting below underside of floor/roof slabs and decks, cut gypsum panels to fit profile formed by structural members; allow 1/4- to 3/8-inch-wide joints to install sealant.

G. Isolate perimeter of gypsum board applied to non-load-bearing partitions at structural abutments. Provide 1/4- to 1/2-inch-wide spaces at these locations and trim edges with edge trim where edges of panels are exposed. Seal joints between edges and abutting structural surfaces with acoustical sealant.

H. Install sound attenuation blankets before installing gypsum panels unless blankets are readily installed after panels have been installed on one side.

3.3 APPLYING INTERIOR GYPSUM BOARD

A. Install interior gypsum board in locations noted in schedule below:

B. Single-Layer Application:

1. On ceilings, apply gypsum panels before wall/partition board application to greatest extent possible and at right angles to framing unless otherwise indicated.
2. On partitions/walls, apply gypsum panels horizontally (perpendicular to framing) unless otherwise indicated or required by fire-resistance-rated assembly, and minimize end joints.
 - a. Stagger abutting end joints not less than one framing member in alternate courses of panels.
 - b. At high walls, install panels horizontally unless otherwise indicated or required by fire-resistance-rated assembly.
3. On Z-shaped furring members, apply gypsum panels vertically (parallel to framing) with no end joints. Locate edge joints over furring members.
4. Fastening Methods: Apply gypsum panels to supports with steel drill screws.

3.4 INSTALLING TRIM ACCESSORIES

- A. General: For trim with back flanges intended for fasteners, attach to framing with same fasteners used for panels. Otherwise, attach trim according to manufacturer's written instructions.
- B. Control Joints: Install control joints at locations indicated on Drawings or where not indicated according to ASTM C 840 and in specific locations approved by Architect for visual effect.
- C. Interior Trim: Install in the following locations:
 - 1. Cornerbead: Use at outside corners.
 - 2. L-Bead: Use where indicated.

3.5 FINISHING GYPSUM BOARD

- A. General: Treat gypsum board joints, interior angles, edge trim, control joints, penetrations, fastener heads, surface defects, and elsewhere as required to prepare gypsum board surfaces for decoration. Promptly remove residual joint compound from adjacent surfaces.
- B. Joint Tape: Finish joints according to following:
 - 1. Typical Paper-Faced Gypsum Board: Paper.
 - 2. Moisture-Resistant Paper-Faced Gypsum Board: Mesh tape.
- C. Finishing: Finish boards and units to achieve specified level of finish as indicated in schedule at end of Section:
 - 1. Typical Paper-Faced Gypsum Board: Either or combination of the following as recommended by manufacturer:
 - a. Setting-type joint compounds.
 - b. Drying-type joint compounds.
 - 2. Moisture-Resistant Paper-Faced Gypsum Board: Setting-type joint compounds.

3.6 INSTALLATION OF INTERIOR GYPSUM BOARD

- A. Install interior gypsum board in the following locations in ADDITION:
 - 1. Wallboard Type: 5/8" thick at new wall construction, unless noted otherwise.
 - 2. Ceiling Type: 5/8" thick at ceiling surfaces.
 - 3. Lightweight Type: Ceiling surfaces
 - 4. Impact-Resistant Type: First 4'-0" of walls in Vestibule.
- B. Install interior gypsum board in the following locations in EXISTING BUILDING:
 - 1. Wallboard Type: 1/4" thick over existing plaster wall construction, 5/8" thick at new wall construction, unless noted otherwise.
 - 2. Lightweight Type: Ceiling surfaces.
 - 3. Impact-Resistant Type: First 4'-0" of walls in Corridors and Stairs.
 - 4. Mold and Moisture Resistant Type: Exterior Walls over existing plaster wall construction.
- C. Single-Layer Application:
 - 1. On ceilings, apply gypsum panels before wall/partition board application to greatest extent possible and at right angles to framing unless otherwise indicated.
 - 2. On partitions/walls, apply gypsum panels horizontally (perpendicular to framing) unless otherwise indicated or required by fire-resistance-rated assembly, and minimize end joints.
 - a. Stagger abutting end joints not less than one framing member in alternate courses of panels.
 - b. At stairwells and other high walls, install panels horizontally unless otherwise indicated or required by fire-resistance-rated assembly.

3. Fastening Methods: Apply gypsum panels to supports with steel drill screws.

D. Laminating to Substrate: Where gypsum panels are indicated as directly adhered to a substrate (other than studs, joists, furring members, or base layer of gypsum board), comply with gypsum board manufacturer's written instructions and temporarily brace or fasten gypsum panels until fastening adhesive has set.

3.7 GYPSUM BOARD FINISHING SCHEDULE

A. Gypsum Board Finishing Schedule, General: Finish panels to Levels of Finish indicated below. Apply joint tape over panel joints, except those with trim having flanges not intended for tape. Sand between coats and after last coat to produce a surface free of defects and ready for applied finish system.

B. Preparation: Apply joint compound at open joints, panel edges, and damaged surface areas.

C. Level 1: At following locations, embed tape at joints in joint compound unless a higher level of finish is required for fire resistance rated assemblies:

1. Ceiling plenum areas above ceilings.
2. Concealed areas.
3. Substrate for interior stone facing.
4. Substrate for interior woodwork.
5. Unfinished areas designated for future expansion.

D. Level 2: At following locations, embed tape and apply separate first coat of joint compound to tape, fasteners, and trim flanges:

1. Substrate for tile..

E. Level 3: At following locations, embed tape and apply separate first and second coats of joint compound to tape, fasteners, and trim flanges:

1. Areas to receive paint with flat sheen or medium/heavy texture.

F. Level 4: At following locations, embed tape and apply separate first, fill, and finish coats of joint compound to tape, fasteners, and trim flanges:

1. Areas to receive paint with eggshell/satin sheen or light texture.
2. Areas to receive Type II vinyl wall coverings.
3. Areas to receive fabric wall coverings.

G. Level 5: At following locations, embed tape and apply separate first, fill, and finish coats of joint compound to tape, fasteners, and trim flanges, and apply skim coat of joint compound or Level 5 Primer and Surfacer over entire surface:

1. Areas to receive paint with semi-gloss or gloss sheen.
2. Areas to receive lightweight Type I vinyl wall coverings.
3. Areas to receive un-backed vinyl wall coverings.
4. Curved ceilings and partitions.
5. Areas where critical lighting conditions occur.
6. Areas as indicated on the Drawings.

3.8 PROTECTION

A. Protect adjacent surfaces from drywall compound and promptly remove from floors and other non-drywall surfaces. Repair surfaces stained, marred, or otherwise damaged during drywall application.

- B. Protect installed products from damage from weather, condensation, direct sunlight, construction, and other causes during remainder of the construction period.
- C. Remove and replace panels that are wet, moisture damaged, and mold damaged.
 - 1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
 - 2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

END OF SECTION 09 29 00

SECTION 09 30 13 - CERAMIC TILING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:

- 1. Porcelain mosaic tile.
- 2. Waterproof membrane.
- 3. Crack isolation membrane.
- 4. Synthetic Thresholds.

- B. Related Requirements:

- 1. Section 07 92 00 "Joint Sealants" for sealing of expansion, contraction, control, and isolation joints in tile surfaces.

1.3 DEFINITIONS

- A. General: Definitions in the ANSI A108 series of tile installation standards and in ANSI A137.1 apply to Work of this Section unless otherwise specified.

- B. ANSI A108 Series: ANSI A108.01, ANSI A108.02, ANSI A108.1A, ANSI A108.1B, ANSI A108.1C, ANSI A108.4, ANSI A108.5, ANSI A108.6, ANSI A108.8, ANSI A108.9, ANSI A108.10, ANSI A108.11, ANSI A108.12, ANSI A108.13, ANSI A108.14, ANSI A108.15, ANSI A108.16, and ANSI A108.17, which are contained in its "Specifications for Installation of Ceramic Tile."

- C. Module Size: Actual tile size plus joint width indicated.

- D. Face Size: Actual tile size, excluding spacer lugs.

1.4 SUBMITTALS

- A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.

- B. Product Data: For each type of product specified.

- C. Samples for Initial Selection: For tile, grout, and accessories involving color selection.

- D. Samples for Verification:

- 1. Full-size units of each type and composition of tile and for each color and finish required for ceramic mosaic tile in color blend patterns, provide full sheets of each color blend.
- 2. Full-size units of each type of trim and accessory for each color and finish required.
- 3. Metal edge strips in 6-inch lengths.

1.5 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match and are from same production runs as products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Tile and Trim Units: Furnish quantity of full-size units equal to 3 percent of amount installed for each type, composition, color, pattern, and size indicated.

1.6 QUALITY ASSURANCE

- A. Single-Source Responsibility for Tile: Obtain each color, grade, finish, type, composition, and variety of tile from a single source with resources to provide products of consistent quality in appearance and physical properties without delaying progress of the Work.
- B. Single-Source Responsibility for Setting and Grouting Materials: Obtain ingredients of a uniform quality from one manufacturer for each cementitious and admixture component and from one source or producer for each aggregate.
- C. Installer Qualifications: Engage an experienced installer who has successfully completed tile installations similar in material, design, and extent to that indicated for the project.
- D. Preinstallation Conference: Conduct conference at Project site to comply with requirements of Division 1.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver and store packaged materials in original containers with seals unbroken and labels intact until time of use. Comply with requirements in ANSI A137.1 for labeling tile packages.
- B. Store tile and cementitious materials on elevated platforms, under cover, and in a dry location.
- C. Store aggregates where grading and other required characteristics can be maintained and contamination can be avoided.
- D. Store liquid materials in unopened containers and protected from freezing.

1.8 FIELD CONDITIONS

- A. Environmental Limitations: Do not install tile until construction in spaces is complete and ambient temperature and humidity conditions are maintained at the levels indicated in referenced standards and manufacturer's written instructions.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Tile: Subject to compliance with requirements, provide products as follows:
 - 1. CT:
 - Daltile
 - Keystones Colorbody Porcelain Mosaics
 - Size: 1" x 1"
 - Tile Thickness: 1/4"
 - Recommended Grout Joint: 1/8"
 - Meets DCOF

Sheet Size: 12" x 24"

Pattern: 2040

Colors: (6%) Mint Ice D152, (81%) Marble D325, (13%) Cypress D452

Manufacturer's Representative: Kelly Reich (734) 787-7332.

2.2 PRODUCTS, GENERAL

- A. ANSI Ceramic Tile Standard: Provide tile that complies with ANSI A137.1 for types, compositions, and other characteristics indicated.
 - 1. Provide tile complying with Standard grade requirements unless otherwise indicated.
- B. ANSI Standards for Tile Installation Materials: Provide materials complying with ANSI A108.02, ANSI standards referenced in other Part 2 articles, ANSI standards referenced by TCNA installation methods specified in tile installation schedules, and other requirements specified.
- C. Colors, Textures, and Patterns: Where manufacturer's standard products are indicated for tile, grout, and other products requiring selection of colors, surface textures, patterns, and other appearance characteristics, provide specific products or materials complying with the following requirements:
 - 1. Provide selections made by Architect from manufacturer's full range of colors, textures, and patterns as indicated for each product.
- E. Revise below if color and finish of trim and tile accessories are different from field tile.
 - 2. Provide tile trim and accessories that match color and finish of adjoining flat tile.
- F. Factory Blending: For tile exhibiting color variations within ranges, blend tile in factory and package so tile units taken from one package show same range in colors as those taken from other packages and match approved Samples.
- G. Mounting: For factory-mounted tile, provide back- or edge-mounted tile assemblies as standard with manufacturer unless otherwise indicated.
 - 1. Where tile is indicated for installation in wet areas, do not use back- or edge-mounted tile assemblies unless tile manufacturer specifies in writing that this type of mounting is suitable for installation indicated and has a record of successful in-service performance.

2.3 WATERPROOFING AND CRACK ISOLATION MEMBRANE

- A. General: Manufacturer's standard product that complies with ANSI A118.12 for standard performance and is recommended by the manufacturer for the application indicated. Include reinforcement and accessories recommended by manufacturer.
- B. Fluid-Applied Membrane: Liquid-latex rubber or elastomeric polymer.
 - 1. Products: Subject to compliance with requirements, provide the following:
 - a. Laticrete: Blue 92 Anti-Fracture Membrane.
 - b. MAPEI Corporation; Mapelastic AquaDefense Waterproofing and Crack-Isolation Membrane.
 - c. TEC; a subsidiary of H. B. Fuller Company; HydraFlex Waterproofing Crack Isolation Membrane.
 - d. Custom Building Products: RedGard Waterproofing and Crack Prevention Membrane or 9240 Waterproofing and Anti-Fracture Membrane.
 - 2. Location: Full membrane at all locations unless indicated otherwise.

2.4 THRESHOLDS

- A. General: Fabricate to sizes and profiles indicated or required to provide transition between adjacent floor finishes.
 - 1. Bevel edges at 1:2 slope, aligning lower edge of bevel with adjacent floor finish. Limit height of bevel to ½ inch (12.7 mm) or less, and finish bevel to match face of threshold.
- B. Synthetic (Solid Polymer) Thresholds: Made from homogenous solid sheets of filled plastic resin complying with material and performance requirements in ANSI Z124.3, for Type 5 or 6, without precoated finish.
 - 1. Manufacturers: E. I. DuPont De Nemours & Co., Corian Surfaces.
 - a. Color: Canvas

2.5 SETTING MATERIALS

- A. Improved Modified Dry-Set Mortar (Thinset): ANSI A118.15.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Custom Building Products.
 - b. H.B. Fuller Construction Products Inc. / TEC.
 - c. MAPEI Corporation.
 - 2. For wall applications, provide mortar that complies with requirements for nonsagging mortar in addition to the other requirements in ANSI A118.15.

2.6 GROUT MATERIALS

- A. Water-Cleanable Epoxy Grout: ANSI A118.3.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Bostik, Inc.
 - b. Custom Building Products.
 - c. H.B. Fuller Construction Products Inc. / TEC.
 - d. MAPEI Corporation.
 - 2. Provide product capable of withstanding continuous and intermittent exposure to temperatures of up to 140 and 212 deg F, respectively, and certified by manufacturer for intended use.
 - 3. Color at CT: Mapei, Ivory 39

2.7 MISCELLANEOUS MATERIALS

- A. Trowelable Underlayments and Patching Compounds: Latex-modified, portland cement-based formulation provided or approved by manufacturer of tile-setting materials for installations indicated.
- B. Vapor-Retarder Membrane: Polyethylene sheeting, ASTM D 4397, 4.0 mils thick.
- C. Tile Cleaner: A neutral cleaner capable of removing soil and residue without harming tile and grout surfaces, specifically approved for materials and installations indicated by tile and grout manufacturers.

2.8 MIXING MORTARS AND GROUT

- A. Mix mortars and grouts to comply with referenced standards and mortar and grout manufacturers' written instructions.
- B. Add materials, water, and additives in accurate proportions.

- C. Obtain and use type of mixing equipment, mixer speeds, mixing containers, mixing time, and other procedures to produce mortars and grouts of uniform quality with optimum performance characteristics for installations indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions where tile will be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
 - 1. Verify that substrates for setting tile are firm; dry; clean; free of coatings that are incompatible with tile-setting materials, including curing compounds and other substances that contain soap, wax, oil, or silicone; and comply with flatness tolerances required by ANSI A108.01 for installations indicated.
 - 2. Verify that concrete substrates for tile floors installed with adhesives, bonded mortar bed or thinset mortar comply with surface finish requirements in ANSI A108.01 for installations indicated.
 - a. Verify that surfaces that received a steel trowel finish have been mechanically scarified.
 - b. Verify that protrusions, bumps, and ridges have been removed by sanding or grinding.
 - 3. Verify that installation of grounds, anchors, recessed frames, electrical and mechanical units of work, and similar items located in or behind tile has been completed.
 - 4. Verify that joints and cracks in tile substrates are coordinated with tile joint locations; if not coordinated, adjust joint locations in consultation with Architect.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Fill cracks, holes, and depressions in concrete substrates for tile floors installed with thinset mortar with trowelable leveling and patching compound specifically recommended by tile-setting material manufacturer.
- B. Where indicated, prepare substrates to receive waterproofing by applying a reinforced mortar bed that complies with ANSI A108.1A and is sloped 1/4 inch per foot toward drains.
- C. Blending: For tile exhibiting color variations, verify that tile has been factory blended and packaged so tile units taken from one package show same range of colors as those taken from other packages and match approved Samples. If not factory blended, either return to manufacturer or blend tiles at Project site before installing.

3.3 CERAMIC TILE INSTALLATION

- A. Comply with TCNA's "Handbook for Ceramic, Glass, and Stone Tile Installation" for TCNA installation methods specified in tile installation schedules. Comply with parts of the ANSI A108 series "Specifications for Installation of Ceramic Tile" that are referenced in TCNA installation methods, specified in tile installation schedules, and apply to types of setting and grouting materials used.
- B. Extend tile work into recesses and under or behind equipment and fixtures to form complete covering without interruptions unless otherwise indicated. Terminate work neatly at obstructions, edges, and corners without disrupting pattern or joint alignments.

- C. Accurately form intersections and returns. Perform cutting and drilling of tile without marring visible surfaces. Carefully grind cut edges of tile abutting trim, finish, or built-in items for straight aligned joints. Fit tile closely to electrical outlets, piping, fixtures, and other penetrations so plates, collars, or covers overlap tile.
- D. Provide manufacturer's standard trim shapes where necessary to eliminate exposed tile edges.
- E. Where accent tile differs in thickness from field tile, vary setting-bed thickness so that tiles are flush.
- F. Jointing Pattern: Lay tile in grid pattern unless otherwise indicated. Lay out tile work and center tile fields in both directions in each space or on each wall area. Lay out tile work to minimize the use of pieces that are less than half of a tile. Provide uniform joint widths unless otherwise indicated.
 - 1. For tile mounted in sheets, make joints between tile sheets same width as joints within tile sheets so joints between sheets are not apparent in finished work.
 - 2. Where adjoining tiles on floor, base, walls, or trim are specified or indicated to be same size, align joints.
 - 3. Where tiles are specified or indicated to be whole integer multiples of adjoining tiles on floor, base, walls, or trim, align joints unless otherwise indicated.
- G. Lay out tile wainscots to dimensions indicated or to next full tile beyond dimensions indicated.
- H. Thresholds: Install synthetic thresholds at locations indicated; set in same type of setting bed as abutting field tile unless otherwise indicated.
 - 1. Set thresholds in latex-portland cement mortar for locations where mortar bed would otherwise be exposed above adjacent nontile floor finish.
- J. Expansion Joints: Provide expansion joints and other sealant-filled joints, including control, contraction, and isolation joints, where indicated. Form joints during installation of setting materials, mortar beds, and tile. Do not saw-cut joints after installing tiles.
 - 1. Where joints occur in concrete substrates, locate joints in tile surfaces directly above them.
- K. Metal Edge Strips: Install where exposed edge of tile flooring meets carpet, wood, or other flooring that finishes flush with or below top of tile and no threshold is indicated.

3.4 WATERPROOFING INSTALLATION

- A. Install waterproofing to comply with ANSI A108.13 and manufacturer's written instructions to produce waterproof membrane of uniform thickness that is bonded securely to substrate.
- B. Allow waterproofing to cure and verify by testing that it is watertight before installing tile or setting materials over it.

3.5 CRACK ISOLATION MEMBRANE INSTALLATION

- A. Install crack isolation membrane to comply with ANSI A108.17 and manufacturer's written instructions to produce membrane of uniform thickness that is bonded securely to substrate.
- B. Allow crack isolation membrane to cure before installing tile or setting materials over it.

3.6 ADJUSTING AND CLEANING

- A. Remove and replace tile that is damaged or that does not match adjoining tile. Provide new matching units, installed as specified and in a manner to eliminate evidence of replacement.

- B. Cleaning: On completion of placement and grouting, clean all ceramic tile surfaces so they are free of foreign matter.
 - 1. Remove grout residue from tile as soon as possible.
 - 2. Clean grout smears and haze from tile according to tile and grout manufacturer's written instructions but no sooner than 10 days after installation. Use only cleaners recommended by tile and grout manufacturers and only after determining that cleaners are safe to use by testing on samples of tile and other surfaces to be cleaned. Protect metal surfaces and plumbing fixtures from effects of cleaning. Flush surfaces with clean water before and after cleaning.

3.7 PROTECTION

- A. Protect installed tile work with kraft paper or other heavy covering during construction period to prevent staining, damage, and wear. If recommended by tile manufacturer, apply coat of neutral protective cleaner to completed tile walls and floors.
- B. Prohibit foot and wheel traffic from tiled floors for at least seven days after grouting is completed.
- C. Before final inspection, remove protective coverings and rinse neutral protective cleaner from tile surfaces.

END OF SECTION 09 30 13

SECTION 09 65 13 - RESILIENT BASE AND ACCESSORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Thermoset-rubber base.
 - 2. Vinyl stair accessories.
 - 3. Rubber molding accessories.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Samples: For each exposed product and for each color and texture specified, not less than 12 inches long.
- C. Samples for Initial Selection: For each type of product indicated.
- D. Samples for Verification: For each type of product indicated and for each color, texture, and pattern required in manufacturer's standard-size Samples, but not less than 12 inches long.

1.4 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Furnish not less than 10 linear feet for every 500 linear feet or fraction thereof, of each type, color, pattern, and size of resilient product installed.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Store resilient products and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than 50 deg F or more than 90 deg F.

1.6 FIELD CONDITIONS

- A. Maintain ambient temperatures within range recommended by manufacturer, in spaces to receive resilient products during the following periods:
 - 1. 48 hours before installation.
 - 2. During installation.
 - 3. 48 hours after installation.
- B. Install resilient products after other finishing operations, including painting, have been completed.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Test-Response Characteristics: As determined by testing identical products according to ASTM E648 or NFPA 253 by a qualified testing agency.
 - 1. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm.
- B. Slip Resistance / ASTM D 2047: Greater than .60 (wet/dry)
- C. Smoke Density: ASTM E662/NFPA 258, Passes, less than 450

2.2 THERMOSET-RUBBER BASE

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Johnsonite; a Tarkett company.
 - 2. Roppe Corporation, USA.
 - 3. Armstrong World Industries; Rubber Base
 - 4. VPI, Floor Products Division, Premium Rubber Base
- B. Product Standard: ASTM F 1861, Type TS (rubber, vulcanized thermoset), Group I (solid, homogeneous).
 - 1. Style and Location:
 - a. Style A, Straight: Provide in areas with carpet.
 - b. Style B, Cove: Provide in areas with resilient floor coverings.
- C. Thickness: 0.125 inch.
- D. Height: 4 inches.
- E. Lengths: Coils in manufacturer's standard length
- F. Outside Corners: Preformed by 4 inches in length each way. Premolded corners less than 4 inches in length each way are not acceptable.
- G. Inside Corners: Job formed
- H. Colors: Johnsonite, 47 Brown

2.3 VINYL STAIR ACCESSORIES

- A. Fire-Test-Response Characteristics: As determined by testing identical products according to ASTM E 648 or NFPA 253 by a qualified testing agency.
 - 1. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm.
- B. Manufacturers: Provide Basis of Design: Johnsonite, VIRCN-XX-B or equal by the following:
 - 1. Roppe Corporation, USA.
 - 2. Armstrong World Industries; Rubber Base
 - 3. VPI, Floor Products Division, Premium Rubber Base
- C. Stair Nosings: ASTM F 2169, Type TV (vinyl, thermoplastic).
 - 1. Class: 1 (smooth, flat).
 - 2. Group: 2 (with contrasting color for the visually impaired).
 - 3. Nosing Style: Square, adjustable to cover angles between 60 and 90 degrees.

4. Nosing Height: 2-3/17 inches.
5. Thickness: 1/8 inch and tapered to back edge.
6. Size: Lengths and depths to fit each stair tread in one piece or, for treads exceeding maximum lengths manufactured, in equal-length units.

D. Locations: Provide vinyl stair nosing at transition between linoleum flooring (LIN) and stair.

E. Colors and Patterns: Johnsonite, 47 Brown with visually impaired strip color: 49 Beige

2.4 RUBBER MOLDING ACCESSORY AT CPT1 to LIN

A. Description: Rubber transition strips.

B. Profile and Dimensions: CTA-XX-Z.

C. Locations: Provide rubber molding accessories at transition between CPT1 and LIN.

D. Colors and Patterns: Johnsonite, 47 Brown

2.5 RUBBER MOLDING ACCESSORY AT CPT2 to LIN

A. Description: Rubber transition strips.

B. Profile and Dimensions: CTA-XX-HT.

C. Locations: Provide rubber molding accessories at transition between CPT2 and LIN.

D. Colors and Patterns: Johnsonite, 47 Brown

2.6 INSTALLATION MATERIALS

A. Trowelable Leveling and Patching Compounds: Latex-modified, portland-cement-based or blended hydraulic-cement-based formulation provided or approved by resilient-product manufacturer for applications indicated.

B. Adhesives: Water-resistant type recommended by resilient-product manufacturer for resilient products and substrate conditions indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, with Installer present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.

1. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of resilient products.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

1. Installation of resilient products indicates acceptance of surfaces and conditions.

3.2 PREPARATION

- A. Prepare substrates according to manufacturer's written instructions to ensure adhesion of resilient products.
- B. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound; remove bumps and ridges to produce a uniform and smooth substrate.
- C. Do not install resilient products until materials are the same temperature as space where they are to be installed.
 - 1. At least 48 hours in advance of installation, move resilient products and installation materials into spaces where they will be installed.
- D. Immediately before installation, sweep and vacuum clean substrates to be covered by resilient products.

3.3 RESILIENT BASE INSTALLATION

- A. Comply with manufacturer's written instructions for installing resilient base.
- B. Apply resilient base to walls, columns, pilasters, casework and cabinets in toe spaces, and other permanent fixtures in rooms and areas where base is required.
- C. Install resilient base in lengths as long as practical without gaps at seams and with tops of adjacent pieces aligned.
- D. Tightly adhere resilient base to substrate throughout length of each piece, with base in continuous contact with horizontal and vertical substrates.
- E. Do not stretch resilient base during installation.
- F. On masonry surfaces or other similar irregular substrates, fill voids along top edge of resilient base with manufacturer's recommended adhesive filler material.
- G. Preformed Corners: Install preformed corners before installing straight pieces.

3.4 RESILIENT ACCESSORY INSTALLATION

- A. Comply with manufacturer's written instructions for installing resilient accessories.
- B. Resilient Molding Accessories: Butt to adjacent materials and tightly adhere to substrates throughout length of each piece. Install reducer strips at edges of floor covering that would otherwise be exposed.

3.5 CLEANING AND PROTECTION

- A. Comply with manufacturer's written instructions for cleaning and protecting resilient products.
- B. Perform the following operations immediately after completing resilient-product installation:
 - 1. Remove adhesive and other blemishes from surfaces.
 - 2. Sweep and vacuum horizontal surfaces thoroughly.
 - 3. Damp-mop horizontal surfaces to remove marks and soil.
- C. Protect resilient products from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.

D. Cover resilient products subject to wear and foot traffic until Substantial Completion.

END OF SECTION 09 65 13

SECTION 09 65 43 - LINOLEUM FLOORING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Linoleum floor tile.

1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.
 - 1. Review methods and procedures related to carpet installation including, but not limited to, the following:
 - a. Review delivery, storage, and handling procedures.
 - b. Review ambient conditions and ventilation procedures.
 - c. Review subfloor preparation procedures.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Samples: For each exposed product and for each color and pattern specified in manufacturer's standard size, but not less than 6-by-9-inch sections.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.

1.6 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For each type of linoleum flooring to include in maintenance manuals.

1.7 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Floor Tile: Furnish one box for every 50 boxes or fraction thereof, of each type, color, and pattern of floor tile installed.

1.8 QUALITY ASSURANCE

- A. Installer Qualifications: An entity that employs installers and supervisors who are competent in techniques required by manufacturer for flooring installation and seaming methods indicated.
 - 1. Engage an installer who employs workers for this Project who are trained or certified by flooring manufacturer for installation techniques required.
 - 2. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Store flooring and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than 65 deg F or more than 90 deg F.
 - 1. Floor Tile: Store on flat surfaces.
 - 2. Sheet Flooring: Store rolls upright.

1.10 FIELD CONDITIONS

- A. Maintain ambient temperatures within range recommended by manufacturer, but not less than 70 deg F or more than 95 deg F, in spaces to receive flooring during the following periods:
 - 1. 72 hours before installation.
 - 2. During installation.
 - 3. 72 hours after installation.
- B. After installation and until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer, but not less than 55 deg F or more than 95 deg F.
- C. Close spaces to traffic during flooring installation.
- D. Close spaces to traffic for 72 hours after flooring installation.
- E. Install flooring after other finishing operations, including painting, have been completed.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Test-Response Characteristics: For linoleum flooring, as determined by testing identical products according to ASTM E 648 or NFPA 253 by a qualified testing agency.
 - 1. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm.

2.2 LINOLEUM FLOOR TILE

- A. LIN
 - Forbo
 - Marmoleum Tile
 - Style: Concrete
 - Total Thickness: 2.5mm
 - Size: 19.7" x 19.7"
 - Color: t3568 Delta Lace

Manufacturer's Representative: Stephanie Gutowski (248) 385-8805

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, with Installer present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.

1. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of flooring.

3.2 PREPARATION

- A. Prepare substrates according to linoleum flooring manufacturer's written instructions to ensure adhesion of flooring.
- B. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound; remove bumps and ridges to produce a uniform and smooth substrate.
- C. Do not install flooring until materials are the same temperature as space where they are to be installed.
 1. At least 72 hours in advance of installation, move flooring and installation materials into spaces where they will be installed.
- D. Immediately before installation, sweep and vacuum clean substrates to be covered by flooring.

3.3 INSTALLATION, GENERAL

- A. Comply with manufacturer's written instructions for installing flooring.
- B. Scribe and cut flooring to butt neatly and tightly to vertical surfaces and permanent fixtures, including built-in furniture, cabinets, pipes, outlets, edgings, thresholds, door frames, and nosings.
- C. Extend flooring into toe spaces, door reveals, closets, and similar openings.
- D. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on flooring as marked on substrates. Use chalk or other nonpermanent marking device.
- E. Adhere flooring to substrates using a full spread of adhesive applied to substrate to produce a completed installation without open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, and other surface imperfections.

3.4 LINOLEUM FLOOR TILE INSTALLATION

- A. Lay out linoleum floor tiles from center marks established with principal walls, discounting minor offsets, so floor tiles at opposite edges of room are of equal width. Adjust as necessary to avoid using cut widths that equal less than one-half tile at perimeter.
 1. Lay floor tiles square with room axis.
- B. Match linoleum floor tiles for color and pattern by selecting tiles from cartons in same sequence as manufactured and packaged, if so numbered. Discard broken, cracked, chipped, or deformed floor tiles.
 1. Lay floor tiles with grain running in one direction.

3.5 CLEANING AND PROTECTION

- A. Comply with manufacturer's written instructions for cleaning and protecting linoleum flooring.
- B. Perform the following operations immediately after completing linoleum flooring installation:
 1. Remove adhesive and other blemishes from surfaces.

2. Sweep and vacuum surfaces thoroughly.
 3. Damp-mop surfaces to remove marks and soil.
- C. Protect linoleum flooring from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.
- D. After allowing drying room film (yellow film caused by linseed oil oxidation) to disappear, cover linoleum flooring until Substantial Completion.

END OF SECTION 09 65 43

SECTION 09 68 13 - TILE CARPETING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes modular carpet tile.
- B. Related Requirements:
 - 1. Section 09 65 13 "Resilient Base and Accessories" for resilient wall base and accessories installed with carpet tile.

1.2 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.
 - 1. Review methods and procedures related to carpet installation including, but not limited to, the following:
 - a. Review delivery, storage, and handling procedures.
 - b. Review ambient conditions and ventilation procedures.
 - c. Review subfloor preparation procedures.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include manufacturer's written data on physical characteristics, durability, and fade resistance.
 - 2. Include manufacturer's written installation recommendations for each type of substrate.
- B. Samples: For each of the following products and for each color and texture required. Label each Sample with manufacturer's name, material description, color, pattern, and designation indicated on Drawings and in schedules.
 - 1. Carpet Tile: Full-size Sample.
 - 2. Exposed Edge, Transition, and Other Accessory Stripping: 12-inch-long Samples.
- C. Samples for Initial Selection: For each type of carpet tile.
 - 1. Include Samples of exposed edge, transition, and other accessory stripping involving color or finish selection.
- D. Samples for Verification: For each of the following products and for each color and texture required. Label each Sample with manufacturer's name, material description, color, pattern, and designation indicated on Drawings and in schedules.
 - 1. Carpet Tile: Full-size Sample.
 - 2. Exposed Edge, Transition, and Other Accessory Stripping: 12-inch-long Samples.
- E. Product Schedule: For carpet tile. Use same designations indicated on Drawings.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Product Test Reports: For carpet tile, for tests performed by a qualified testing agency.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For carpet tiles to include in maintenance manuals. Include the following:
 - 1. Methods for maintaining carpet tile, including cleaning and stain-removal products and procedures and manufacturer's recommended maintenance schedule.
 - 2. Precautions for cleaning materials and methods that could be detrimental to carpet tile.

1.6 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Carpet Tile: Full-size units equal to 5 percent of amount installed for each type indicated, but not less than 10 sq. yd..

1.7 QUALITY ASSURANCE

- A. Installer Qualifications: An experienced installer who is certified by the International Certified Floorcovering Installers Association.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Comply with CRI's "CRI Carpet Installation Standard."

1.9 FIELD CONDITIONS

- A. Comply with CRI's "CRI Carpet Installation Standard" for temperature, humidity, and ventilation limitations.
- B. Environmental Limitations: Do not deliver or install carpet tiles until spaces are enclosed and weathertight, wet-work in spaces is complete and dry, and ambient temperature and humidity conditions are maintained at levels planned for building occupants during the remainder of the construction period.
- C. Do not install carpet tiles over concrete slabs until slabs have cured and are sufficiently dry to bond with adhesive and concrete slabs have pH range recommended by carpet tile manufacturer.
- D. Where demountable partitions or other items are indicated for installation on top of carpet tiles, install carpet tiles before installing these items.

PART 2 - PRODUCTS

2.1 CARPET TILE

- A. Manufacturers: Subject to compliance with requirements, provide products by the following:
- B. CPT2
 - Patcraft
 - Collection: Mid Century Pop
 - Style: Color Block I0382
 - Construction: Multi-Level Pattern Loop
 - Fiber Type: Eco Solution Q SD Nylon
 - Dye Method: 100% Solution Dyed
 - Gauge: 1/10

Stitches Per Inch: 10.3
Tufted Pile Height: 4/32" low – 6/32" high
Tufted Yarn Weight: 16.0 oz.
Finished Pile Thickness: 0.099
Total Thickness: 0.224
Size: 24" x 24"
Average Density: 5818
Square Yards per Box: 5.33
Color: Doo Wop 00770
Installation Method: Brick

Manufacturer's Representative: Tina Katikos (248) 444-8894

2.2 INSTALLATION ACCESSORIES

- A. Adhesives: Water-resistant, mildew-resistant, nonstaining, pressure-sensitive type to suit products and subfloor conditions indicated, that comply with flammability requirements for installed carpet tile, and are recommended by carpet tile manufacturer for releasable installation.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for maximum moisture content, alkalinity range, installation tolerances, and other conditions affecting carpet tile performance.
- B. Examine carpet tile for type, color, pattern, and potential defects.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. General: Comply with CRI's "Carpet Installation Standards" and with carpet tile manufacturer's written installation instructions for preparing substrates indicated to receive carpet tile.
- B. Concrete Substrates: Remove coatings, including curing compounds, and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, without using solvents. Use mechanical methods recommended in writing by adhesive and carpet tile manufacturers.
- C. Metal Substrates: Clean grease, oil, soil and rust, and prime if recommended in writing by adhesive manufacturer. Rough sand painted metal surfaces and remove loose paint. Sand aluminum surfaces, to remove metal oxides, immediately before applying adhesive.
- D. Broom and vacuum clean substrates to be covered immediately before installing carpet tile.

3.3 INSTALLATION

- A. General: Comply with CRI's "CRI Carpet Installation Standard," Section 18, "Modular Carpet" and with carpet tile manufacturer's written installation instructions.

- B. Installation Method: As recommended in writing by carpet tile manufacturer; install every tile with full-spread, releasable, pressure-sensitive adhesive.
- C. Maintain dye-lot integrity. Do not mix dye lots in same area.
- D. Cut and fit carpet tile to butt tightly to vertical surfaces, permanent fixtures, and built-in furniture including cabinets, pipes, outlets, edgings, thresholds, and nosings. Bind or seal cut edges as recommended by carpet tile manufacturer.
- E. Extend carpet tile into toe spaces, door reveals, closets, open-bottomed obstructions, removable flanges, alcoves, and similar openings.
- F. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on carpet tile as marked on subfloor. Use nonpermanent, nonstaining marking device.
- G. Install pattern parallel to walls and borders.

3.4 CLEANING AND PROTECTION

- A. Perform the following operations immediately after installing carpet tile:
 - 1. Remove excess adhesive and other surface blemishes using cleaner recommended by carpet tile manufacturer.
 - 2. Remove yarns that protrude from carpet tile surface.
 - 3. Vacuum carpet tile using commercial machine with face-beater element.
- B. Protect installed carpet tile to comply with CRI's "Carpet Installation Standard," Section 20, "Protecting Indoor Installations."
- C. Protect carpet tile against damage from construction operations and placement of equipment and fixtures during the remainder of construction period. Use protection methods indicated or recommended in writing by carpet tile manufacturer.

END OF SECTION 09 68 13

SECTION 09 68 16 - SHEET CARPETING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Tufted carpet.
 - 2. Carpet cushion.
- B. Related Requirements:
 - 1. Section 09 68 13 "Tile Carpeting" for modular carpet tiles.

1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.
 - 1. Review methods and procedures related to carpet installation including, but not limited to, the following:
 - a. Review delivery, storage, and handling procedures.
 - b. Review ambient conditions and ventilation procedures.
 - c. Review subfloor preparation procedures.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include manufacturer's written data on physical characteristics and durability.
 - 2. Include manufacturer's written installation recommendations for each type of substrate.
- B. Shop Drawings: For carpet installation, showing the following:
 - 1. Columns, doorways, enclosing walls or partitions, built-in cabinets, and locations where cutouts are required in carpet.
 - 2. Carpet type, color, and dye lot.
 - 3. Locations where dye lot changes occur.
 - 4. Seam locations, types, and methods.
 - 5. Type of installation.
 - 6. Pattern type, repeat size, location, direction, and starting point.
 - 7. Pile direction.
 - 8. Types, colors, and locations of edge, transition, and other accessory strips.
 - 9. Transition details to other flooring materials.
 - 10. Type of carpet cushion.
- C. Samples: For each of the following products and for each color and texture required. Label each Sample with manufacturer's name, material description, color, pattern, and designation indicated on Drawings and in schedules.
 - 1. Carpet: 12-inch-square Sample.
 - 2. Exposed Edge, Transition, and Other Accessory Stripping: 12-inch-long Samples.
 - 3. Carpet Cushion: 6-inch-square Sample.
 - 4. Carpet Seam: 6-inch Sample.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Product Test Reports: For carpet and carpet cushion, for tests performed by a qualified testing agency.
- C. Sample Warranties: For special warranties.

1.6 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For carpet to include in maintenance manuals. Include the following:
 - 1. Methods for maintaining carpet, including cleaning and stain-removal products and procedures and manufacturer's recommended maintenance schedule.
 - 2. Precautions for cleaning materials and methods that could be detrimental to carpet and carpet cushion.

1.7 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Carpet: Full-width rolls equal to 5 percent of amount installed for each type indicated, but not less than 10 sq. yd.

1.8 QUALITY ASSURANCE

- A. Installer Qualifications: An experienced installer who is certified by the International Certified Floorcovering Installers Association.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Comply with CRI's "CRI Carpet Installation Standard."
- B. Deliver carpet in original mill protective covering with mill register numbers and tags attached.

1.10 FIELD CONDITIONS

- A. Comply with CRI's "CRI Carpet Installation Standard" for temperature, humidity, and ventilation limitations.
- B. Environmental Limitations: Do not deliver or install carpet and carpet cushion until spaces are enclosed and weathertight, wet-work in spaces is complete and dry, and ambient temperature and humidity conditions are maintained at levels planned for building occupants during the remainder of the construction period.

1.11 WARRANTY

- A. Special Warranty for Carpet: Manufacturer agrees to repair or replace components of carpet installation that fail in materials or workmanship within specified warranty period.
 - 1. Warranty does not include deterioration or failure of carpet due to unusual traffic, failure of substrate, vandalism, or abuse.
 - 2. Failures include, but are not limited to, the following:
 - a. More than 10 percent loss of face fiber, edge raveling, snags, and runs.
 - b. Loss of tuft bind strength.
 - c. Excess static discharge.

- d. Delamination.
- 3. Warranty Period: 10 years from date of Substantial Completion.
- B. Special Warranty for Carpet Cushion: Manufacturer agrees to repair or replace components of carpet cushion installation that fail in materials or workmanship within specified warranty period.
 - 1. Warranty includes removal and replacement of carpet and accessories required by replacement of carpet cushion.
 - 2. Warranty does not include deterioration or failure of carpet cushion due to unusual traffic, failure of substrate, vandalism, or abuse.
 - 3. Failure includes, but is not limited to, permanent indentation or compression.
 - 4. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 TUFTED CARPET

- A. CPT1
 - Shaw Contract
 - Collection: Lush Life
 - Style: Moritz 5B091
 - Product type: Broadloom
 - Construction: Cut Pile
 - Fiber: Eco Solution Q Nylon
 - Dye Method: 100% dye injection
 - Primary Backing: Synthetic
 - Secondary Backing: Classicbac
 - Protective Treatments: Bleach and Stain Resistance
 - Warranty: 10 year commercial limited
 - Product Size: 12.00 ft
 - Gauge: 1/10 inch
 - Stitches: 12 per inch
 - Finished Pile Thickness: 0.257 inches
 - Average Density: 5043 per cu. Yd.
 - Total Thickness: 0.390 in
 - Tufted Weight: 36.0 oz/yd²
 - Pattern Repeat: 24"W x 24"L
 - Recommended Installation: Direct Glue
 - Color: Panache 91761

Manufacturer's Representative: Drew Pennington (248) 310-9031

2.2 CARPET CUSHION

- A. Shaw Contract, DS-34 Cushion
- B. Traffic Classification: CCC Class II, heavy traffic.
- C. Fiber Cushion: Synthetic.
 - 1. Weight: 34 oz.
 - 2. Thickness: 0.3125 inches plus 5 percent maximum.
 - 3. Density: 9.1 lb/ft

2.3 INSTALLATION ACCESSORIES

- A. Adhesives: Water-resistant, mildew-resistant, nonstaining type to suit products and subfloor conditions indicated, that complies with flammability requirements for installed carpet and is recommended or provided by carpet and carpet cushion manufacturers.
- B. Seam Adhesive: Hot-melt adhesive tape or similar product recommended by carpet manufacturer for sealing and taping seams and butting cut edges at backing to form secure seams and to prevent pile loss at seams.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for maximum moisture content, alkalinity range, installation tolerances, and other conditions affecting carpet performance.
- B. Examine carpet for type, color, pattern, and potential defects.
 - 1. Underlayment surface is free of substances that may interfere with adhesive bond.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. General: Comply with CRI's "CRI Carpet Installation Standard" and with carpet manufacturer's written installation instructions for preparing substrates.
- B. Substrates: Remove coatings, including curing compounds, and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, without using solvents. Use mechanical methods recommended in writing by adhesive, carpet, and carpet cushion manufacturers.
- C. Broom and vacuum clean substrates to be covered immediately before installing carpet.

3.3 CARPET INSTALLATION

- A. Comply with CRI's "CRI Carpet Installation Standard" and carpet and carpet cushion manufacturers' written installation instructions for the following:
 - 1. Double-glue-down installation.
- B. Comply with carpet manufacturer's written instructions and Shop Drawings for seam locations and direction of carpet; maintain uniformity of carpet direction and lay of pile. At doorways, center seams under the door in closed position.
- C. Cut and fit carpet to butt tightly to vertical surfaces, permanent fixtures, and built-in furniture including cabinets, pipes, outlets, edgings, thresholds, and nosings. Bind or seal cut edges as recommended by carpet manufacturer.
- D. Extend carpet into toe spaces, door reveals, closets, open-bottomed obstructions, removable flanges, alcoves, and similar openings.
- E. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on carpet as marked on subfloor. Use nonpermanent, nonstaining marking device.

3.4 CLEANING AND PROTECTION

- A. Perform the following operations immediately after installing carpet:
 - 1. Remove excess adhesive, seam sealer, and other surface blemishes using cleaner recommended by carpet manufacturer.
 - 2. Remove yarns that protrude from carpet surface.
 - 3. Vacuum carpet using commercial machine with face-beater element.
- B. Protect installed carpet to comply with CRI's "CRI Carpet Installation Standard."
- C. Protect carpet against damage from construction operations and placement of equipment and fixtures during the remainder of construction period. Use protection methods recommended in writing by carpet manufacturer and carpet cushion and adhesive manufacturers.

END OF SECTION 09 68 16

SECTION 09 72 00 - WALL COVERINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Vinyl wall covering.

1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at project site prior to installation.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include data on physical characteristics, durability, fade resistance, and fire-test-response characteristics.
- B. Shop Drawings: Show location and extent of each wall-covering type. Indicate pattern placement, seams and termination points.
- C. Samples for Verification: For each type of wall covering and for each color, pattern, texture, and finish specified, full width by 36-inch-long in size.
 - 1. Wall-Covering Sample: From same production run to be used for the Work, with specified treatments applied.
- D. Product Schedule: For wall coverings. Use same designations indicated on Drawings.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For testing agency.
- B. Product Test Reports: For each wall covering, for tests performed by a qualified testing agency.

1.6 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For wall coverings to include in maintenance manuals.

1.7 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Wall-Covering Materials: For each type, color, texture, and finish, full width by length to equal to 5 percent of amount installed.

1.8 QUALITY ASSURANCE

- A. Mockups: Build mockups to verify selections made under Sample submittals and to demonstrate aesthetic effects and to set quality standards for installation.
 - 1. Build mockups for each type of wall covering on each substrate required. Comply with requirements in ASTM F 1141 for appearance shading characteristics.
 - 2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
 - 3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.9 FIELD CONDITIONS

- A. Environmental Limitations: Do not deliver or install wall coverings until spaces are enclosed and weathertight, wet work in spaces is complete and dry, work above ceilings is complete, and temporary HVAC system is operating and maintaining ambient temperature and humidity conditions at levels intended for occupants after Project completion during the remainder of the construction period.
- B. Lighting: Do not install wall covering until lighting that matches conditions intended for occupants after Project completion is provided on the surfaces to receive wall covering.
- C. Ventilation: Provide continuous ventilation during installation and for not less than the time recommended by wall-covering manufacturer for full drying or curing.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Vinyl Wall Covering: Subject to compliance with requirements, provide products as follows:
 - 1. WC-1
 - Thibaut
 - Savoy Stripe
 - Pattern Number: 839-T-2813
 - Color: Metallic on Gold
 - Match: Straight
 - Width: 20-1/2"
 - Vertical Repeat: 6"

Manufacturer's Representative: Karen Connolly (248) 649-0220

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Installer present, for compliance with requirements for levelness, wall plumbness, maximum moisture content, and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Comply with manufacturer's written instructions for surface preparation.
- B. Clean substrates of substances that could impair bond of wall covering, including dirt, oil, grease, mold, mildew, and incompatible primers.
- C. Prepare substrates to achieve a smooth, dry, clean, structurally sound surface free of flaking, unsound coatings, cracks, and defects.
 - 1. Moisture Content: Maximum of 5 percent on new plaster, concrete, and concrete masonry units when tested with an electronic moisture meter.
 - 2. Plaster: Allow new plaster to cure. Neutralize areas of high alkalinity. Prime with primer recommended in writing by primer/sealer manufacturer and wall-covering manufacturer.
 - 3. Metals: If not factory primed, clean and apply primer recommended in writing by primer/sealer manufacturer and wall-covering manufacturer.
 - 4. Gypsum Board: Prime with primer as recommended in writing by primer/sealer manufacturer and wall-covering manufacturer.
 - 5. Painted Surfaces: Treat areas susceptible to pigment bleeding.
- D. Check painted surfaces for pigment bleeding. Sand gloss, semigloss, and eggshell finish with fine sandpaper.
- E. Remove hardware and hardware accessories, electrical plates and covers, light fixture trims, and similar items.
- F. Acclimatize wall-covering materials by removing them from packaging in the installation areas not less than 24 hours before installation.

3.3 WALL-COVERING INSTALLATION

- A. Comply with wall-covering manufacturers' written installation instructions applicable to products and applications indicated.
- B. Cut wall-covering strips in roll number sequence. Change the roll numbers at partition breaks and corners.
- C. Install strips in same order as cut from roll.
 - 1. For solid-color, even-texture, or random-match wall coverings, reverse every other strip.
- D. Install wall covering without lifted or curling edges and without visible shrinkage.
- E. Install seams vertical and plumb at least 6 inches from outside corners and 6 inches from inside corners unless a change of pattern or color exists at corner. Horizontal seams are not permitted.
- F. Trim edges and seams for color uniformity, pattern match, and tight closure. Butt seams without overlaps or gaps between strips.
- G. Fully bond wall covering to substrate. Remove air bubbles, wrinkles, blisters, and other defects.

3.4 CLEANING

- A. Remove excess adhesive at seams, perimeter edges, and adjacent surfaces.
- B. Use cleaning methods recommended in writing by wall-covering manufacturer.

- C. Replace strips that cannot be cleaned.
- D. Reinstall hardware and hardware accessories, electrical plates and covers, light fixture trims, and similar items.

END OF SECTION 09 72 00

SECTION 09 77 00 - SPECIAL WALL SURFACING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes durable, decorative wall panels with textured finishes. Mounting hardware, adhesives, accessories and trims.
- B. Related Requirements:
 - 1. Division 09 Section 09 29 00 for gypsum board.

1.2 REFERENCES

- A. ASTM International:
 - 1. ASTM E84 Standard Test Method for Surface Burning Characteristics of Building Materials.
 - 2. ASTM D256 Standard Test Methods for Determining the Izod Pendulum Impact Resistance of Plastics.
 - 3. ASTM D638 Standard Test Method for Tensile Properties of Plastics.
 - 4. ASTM D790 Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials.
 - 5. ASTM D2583 Standard Test Method for Indentation Hardness of Rigid Plastics by Means of a Barcol Impressor.

1.3 ACTION SUBMITTALS

- A. Product Data: Submit manufacturer's product data, storage, handling and preparation requirements and installation instructions.
- B. Shop Drawings: Submit shop drawings showing layout, product components, accessories, finish colors, patterns and textures. Indicate location and dimension joints.
- C. Samples: For each exposed product and for each color and texture specified.
- D. Test Reports: Certified test reports showing compliance with specified performance characteristics and physical properties.
- E. Certificates: Submit manufacturer's certificate that products meet or exceed specified requirements.

1.4 CLOSEOUT SUBMITTALS

- A. Operations and Maintenance Data: Operation and maintenance data for installed products in accordance with Division 01 Closeout Submittals (Maintenance Data and Operation Data) Section. Include methods for maintaining installed products and precautions against cleaning materials and methods detrimental to finishes and performance.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: Installer shall have a minimum of 5 years experience with composite wall panel work similar in scope and size to this project.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Basis-of-Design Product: Subject to compliance with requirements, provide Crane Composites; Kemply Laminated FRP Wall Panels with 5/8" Plywood backing or a comparable product by one of the following:
1. Marlite, Inc.
 2. Fiber-Tech Industries
 3. Nudo

2.2 PERFORMANCE REQUIREMENTS

- A. Surface-Burning Characteristics: Comply with ASTM E 84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
1. Flame-Spread Index: 25 or less.
 2. Smoke-Developed Index: 50 or less.

2.3 MATERIALS

- A. Fiberglass Reinforced Plastic (FRP).
1. Color: Ivory (84).
 2. Texture: Embossed
 3. Thickness: 0.09 inch
 4. Fire-Rating Class: A
 5. Size and locations: As indicated as wall protection on drawings.

2.4 ACCESSORIES

- A. Moldings: coordinating PVC (polyvinyl chloride) molding(s): color to match panels.
- B. Adhesives: As recommended by Manufacturer

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine: Verify substrate conditions, which have been previously installed under other sections, are acceptable for product installation in accordance with manufacturer's instructions. Verify that site conditions are acceptable for installation of durable, decorative wall panels. Examine back-up surfaces to determine that corners are plumb and straight, surfaces are smooth, uniform, clean and free from foreign matter, nails are countersunk and joints and cracks are filled flush and smooth with the adjoining surface. Do not proceed with installation of durable, decorative wall panels until unacceptable conditions are corrected.

3.2 INSTALLATION

- A. General:
1. Inspect panels for any defects immediately. Do not install panels of unacceptable quality. Field cutting of all wall systems should be accomplished using a circular saw with fine tooth carbide blade.
 2. Position panel so that the saw blade enters the finished HPL side first to avoid chipping or damage. Protect decorative laminate face of panel by covering work area, do not remove protective will until after installation.
 3. Follow adhesive manufacturer's recommendations for appropriate height of adhesive bead left by trowel and do not allow adhesive to skin over.

3.3 CLEANING

- A. Clean panel surfaces in compliance with manufacturer's recommendations.
 - 1. Use a clean, damp, nonabrasive cotton cloth and a mild liquid detergent or household cleaner.
 - 2. Rinse with clean water using a clean, nonabrasive cotton cloth.
 - 3. Dry panels with a soft, clean nonabrasive cotton cloth.
 - 4. Do not use cleaners containing acid, alkali or sodium hypochlorite

3.4 PROTECTION

- A. Protect installed work from damage due to subsequent construction activity on the site.

END OF SECTION 09 77 00

SECTION 09 91 00 - PAINTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes Painting and Finishing.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Samples for Verification: For each type of paint system and in each color and gloss of topcoat indicated.
 - 1. Submit 8-1/2 x 11 color downs on heavy paper to match Architect's color chips for each color and type of paint specified for Architect's approval.
 - a. Architect will furnish a schedule after beginning of construction. The schedule will include color chips for matching.
 - 2. Step coats on Samples to show each coat required for system.
 - 3. Label each coat of each Sample.
 - 4. Label each Sample for location and application area.
- C. Material Certificates: For scrub resistance and washability, signed by manufacturers.

1.4 QUALITY ASSURANCE

- A. Architect has the option of requesting test patches in place for Architect's approval of final color and finish.
 - 1. Notify Architect 48 hours in advance of the time the test patches will be ready for inspection.
- B. Manufacturer shall certify that tests have been performed on semi-gloss wall finish and others as selected by the Architect. Acceptance of materials is conditional upon demonstration of washability and abrasion resistance of test patches. Testing shall include the following:
 - 1. Scrub resistance per ASTM D2486-79: Value as specified in approved finish schedule but not less than 1200.
 - 2. Washability per ASTM D3450-80: Value as specified in approved finish schedule but not less than 80% for sponge and 90% for brush.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F (7 deg C).
 - 1. Maintain containers in clean condition, free of foreign materials and residue.
 - 2. Remove rags and waste from storage areas daily.
 - a. Do not store oil or paint soaked rags inside the building.
 - 3. Do not store materials in any room containing a direct-fired heating unit.
- B. Mix and thin paints in strict accordance with recommendations of the manufacturer.
 - 1. Mix paints only in areas designated, and provided proper protection for walls and floors.

1.6 FIELD CONDITIONS

- A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg F (10 and 35 deg C).
- B. Do not apply interior paints when relative humidity exceeds 85 percent; at temperatures less than 5 deg F (3 deg C) above the dew point; or to damp or wet surfaces.
- C. Do not apply exterior paints in snow, rain, fog, or mist; when relative humidity exceeds 85 percent; at temperatures less than 5 deg F (3 deg C) above the dew point; or to damp or wet surfaces.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. In other Part 2 articles where titles below introduce manufacturer and product lists, the following requirements apply for product selection:
 - 1. Products: Subject to compliance with requirements, provide one of the products specified.

2.2 PAINT, GENERAL

- A. Material Compatibility:
 - 1. Provide materials for use within each paint system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
 - 2. For each coat in a paint system, provide products recommended in writing by manufacturers of topcoat for use in paint system and on substrate indicated.

2.3 COLORS

- A. The Architect has the option of accenting certain building elements different colors; (i.e.: doors, frames, columns, ceilings, walls) to be defined in a Schedule.
- B. The Architect reserves the right to select colors from manufacturer's standard or premium price groups, including deep tone colors for both interior and exterior products.

- C. Furnish an equal product by the same manufacturer only in those instances where a deep tone color specified by the Architect is not available in the specified product. This is subject to Architect's approval.
- D. Tinted primer shall be used whenever deep tone colors are specified.

2.4 EXTERIOR FINISHES

A. Wood:

1. First Coat:

- a. Benjamin Moore: Ultra Spec EXT Latex Primer N558
- b. PPG Glidden: Hydrosealer Primer Sealer 6001-1200.
- c. PPG Paints: , SealGrip Exterior Latex Primer. 17-921XI.
- d. Pratt & Lambert: Pro Hide Gold Exterior Latex Primer Z8460
- e. Sherwin Williams: Exterior Latex Wood Primer, B42 Series

2. Second and Third Coats:

- a. Benjamin Moore: Ultra Spec EXT Satin Finish N448
- b. PPG Glidden: Ultra-Hide 150 Exterior Satin Paint 2412V Series.
- c. PPG Paints: 6-2000 Series, Speedhide Exterior Satin Latex.
- d. Pratt & Lambert: Pro Hide Gold Exterior Acrylic Latex Flat Z8400, Eggshell Z8500 or Semi Z8600
- e. Sherwin Williams: A-100 Exterior Acrylic Latex Satin, A82 Series

2.5 INTERIOR FINISHES

A. Plaster and Gypsum Board Ceilings and Ceiling Drops

1. First Coat:

- a. Benjamin Moore: Moorcraft Vinyl Latex Primer-Sealer 273.
- b. Glidden Professional: High Hide Interior Primer Sealer 1000-1200.
- c. Pittsburgh Paints: 4-603 Permacrete interior/exterior Acrylic Alkali Resistant Primer for plaster; 6-2 Interior Latex Sealer for gypsum board.
- d. Pratt & Lambert: Plaster: Pro Hide Gold Z1001 Gypsum: Pro Hide Gold High Holdout Latex Primer/Sealer Z8165
- e. Sherwin Williams: ProMar 200 Zero VOC Primer B28W2600

2. Second Coat:

- a. Benjamin Moore: Moorcraft Vinyl Latex Flat 275
- b. Glidden Professional: Ultra-Hide 150 Interior Flat Paint 1210V Series.
- c. Pittsburgh Paints: Speedhide Latex Flat 6-70 (for all colors)
- d. Pratt & Lambert: Pro Hide Gold Latex Flat Z8100, Eggshell Z8200, Satin Z9400 or Semi Z8300.
- e. Sherwin Williams: ProMar 200 Zero VOC Latex Flat B30 Series

3. Third Coat:

- a. Benjamin Moore: Moorcraft Vinyl Latex Flat 275
- b. Glidden Professional: Ultra-Hide 150 Interior Flat Paint 1210V Series.
- c. Pittsburgh Paints: Speedhide Latex Flat 6-70 (for all colors)

- d. Pratt & Lambert: Pro Hide Gold Latex Flat Z8100, Eggshell Z8200, Satin Z9400, or Semi Z8300.
 - e. Sherwin Williams: ProMar 200 Zero VOC Latex Flat B30 Series
- B. Plaster and Gypsum Board Walls and Columns – Non-epoxy:
 - 1. First Coat:
 - a. Benjamin Moore: Moorcraft Vinyl Latex Primer-Sealer 273
 - b. Glidden Professional: High Hide Interior Primer Sealer 1000-1200.
 - c. Pittsburgh Paints: 4-603 Permacrete interior/exterior Acrylic Alkali Resistant Primer for plaster; 6-2 Interior Latex Sealer for gypsum board.
 - d. Pratt & Lambert: Plaster: Pro Hide Gold Z1001 Gypsum: Pro Hide Gold High Holdout Latex Primer/Sealer Z8165.
 - e. Sherwin Williams: ProMar 200 Zero VOC Primer B28W2600
 - 2. Second and Third Coats:
 - a. Benjamin Moore: Moorcraft Latex Eggshell Enamel 274
 - b. Glidden Professional: Ultra-Hide 150 Interior Eggshell Paint 1412V Series.
 - c. Pittsburgh Paints: Speedhide Latex Eggshell 6-411
 - d. Pratt & Lambert: Pro Hide Gold Latex Flat Z8100, Eggshell Z8200, Satin Z9400 or Semi Z8300.
 - e. Sherwin Williams: ProMar 200 Zero VOC Latex Eg-Shel B20 Series
- C. Plaster and Gypsum Board Walls and Columns - Epoxy:
 - 1. First Coat:
 - a. Benjamin Moore: M08/M09 Waterborne Epoxy Primer
 - b. Glidden Professional: High Hide Interior Primer Sealer 1000-1200.
 - c. Pittsburgh Paints: 4-603 Permacrete interior/exterior Acrylic Alkali Resistant Primer for plaster; 6-2 Interior Latex Sealer for gypsum board.
 - d. Pratt & Lambert: Plaster: Pro Hide Gold Z1001 Gypsum: Pro Hide Gold High Holdout Latex Primer/Sealer Z8165.
 - e. Sherwin Williams: ProMar 200 Zero VOC Primer B28W2600
 - 2. Second and Third Coats:
 - a. Benjamin Moore: M43/M44 Acrylic Epoxy Gloss Coating
 - b. Glidden Professional: Devoe Coatings Tru-Glaze-WB Waterborne Epoxy Gloss Coating 4428.
 - c. Pittsburgh Paints: 16-551 Series, Pitt-Glaze High Solids Acrylic-Epoxy.
 - d. Pratt & Lambert: Acrylic Water-Based Epoxy Z7021.
 - e. Sherwin Williams: Water Based Catalyzed Epoxy, B70/B60V25
- D. Painted Woodwork including any interior window sash and trim:
 - 1. First Coat:
 - a. Benjamin Moore: Fresh Start High-Hiding All Purpose Primer 046
 - b. PPG Glidden: Gripper Interior/Exterior Primer Sealer 3210
 - c. PPG Paints: 17-956, Seal-Grip interior Alkyd Enamel Undercoater.
 - d. Pratt & Lambert: Suprime Interior Alkyd Primer S1011
 - e. Sherwin Williams: Premium Wall & Wood Interior Latex Primer, B28 Series

2. Second Coat:

- a. Benjamin Moore: Coronado Superkote 5000 Waterborne Acrylic-Alkyd Satin Finish 203
- b. PPG Paints: Speedhide WB Alkyd Enamel 6-1410XI
- c. Pratt & Lambert: Pro Hide Gold Alkyd Semi Gloss S8800
- d. Sherwin Williams: ProMar 200 Interior Waterbased Acrylic-Alkyd Eg-shel, B33 Series

2.6 MECHANICAL

A. Grilles, Registers, and Diffusers

1. First Coat:

- a. Benjamin Moore: M04 Acrylic Metal Primer
- b. Glidden Professional: Devoe Coatings Devflex 4020PF Direct to Metal Primer & Flat Finish.
- c. Pittsburgh Paints: 90-708 Series, Pitt-Tech One Pack Interior/Exterior Industrial Primer.
- d. Pratt & Lambert: Steel Tech Acrylic Prime & Finish Z190
- e. Sherwin Williams: ProCryl Universal Metal Primer B66-310 Series.

2. Second and Third Coats:

- a. Benjamin Moore: Moorcraft Latex Semi Gloss Enamel 276
- b. Glidden Professional: Devoe Coatings Devflex 4216HP High Performance Waterborne Acrylic Semi-Gloss Enamel.
- c. Pittsburgh Paints: 90-474 Series, Pitt-Tech One Pack Interior/Exterior Satin High Performance Industrial Enamel.
- d. Pratt & Lambert: Enducryl Acrylic Semi Gloss Z6621
- e. Sherwin Williams: Pro Industrial Zero VOC Acrylic Semi-Gloss B66-600 Series.

2.7 ELECTRICAL

A. Exterior Exposed Electrical Conduit Fittings, Boxes, and other miscellaneous exterior electrical items.

1. First Coat - Galvanized:

- a. Benjamin Moore: M04 Acrylic Metal Primer
- b. Glidden Professional: Devoe Coatings Devflex 4020PF Direct to Metal Primer & Flat Finish.
- c. Pittsburgh Paints: 90-708 Series, Pitt-Tech One Pack Interior/Exterior Industrial Primer.
- d. Pratt & Lambert: Steel Tech Acrylic Prime & Finish Z190
- e. Sherwin Williams: ProCryl Universal Metal Primer B66-310 Series.

2. First Coat - Ferrous Metal:

- a. Benjamin Moore: M04 Acrylic Metal Primer
- b. Glidden Professional: Devoe Coatings Devflex 4020PF Direct to Metal Primer & Flat Finish.
- c. Pittsburgh Paints: 90-708 Series, Pitt-Tech One Pack Interior/Exterior Industrial Primer.
- d. Pratt & Lambert: Steel Tech Acrylic Prime & Finish Z190

- e. Sherwin Williams: ProCryl Universal Metal Primer B66-310 Series.
- 3. Second and Third Coats:
 - a. Benjamin Moore: Impervex Enamel 309
 - b. Glidden Professional: Devoe Coatings Devflex 4216HP High Performance Waterborne Acrylic Semi-Gloss Enamel.
 - c. Pittsburgh Paints: 90-374 Series, Pitt-Tech One Pack Interior/Exterior Gloss High Performance Industrial Enamel.
 - d. Pratt & Lambert: Enducryl Acrylic Gloss Z6611
 - e. Sherwin Williams: DTM Acrylic Gloss Coating (Water Reducible), B66 Series
- B. Interior Exposed Electrical Items in areas where walls and/or ceilings are painted including electrical panels, cabinets, exposed conduit, etc.
 - 1. First Coat - Galvanized:
 - a. Benjamin Moore: M04 Acrylic Metal Primer
 - b. Glidden Professional: Devoe Coatings Devflex 4020PF Direct to Metal Primer & Flat Finish.
 - c. Pittsburgh Paints: 90-708 Series, Pitt-Tech One Pack Interior/Exterior Industrial Primer.
 - d. Pratt & Lambert: Steel Tech Acrylic Prime & Finish Z190
 - e. Sherwin Williams: ProCryl Universal Metal Primer B66-310 Series.
 - 2. First Coat - Ferrous Metal:
 - a. Benjamin Moore: M04 Acrylic Metal Primer
 - b. Glidden Professional: Devoe Coatings Devflex 4020PF Direct to Metal Primer & Flat Finish.
 - c. Pittsburgh Paints: 90-708 Series, Pitt-Tech One Pack Interior/Exterior Industrial Primer.
 - d. Pratt & Lambert: Steel Tech Acrylic Prime & Finish Z190
 - e. Sherwin Williams: ProCryl Universal Metal Primer B66-310 Series.
 - 3. Second and Third Coats:
 - a. Benjamin Moore: Moorcraft Latex Semi Gloss Enamel 276
 - b. Glidden Professional: Devoe Coatings Devflex 4216HP High Performance Waterborne Acrylic Semi-Gloss Enamel.
 - c. Pittsburgh Paint: 90-474 Series, Pitt-Tech One Pack Interior/Exterior Satin High Performance Industrial Enamel.
 - d. Pratt & Lambert: Enducryl Acrylic Gloss Z6611
 - e. Sherwin Williams: Pro Industrial Zero VOC Acrylic Semi-Gloss B66-600 Series.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of work.
- B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:
 - 1. Concrete: 12 percent.

2. Masonry (Clay and CMU): 12 percent.
 3. Wood: 15 percent.
 4. Gypsum Board: 12 percent.
 5. Plaster: 12 percent.
- C. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.
 - D. Begin coating application only after unsatisfactory conditions have been corrected and surfaces are dry.
 1. Beginning coating application constitutes Contractor's acceptance of substrates and conditions.

3.2 PREPARATION OF NEW SUBSTRATES

- A. Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual" applicable to substrates and paint systems indicated.
- B. Remove plates, machined surfaces, and similar items already in place that are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.
 1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.
 2. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
- C. Clean substrates of substances that could impair bond of paints, including dirt, oil, grease, and incompatible paints and encapsulants.
 1. Remove incompatible primers and reprime substrate with compatible primers as required to produce paint systems indicated.
- D. Concrete Substrates: Remove release agents, curing compounds, efflorescence, and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces to be painted exceeds that permitted in manufacturer's written instructions.
- E. Clay Masonry Substrates: Remove efflorescence and chalk. Do not paint surfaces if moisture content of surfaces or alkalinity of mortar joints to be painted exceed that permitted in manufacturer's written instructions.
- F. Concrete Masonry Substrates: Remove efflorescence and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces to be painted exceeds that permitted in manufacturer's written instructions.
- G. Ferrous Metals, Galvanized Metal, Aluminum: Clean surfaces according to the Steel Structure Painting Council Surface Preparation Specifications: SSPC-SP1 Solvent Cleaning, SSPC-SP2 Hand Tool Cleaning, or SSPC-SP3 Power Tool Cleaning, as appropriate.
 1. Steel Substrates: Remove any rust and loose mill scale. Clean using methods recommended in writing by paint manufacturer.

2. Galvanized-Metal Substrates: Remove grease and oil residue from galvanized sheet metal fabricated from coil stock by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied paints.

- a. Thoroughly clean galvanized metal per SSPC-SP1 with water soluble degreaser. No hydrocarbons.

3. Aluminum Substrates: Remove surface oxidation.

H. Wood Substrates:

1. Refer to Division 6 Section "Finish Carpentry and Millwork" for preparation specified under other trades.
2. Countersink all nails and finish with putty or plastic wood filler. Sand smooth when dried.
3. Sand surfaces that will be exposed to view, and dust off.
4. Prime edges, ends, faces, undersides, and backsides of wood.
5. After priming, fill holes and imperfections in the finish surfaces with putty or plastic wood filler. Sand smooth when dried.

I. Gypsum Board Substrates: Do not begin paint application until finishing compound is dry and sanded smooth.

J. Plaster Substrates: Do not begin paint application until plaster is fully cured and dry.

K. Plastic Trim Fabrication Substrates: Remove dust, dirt, and other foreign material that might impair bond of paints to substrates.

3.3 PREPARATION OF EXISTING SUBSTRATES

A. Preparation of Previously Painted Surfaces: Comply with requirements as specified for preparation of new substrates as well as the following:

1. Hand scrape only. Do not employ power washing.
2. Scrape loose and poorly adhered wood. Spot prime bare wood.
3. At areas where paint is severely peeling or where wood is severely weathered, scrape loose paint and sand surfaces back to sound wood fibers.

3.4 PRIMING AND BACKPRIMING OF WOOD

- A. All wood, factory finished or otherwise, must be back-primed immediately upon delivery with interior trim primer specified for wood which is to be painted, or finish manufacturer's recommended protective pre-treatment for wood which is to have natural finish.
- B. Apply first coat to all wood scheduled to receive natural finish before material is handled at the site by other trades.
- C. Furnish sealer to other trades for touching up any bare wood caused by mortising or butting of surfaces, or any kind of assembly or installation.
- D. Avoid painting over or otherwise staining edges of wood where natural finish is scheduled.

3.5 APPLICATION

- A. General: Apply paints according to manufacturer's written instructions.
 - 1. Use applicators and techniques suited for paint and substrate indicated.
 - a. Except where specifically authorized by the Architect to do otherwise: Apply flat or eggshell wall paint by brush or roller; apply gloss or semi-gloss with brush only.
 - 2. Sanding: In addition to preparatory sanding, fine sand between succeeding coats of all varnish enamel or flat enamel, using sandpaper appropriate to the finish. Use fine production paper between coats.
 - 3. Paint surfaces behind movable equipment and furniture same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed equipment or furniture with prime coat only.
 - 4. Paint front and backsides of access panels, removable or hinged covers, and similar hinged items to match exposed surfaces.
 - 5. Doors: Finish all edges, including tops and bottoms, of wood and metal doors same as faces. Fill edges of exposed plywood doors, panels, similar materials.
 - 6. Finish interior of all closets and cabinets same as adjoining rooms, unless otherwise scheduled.
 - 7. Apply one coat of sanding sealer and one coat of semi-gloss varnish to insides of all drawers unless otherwise specified.
- B. Tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of same material are to be applied. Tint undercoats to match color of topcoat, but provide sufficient difference in shade of undercoats to distinguish each separate coat.
- C. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance. The number of coats scheduled are minimums.
- D. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.
 - 1. Holidays and restrikes in painted surfaces shall be considered sufficient cause to require recoating of entire surface.
- E. Painting Mechanical and Electrical Work: Paint items exposed in equipment rooms and occupied spaces including, but not limited to, the following:
 - 1. Mechanical Work:
 - a. Uninsulated metal piping.
 - b. Uninsulated plastic piping.
 - c. Pipe hangers and supports.
 - d. Tanks that do not have factory-applied final finishes.
 - e. Visible portions of internal surfaces of metal ducts, without liner, behind air inlets and outlets.

- f. Duct, equipment, and pipe insulation having cotton or canvas insulation covering or other paintable jacket material.
- g. Mechanical equipment that is indicated to have a factory-primed finish for field painting.

2. Electrical Work:

- a. Switchgear.
- b. Panelboards.
- c. Electrical equipment that is indicated to have a factory-primed finish for field painting.

3.6 FIELD QUALITY CONTROL

- A. Testing of Paint Materials: Owner reserves the right to invoke the following procedure at any time and as often as Owner deems necessary during the period when paints are being applied:
 - 1. Owner will engage the services of a qualified testing agency to sample paint materials being used. Samples of material delivered to Project site will be taken, identified, sealed, and certified in presence of Contractor.
 - 2. Testing agency will perform tests for compliance of paint materials with product requirements.
 - 3. Owner may direct Contractor to stop applying paints if test results show materials being used do not comply with product requirements. Contractor shall remove noncomplying-paint materials from Project site, pay for testing, and repaint surfaces painted with rejected materials. Contractor will be required to remove rejected materials from previously painted surfaces if, on repainting with complying materials, the two paints are incompatible.

3.7 CLEANING AND PROTECTION

- A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.
- B. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.
- C. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.
- D. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.8 PAINT SCHEDULE

- A. PT1
Sherwin Williams
Olive Grove
SW7734
- B. PT2
Sherwin Williams
Colonial Yellow
SW0030
- C. PT3
Sherwin Williams
Accessible Beige
SW7036
- D. PT/EP4
Sherwin Williams
Ivory Lace
SW7013
- E. PT/EP5
Sherwin Williams
Herbal Wash
SW7739
- F. PT/EP6
Sherwin Williams
Clary Sage
SW6178
- G. PT7 (Exterior)
PPG
Radisson
PPG1013-1
- H. PT8 (Exterior Accent)
Benjamin Moore
Sioux Falls 705

END OF SECTION 09 91 00

SECTION 10 28 00 - ACCESSORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Public-use washroom accessories.
 - 2. Underlavatory guards.
 - 3. Custodial accessories.
- B. Related Requirements:
 - 1. Section 08 83 00 "Mirrors" for frameless mirrors.

1.3 COORDINATION

- A. Coordinate accessory locations with other work to prevent interference with clearances required for access by people with disabilities, and for proper installation, adjustment, operation, cleaning, and servicing of accessories.
- B. Deliver inserts and anchoring devices set into concrete or masonry as required to prevent delaying the Work.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
 - 2. Include anchoring and mounting requirements, including requirements for cutouts in other work and substrate preparation.
- B. Product Schedule: Indicating types, quantities, sizes, and installation locations by room of each accessory required.
 - 1. Identify locations using room designations indicated.
 - 2. Identify accessories using designations indicated.

1.5 INFORMATIONAL SUBMITTALS

- A. Sample Warranty: For manufacturer's special warranty.

1.6 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For accessories to include in maintenance manuals.

1.7 QUALITY ASSURANCE

- A. Manufacturer: Provide products manufactured by a company with a minimum of 10 years successful experience manufacturing similar products.

- B. Single Source Requirements: To greatest extent possible provide products from a single manufacturer.
- C. Accessibility Requirements: Comply with requirements applicable in the jurisdiction of the project, including but not limited to ADA and ICC/ANSI A117.1 requirements as applicable.

PART 2 - PRODUCTS

2.1 GENERAL

- A. Basis-of-Design Products: Subject to compliance with requirements, provide products by Bobrick Washroom Equipment, Inc. or comparable product by one of the following:
 - 1. Bradley Washfountain Co.
 - 2. Delta Faucet Company

2.2 PUBLIC-USE WASHROOM ACCESSORIES

- A. Toilet Tissue (Roll) Dispenser TP:
 - 1. Delta Faucet Company 75050-RB
 - 2. Description: Single-roll dispenser
 - 3. Mounting: Surface mounted.
- B. Grab Bar GBXX:
 - 1. Delta Faucet Company 416XX-GB Series
 - 2. Mounting: Flanges with concealed fasteners.
 - 3. Material: Stainless steel, 0.05 inch thick.
 - a. Finish: Smooth, Venetian Bronze
 - 4. Outside Diameter: 1-1/4 inches.
 - 5. Configuration and Length: As indicated on Drawings.
- C. Coat Hook CH:
 - 1. Delta Faucet Company 75035-RB
 - 2. Description: Double robe hook.
 - 3. Material and Finish: Stainless Steel, Venetian Bronze
- D. Towel Ring TR:
 - 1. Delta Faucet Company 75046-RB
 - 2. Description: Towel Ring.
 - 3. Material and Finish: Stainless Steel, Venetian Bronze

2.3 UNDERLAVATORY GUARDS

- A. Underlavatory Guard:
 - 1. Description: Insulating pipe covering for supply and drain piping assemblies that prevents direct contact with and burns from piping; allow service access without removing coverings.
 - 2. Material and Finish: Antimicrobial, molded plastic, white.

2.4 CUSTODIAL ACCESSORIES

- A. Source Limitations: Obtain custodial accessories from single source from single manufacturer.
- B. Mop and Broom Holder MH:
 - 1. Bradley Washfountain Co Model# 9984
 - 2. Description: Unit with shelf, hooks, and holders.

3. Length: 36 inches.
4. Hooks: Three.
5. Mop/Broom Holders: Four, spring-loaded, rubber hat, cam type.
6. Material and Finish: Stainless steel, No. 4 finish (satin).
 - a. Shelf: Not less than nominal 0.05-inch-thick stainless steel.

2.5 MATERIALS

- A. Stainless Steel: ASTM A 666, Type 304, 0.031-inch minimum nominal thickness unless otherwise indicated.
- B. Steel Sheet: ASTM A 1008/A 1008M, Designation CS (cold rolled, commercial steel), 0.036-inch minimum nominal thickness.
- C. Galvanized-Steel Sheet: ASTM A 653/A 653M, with G60 hot-dip zinc coating.
- D. Galvanized-Steel Mounting Devices: ASTM A 153/A 153M, hot-dip galvanized after fabrication.
- E. Fasteners: Screws, bolts, and other devices of same material as accessory unit and tamper-and-theft resistant where exposed, and of galvanized steel where concealed.

2.6 FABRICATION

- A. General: Fabricate units with tight seams and joints, and exposed edges rolled. Hang doors and access panels with full-length, continuous hinges. Equip units for concealed anchorage and with corrosion-resistant backing plates.
- B. Keys: Provide universal keys for internal access to accessories for servicing and resupplying. Provide minimum of six keys to Owner's representative.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install accessories according to manufacturers' written instructions, using fasteners appropriate to substrate indicated and recommended by unit manufacturer. Install units level, plumb, and firmly anchored in locations and at heights indicated.
- B. Grab Bars: Install to withstand a downward load of at least 250 lbf, when tested according to ASTM F 446.

3.2 ADJUSTING AND CLEANING

- A. Adjust accessories for unencumbered, smooth operation. Replace damaged or defective items.
- B. Remove temporary labels and protective coatings.
- C. Clean and polish exposed surfaces according to manufacturer's written instructions.

END OF SECTION 10 28 00

SECTION 12 32 16 - MANUFACTURED PLASTIC-LAMINATE-FACED CASEWORK

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes plastic-laminate-faced cabinets of stock design.
- B. Related Requirements:
 - 1. Section 06 10 00 "Rough Carpentry" for wood blocking for anchoring casework.
 - 2. Section 09 65 13 "Resilient Base and Accessories" for resilient base applied to plastic-laminate-faced casework.
 - 3. Section 12 36 23 "Countertops."

1.3 DEFINITIONS

- A. Definitions in the AWI's, AWMAC's, and WI's "Architectural Woodwork Standards" apply to the work of this Section.
- B. MDF: Medium-density fiberboard.
- C. Hardwood Plywood: A panel product composed of layers or plies of veneer, or of veneers in combination with lumber core, hardboard core, MDF core, or particleboard core, joined with adhesive, and faced both front and back with hardwood veneers.

1.4 COORDINATION

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

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work. Show fabrication details, including types and locations of hardware. Show installation details, including field joints and filler panels. Indicate manufacturer's catalog numbers for casework.
- C. Keying Schedule: Include schematic keying diagram and index each key set to unique designations that are coordinated with the Contract Documents.
- D. Samples: For cabinet finishes.
- E. Samples for Initial Selection: For cabinet finishes.
- F. Samples for Verification: 8-by-10-inch Samples for each type of finish.
- G. Hardware finishes

1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Quality Standard Compliance Certificates: AWI Quality Certification Program certificates.
- C. Sample Warranty: For special warranty.

1.7 QUALITY ASSURANCE

- A. Installer Qualifications: An authorized representative who is trained and approved by manufacturer for installation of units required for this Project and who is a certified participant in AWI's Quality Certification Program.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Deliver casework only after painting, utility roughing-in, and similar operations that could damage, soil, or deteriorate casework have been completed in installation areas. If casework must be stored in other than installation areas, store only in areas where environmental conditions meet requirements specified in "Project Conditions" Article.
- B. Keep finished surfaces covered with polyethylene film or other protective covering during handling and installation.

1.9 FIELD CONDITIONS

- A. Environmental Limitations: Do not deliver or install casework until building is enclosed, wet work is complete, and HVAC system is operating and maintaining temperature and relative humidity at occupancy levels during the remainder of the construction period. Maintain temperature and relative humidity during the remainder of the construction period in range recommended for Project location by the AWI's, AWMAC's, and WI's "Architectural Woodwork Standards."
- B. Established Dimensions: Where casework is indicated to fit to other construction, establish dimensions for areas where woodwork is to fit. Provide allowance for trimming at site, and coordinate construction to ensure that actual dimensions correspond to established dimensions.
- C. Locate concealed framing, blocking, and reinforcements that support casework by field measurements before being enclosed, and indicate measurements on Shop Drawings.

1.10 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace components of casework that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Delamination of components or other failures of glue bond.
 - b. Warping of components.
 - c. Failure of operating hardware.
 - 2. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Case Systems Inc.
 2. Stevens Industries, Inc.
 3. TMI Systems Design Corporation.
- B. Source Limitations: Obtain plastic-laminate-faced cabinets from single manufacturer.

2.2 CASEWORK, GENERAL

- A. Quality Standard: Unless otherwise indicated, comply with the AWI's, AWMAC's, and WI's "Architectural Woodwork Standards" for grades of casework indicated for construction, finishes, installation, and other requirements.
1. Grade: Premium.
 2. Provide labels and certificates from AWI certification program indicating that casework, including installation, complies with requirements of grades specified.

2.3 CASEWORK

- A. Design:
1. Flush overlay.
- B. Grain Direction for Wood Grain Plastic Laminate:
1. Vertical on both doors and drawer fronts, with continuous vertical matching.
 2. Lengthwise on face frame members.
 3. Vertical on end panels.
 4. Side to side on bottoms and tops of units.
 5. Vertical on knee-space panels.
 6. Horizontal on aprons.
- C. Exposed Materials:
1. Plastic Laminate: Grade HGS
 - a. Colors and Patterns: As selected by Architect from the full range from Nevamar, Wilsonart, Formica, and Pionite.
 2. Unless otherwise indicated, provide specified edgebanding on all exposed edges.
- D. Semiexposed Materials:
1. Plastic Laminate: Grade VGS unless otherwise indicated. Provide plastic laminate for semiexposed surfaces unless otherwise indicated.
 - a. Provide plastic laminate of same grade as exposed surfaces for interior faces of doors and drawer fronts and other locations where opposite side of component is exposed.
 2. Thermoset Decorative Panels: Provide thermoset decorative panels for semiexposed surfaces unless otherwise indicated.
 - a. Provide plastic laminate of same grade as exposed surfaces for interior faces of doors and drawer fronts and other locations where opposite side of component is exposed.
 3. Hardboard: Use only for cabinet backs where exterior side of back is not exposed.
 4. Metal for Steel Drawer Pans: Cold-rolled, carbon-steel sheet complying with ASTM A 1008/A 1008M; matte finish; suitable for exposed applications.
 5. Unless otherwise indicated, provide specified edgebanding on all semiexposed edges.
- E. Concealed Materials:

1. Plastic Laminate: Grade BKL.
2. Particleboard.
3. Hardboard.

2.4 MATERIALS

- A. Particleboard: ANSI A208.1, Grade M-2. Provide marine grade particle board at sink locations.
- B. Particleboard: Straw-based particleboard complying with ANSI A208.1, Grade M-2, except for density. Provide marine grade particle board at sink locations.
- C. Hardboard: ANSI A135.4, Class 1 Tempered.
- D. Plastic Laminate: High-pressure decorative laminate complying with NEMA LD 3.
 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Formica Corporation.
 - b. Nevamar; a Panolam Industries International, Inc. brand.
 - c. Pionite, a Panolam Industries International, Inc. brand.
 - d. Wilsonart LLC.
- E. Edgebanding for Plastic Laminate: Rigid PVC extrusions, through color with satin finish, 3 mm thick at doors and drawer fronts, 1 mm thick elsewhere.
- F. Thermoset Decorative Panels: Particleboard or medium-density fiberboard finished with thermally fused, melamine-impregnated decorative paper and complying with requirements of NEMA LD 3, Grade VGL, for Test Methods 3.3, 3.4, 3.6, 3.8, and 3.10.
- G. Edgebanding for Thermoset Decorative Panels: PVC or polyester edgebanding matching thermoset decorative panels.

2.5 COLORS AND FINISHES

- A. Thermoset Decorative Panel Colors, Patterns, and Finishes: As selected by Architect from casework manufacturer's full range.
- B. Plastic-Laminate Colors, Patterns, and Finishes: Wilsonart, Wallaby D439-60.
- C. PVC Edgebanding Color: Architect shall select one (1) color from manufacturer's full range. Design intent is to match plastic laminate.

2.6 FABRICATION

- A. Plastic-Laminate-Faced Cabinet Construction: As required by referenced quality standard, but not less than the following:
 1. Bottoms and Ends of Cabinets, and Tops of Wall Cabinets and Tall Cabinets: 3/4-inch particleboard.
 2. Shelves: 3/4-inch-thick plywood or 1-inch-thick particleboard.
 3. Backs of Cabinets: 1/2-inch-thick particleboard or MDF where exposed, dadoed into sides, bottoms, and tops where not exposed.
 4. Drawer Fronts: 3/4-inch particleboard.
 5. Drawer Sides and Backs: 3/4-inch particleboard or MDF, with glued dovetail or multiple-dowel joints.
 6. Drawer Bottoms: 3/4-inch particleboard or MDF glued and dadoed into front, back, and sides of drawers.

7. Doors 48 Inches High or Less: 3/4 inch thick, with particleboard or MDF cores and solid hardwood stiles and rails.
8. Doors More Than 48 Inches High: 1-1/16 inches thick, with honeycomb cores and solid hardwood stiles and rails.

B. Filler Strips: Provide as needed to close spaces between cabinets and walls, ceilings, and indicated equipment. Fabricate from same material and with same finish as cabinets.

2.7 CASEWORK HARDWARE AND ACCESSORIES

A. Hardware, General: Unless otherwise indicated, provide manufacturer's standard satin-finish, commercial-quality, heavy-duty hardware.

1. Use threaded metal or plastic inserts with machine screws for fastening to particleboard except where hardware is through-bolted from back side.

B. Hinges: Concealed; stainless or chromium plated steel with satin polished finish.

C. Pulls: Oil Rubbed Bronze bow pulls, fastened from back with two screws. For sliding doors, provide recessed stainless-steel or chrome-plated flush pulls. Provide two pulls for drawers more than 24 inches wide.

D. Door Catches: Magnetic catches, BHMA A156.9, BO3141. Provide two catches on doors more than 48 inches high.

E. Drawer Slides: BHMA A156.9, Type B05091.

1. Manufacturers:
 - a. Basis of Design: Accuride International, Inc.
 - b. Hafele America Co.
 - c. Knap & Vogt Manufacturing Company.
2. Light/Medium Duty Drawer Slides for Drawers 24 inches wide or less: Accuride 7434 with overtravel.
 - a. Overtravel: 1 inch.
 - b. Type All ball bearing, full extension, rail mounted, hold-in detent, smooth progressive movement.
 - c. Capacity: 100 pounds per pair for 18" slide length
 - d. Finish: Clear Zinc.
3. Heavy Duty Drawer Slides for Drawers 42 inches Wide or Less and standard File Drawers: Accuride 3640.
 - a. Type: All ball bearing, full extension, rail/bracket mounted, hold-in detent, smooth progressive movement with 1 inch overtravel.
 - b. Capacity: 200 pounds per pair for 18" slide length
 - c. Finish: Clear Zing

F. Sliding-Door Hardware Sets: Manufacturer's standard, to suit type and size of sliding-door units.

G. Adjustable Shelf Supports: BHMA A156.9, B04013; metal.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas, with Installer present, for compliance with requirements for installation tolerances, location of framing and reinforcements, and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 CASEWORK INSTALLATION

A. Grade: Install cabinets to comply with same grade as item to be installed.

B. Install casework level, plumb, and true; shim as required, using concealed shims. Where casework abuts other finished work, apply filler strips and scribe for accurate fit, with fasteners concealed where practical.

C. Base Cabinets: Set cabinets straight, level, and plumb. Adjust subtops within 1/16 inch of a single plane. Align similar adjoining doors and drawers to a tolerance of 1/16 inch. Bolt adjacent cabinets together with joints flush, tight, and uniform.

D. Wall Cabinets: Hang cabinets straight, level, and plumb. Adjust fronts and bottoms within 1/16 inch of a single plane. Fasten to hanging strips, masonry, framing, wood blocking, or reinforcements in walls and partitions. Align similar adjoining doors to a tolerance of 1/16 inch.

E. Fasten cabinets to adjacent cabinets and to masonry, framing, wood blocking, or reinforcements in walls and partitions to comply with the AWI's, AWMAC's, and WI's "Architectural Woodwork Standards."

F. Install hardware uniformly and precisely. Set hinges snug and flat in mortises unless otherwise indicated. Adjust and align hardware so moving parts operate freely and contact points meet accurately. Allow for final adjustment after installation.

G. Adjust casework and hardware so doors and drawers operate smoothly without warp or bind. Lubricate operating hardware as recommended by manufacturer.

3.3 CLEANING

A. Repair or remove and replace defective work as directed on completion of installation.

B. Clean finished surfaces, touch up as required, and remove or refinish damaged or soiled areas to match original factory finish, as approved by Architect.

END OF SECTION 12 32 16

SECTION 12 36 23 - COUNTERTOPS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes:
 - 1. Plastic-laminate-clad countertops.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include data for fire-retardant treatment from chemical-treatment manufacturer and certification by treating plant that treated materials comply with requirements.
- B. Shop Drawings: For plastic-laminate-clad countertops.
 - 1. Include plans, sections, details, and attachments to other work. Detail fabrication and installation, including field joints.
 - 2. Show locations and sizes of cutouts and holes for items installed in plastic-laminate-clad countertops.
 - 3. Show locations of solid-surfacing-material window stools.
 - 4. Apply AWI Quality Certification Program label to Shop Drawings.
- C. Samples: Plastic laminates in each type, color, pattern, and surface finish required in manufacturer's standard size.
- D. Samples for Initial Selection: For plastic laminates and solid surfacing material.
- E. Samples for Verification: As follows:
 - 1. Plastic Laminates: For each type, color, pattern, and surface finish required, 8 by 10 inches in size.
 - 2. Wood-Grain Plastic Laminates: For each type, color, pattern, and surface finish required, 8 x 10 inches in size.
 - 3. Fabrication Sample: For each type and profile of countertop required, provide one sample applied to core material with specified edge material applied to one edge.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For fabricator.
- B. Product Certificates: For the following:
 - 1. Composite wood and agrifiber products.
 - 2. High-pressure decorative laminate.
 - 3. Chemical-resistant, high-pressure decorative laminate.
 - 4. Adhesives.
- C. Quality Standard Compliance Certificates: AWI Quality Certification Program.
- D. Evaluation Reports: For fire-retardant-treated materials, from ICC-ES.

1.5 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.
 - 1. Shop Certification: AWI's Quality Certification Program accredited participant.
- B. Installer Qualifications: AWI's Quality Certification Program accredited participant.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver countertops only after casework and supports on which they will be installed have been completed in installation areas.
- B. Store countertops in areas where environmental conditions comply with requirements specified in "Field Conditions" Article.
- C. Keep surfaces of countertops covered with protective covering during handling and installation.

1.7 FIELD CONDITIONS

- A. Environmental Limitations: Do not deliver or install countertops until building is enclosed, wet-work is complete, and HVAC system is operating and maintaining temperature between 60 and 90 deg F and relative humidity between 25 and 55 percent during the remainder of the construction period.
- B. Field Measurements: Where countertops are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
- C. Established Dimensions: Where countertops are indicated to fit to other construction, establish dimensions for areas where countertops are to fit. Provide allowance for trimming at site, and coordinate construction to ensure that actual dimensions correspond to established dimensions.

PART 2 - PRODUCTS

2.1 FABRICATORS

- 1. Warranty Period for Columns: Five years from date of Substantial Completion.
- B. Fabricators: Subject to compliance with requirements, provide interior architectural woodwork by one of the following:
 - 1. Mica-Tec, 21325 Hoover Rd., Warren, MI 48089, phone: (586) 758-4404, fax: (586) 758-3702, jon@micatec.net.
 - 2. Trend Millwork, 1300 John A. Papalas Drive, Lincoln Park, MI 48146, phone: (313) 383-6300, fax: (313) 381-7656, www.trendmillwork.com.
 - 3. Other fabricator with prior approval by Architect.

2.2 PLASTIC-LAMINATE-CLAD COUNTERTOPS

- A. Quality Standard: Unless otherwise indicated, comply with the "Architectural Woodwork Standards" for grades of plastic-laminate-clad countertops indicated for construction, finishes, installation, and other requirements.

1. Provide inspections of fabrication and installation together with labels and certificates from AWI certification program indicating that countertops comply with requirements of grades specified.

B. Grade: Premium.

C. High-Pressure Decorative Laminate: NEMA LD 3, grades as indicated or, if not indicated, as required by woodwork quality standard.

1. Manufacturers: Subject to compliance with requirements, provide products by the following:

- a. Formica Corporation.
- b. Nevamar; a Panolam Industries International, Inc. brand.
- c. Pionite, a Panolam Industries International, Inc. brand.
- d. Wilsonart LLC.

D. Colors, Patterns, and Finishes: Provide materials and products that result in colors and textures of exposed laminate surfaces complying with the following requirements:

1. Wilsonart, Pearl Soapstone 4886-38

E. Edge Treatment: 3-mm PVC edging

F. Core Material: exterior-grade plywood.

G. Core Material at Sinks: exterior-grade plywood.

H. Core Thickness: 3/4 inch.

1. Build up countertop thickness to 1-1/2 inches at front, back, and ends with additional layers of core material laminated to top.

I. Backer Sheet: Provide plastic-laminate backer sheet, NEMA LD 3, Grade BKL, on underside of countertop substrate.

J. Paper Backing: Provide paper backing on underside of countertop substrate.

2.3 WOOD MATERIALS

A. Wood Products: Provide materials that comply with requirements of referenced quality standard unless otherwise indicated.

B. Composite Wood and Agrifiber Products: Provide materials that comply with requirements of referenced quality standard for each type of countertop and quality grade specified unless otherwise indicated.

1. Particleboard: ANSI A208.1, Grade M-2.
2. Marine Grade Plywood at sink locations.

2.4 MISCELLANEOUS MATERIALS

A. Adhesive for Bonding Plastic Laminate: Unpigmented contact cement.

2.5 FABRICATION

A. Sand fire-retardant-treated wood lightly to remove raised grain on exposed surfaces before fabrication.

B. Fabricate countertops to dimensions, profiles, and details indicated. Provide front and end overhang of 1 inch over base cabinets.

- C. Complete fabrication, including assembly, 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.
- D. Shop cut openings to maximum extent possible to receive appliances, plumbing fixtures, electrical work, and similar items. Locate openings accurately and use templates or roughing-in diagrams to produce accurately sized and shaped openings. Sand edges of cutouts to remove splinters and burrs.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Before installation, condition countertops to average prevailing humidity conditions in installation areas.
- B. Before installing countertops, examine shop-fabricated work for completion and complete work as required, including removal of packing.

3.2 INSTALLATION

- A. Grade: Install countertops to comply with same grade as item to be installed.
- B. Assemble countertops and complete fabrication at Project site to the extent that it was not completed in the shop.
 - 1. Provide cutouts for appliances, plumbing fixtures, electrical work, and similar items. Locate openings accurately and use templates or roughing-in diagrams to produce accurately sized and shaped openings. Sand edges of cutouts to remove splinters and burrs.
- C. Field Jointing: Where possible, make in the same manner as shop jointing, using dowels, splines, adhesives, and fasteners recommended by manufacturer. Prepare edges to be joined in shop so Project-site processing of top and edge surfaces is not required. Locate field joints where shown on Shop Drawings.
 - 1. Secure field joints in countertops with concealed clamping devices located within 6 inches of front and back edges and at intervals not exceeding 24 inches. Tighten according to manufacturer's written instructions to exert a constant, heavy-clamping pressure at joints.
- D. Scribe and cut countertops to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.
- E. Fire-Retardant-Treated Wood: Handle, store, and install fire-retardant-treated wood to comply with chemical-treatment manufacturer's written instructions, including those for adhesives used to install woodwork.
- F. Countertop Installation: Anchor securely by screwing through corner blocks of base cabinets or other supports into underside of countertop.
 - 1. Install countertops level and true in line. Use concealed shims as required to maintain not more than a 1/8-inch-in-96-inches variation from a straight, level plane.
 - 2. Secure backsplashes to tops with concealed metal brackets at 16 inches o.c. and to walls with adhesive.
 - 3. Seal joints between countertop and backsplash, if any, and joints where countertop and backsplash abut walls with mildew-resistant silicone sealant or another permanently elastic sealing compound recommended by countertop material manufacturer.

3.3 ADJUSTING AND CLEANING

- A. Repair damaged and defective countertops, where possible, to eliminate functional and visual defects. Where not possible to repair, replace countertops. Adjust joinery for uniform appearance.
- B. Clean countertops on exposed and semiexposed surfaces.
- C. Protection: Provide Kraft paper or other suitable covering over countertop surfaces, taped to underside of countertop at a minimum of 48 inches o.c. Remove protection at Substantial Completion.

END OF SECTION 12 36 23.13

WAC LIGHTING

7"/11"/15" Round Ceiling and Wall Mount

Fixture Type: **CL1**

Catalog Number:

Project:

Location:

Model & Size	Color Temp & CRI	Watt	Lumens	Finish
○ FM-07RN 7"	○ 930 3000K - 90	15W	1100	○ BN Brushed Nickel
○ FM-11RN 11"	○ 935 3500K - 90	15W	1100	○ BZ Bronze
○ FM-15RN 15"	○ 930 3000K - 90	20W	1525	○ WT White
	○ 935 3500K - 90	20W	1525	
	○ 930 3000K - 90	28W	2550	
	○ 935 3500K - 90	28W	2550	

Example: FM-07RN-930-BN

DESCRIPTION

Ultra-slim flush mount that uses edge-lit technology and a translucent diffuser for uniform illumination without shadows or hotspots.

FEATURES

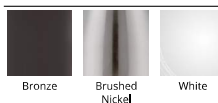
- Multiple LED array for uniform illumination
- Driver installed within the Junction Box, driver dimension: 2.25" Dia x 1" Deep
- 5 year warranty

SPECIFICATIONS

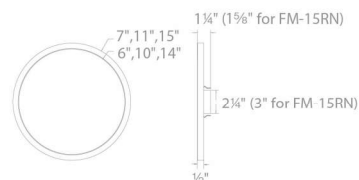
Construction:	Aluminum with translucent diffuser
Power:	20W, 15W, 28W
Input:	120 VAC, 50/60Hz
Dimming:	TRIAC: 100-5%, ELV: 100-5%
Light Source:	Integrated LED
Lens:	Translucent acrylic diffuser
Rated Life:	50000 Hours
Mounting:	Installs over a 3", 4" or 3/0-4/0 hybrid junction box, Can be mounted on ceiling or wall in all orientations
Finish:	Electrostatically Powder Coated White, Electroplated Brushed Nickel, Electrostatically Powder Coated Bronze
Operating Temp:	-4°F to 104°F (-20°C to 40°C)
Standards:	UL, cUL, Damp Location Listed, Energy Star 2.0, Title 24: 2016, ADA



FINISHES



LINE DRAWING



LIGHTOLIER

by **Signify**

Downlighting

SlimSurface LED

S5R, S7R & S10R Round 5", 7" and 10"
Apertures



SlimSurface is a 5/8" thick LED surface mounted luminaire with the appearance of a recessed downlight. Easy to install into most standard j-boxes, the SlimSurface round apertures are available as a 5" 650lm, 7" 1000lm and 10" 2200lm fixture.

Project: _____
Location: _____
Cat.No: _____
Type: **D1**
Lamps: _____ Qty: _____
Notes: _____

Ordering guide

example: S5R830K7AL

Series	CRI	CCT	Lumens	Finish	Dimming
S5R SlimSurface 5" Round	8 80 9 90 ¹	27K 2700K 30K 3000K 35K 3500K 40K 4000K	7 650lm	— White AL Aluminum BK Black W White AL Aluminum BK Black	blank ELV / Triac (120V) Z10U 0-10V (120V-277V)
S7R SlimSurface 7" Round	8 80 9 90 ¹	27K 2700K 30K 3000K 35K 3500K 40K 4000K	10 1000lm	— White AL Aluminum BK Black W White AL Aluminum BK Black	blank ELV / Triac (120V) Z10U 0-10V (120V-277V)
S10R SlimSurface 10" Round ²	8 80 9 90 ¹	27K 2700K 30K 3000K 35K 3500K 40K 4000K	22 2200lm	W White AL Aluminum BK Black MT Metallic	blank ELV / Triac (120V) Z10U 0-10V (120V-277V)

1. Configurations using 90 CRI are only available with 2700K & 3000K CCT.
2. SlimSurface LED 10" round installs into 4-11/16" J-box (not wet location listed).



Features

- Flange:** One piece plastic flange. Injection molded white, applied aluminum or black.
- Lens:** High transmittance lens allowing for smooth, comfortable light pattern.
- Power supply:** Integral class 2 driver. Factory wired electronic LED driver (see Electrical section for specifications)
- LED Strip:** Utilizes LEDs.
- Lifetime:** Expected lifetime 50,000 hours and backed by a 5-year warranty*
- Compliance:** Non-conductive fixture for shower light application (not applicable to metal trim model).

Dimming

Intended for ELV/Triac (120V) or 0-10V dimming (120V-277V) based on the configuration. Min 90°C supply conductors.

Electrical

Electronic power supply: RoHS compliant. Class 2 power unit. Unit tolerates sustained open and short circuit output conditions without damage.

Electrical specifications	Dimming	Input volts	Input frequency	Input current	Input Power	THD Factor	Power Factor	Minimum Operating Temp.
Slim 5" 650lm	Triac	120V	50/60Hz	0.08A	9.5W	<15%	>0.9	-20°C
	0-10V	120V	50/60Hz	0.09A	10.1W	<20%	>0.9	-20°C
		277V	50/60Hz	0.04A	10.2W	<20%	>0.9	-20°C
Slim 7" 1000lm	Triac	120V	50/60Hz	0.13A	14.2W	<15%	>0.9	-20°C
	0-10V	120V	50/60Hz	0.12A	14.4W	<20%	>0.9	-20°C
		277V	50/60Hz	0.06A	14.7W	<20%	>0.9	-20°C
Slim 10" 2200lm	Triac	120V	50/60Hz	0.20A	23.2W	<20%	>0.9	-20°C
	0-10V	120V	50/60Hz	0.20A	23.2W	<10%	>0.95	-20°C
		277V	50/60Hz	0.09A	24.6W	<15%	>0.95	-20°C

For more details, please see LED-DIM-DL spec sheet.

* See Philips.com/warranties for warranty details.

Labels

cULus listed. ENERGY STAR® certified. All models are damp location rated for walls or ceilings. The 5" & 7" are suitable for ceiling mount wet locations when installed per instructions.



TYPE D1

S5R, S7R & S10R SlimSurface LED

Round 5", 7" and 10" Apertures

Compatibility

Installs into standard J-box applications for 5" & 7" models (for 10" model fixture install into 4-11/16" J-box):



3 1/2" round (plastic)



4" square (plastic)
Not compatible with S5R



4" octagonal (metal)



4" square (metal)
Not compatible with S5R



4 11/16" square (metal)
Compatible with S10R only

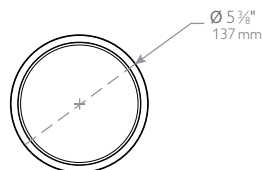
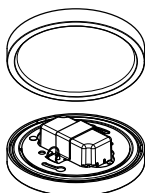
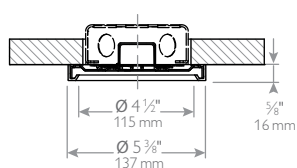


Fire rated J-box
Fire rated classification is per the ceiling and junction box ratings.

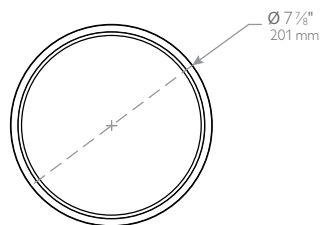
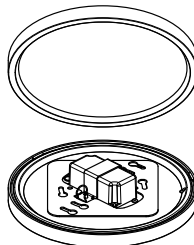
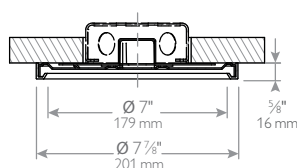
Note: A 2 1/8" deep octagon junction box is recommended for through circuit wiring applications.

Dimensions

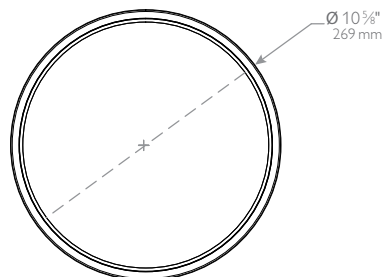
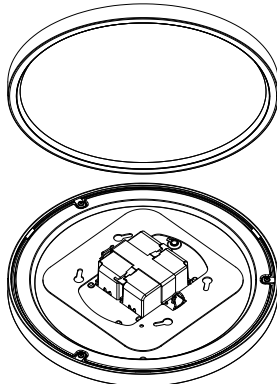
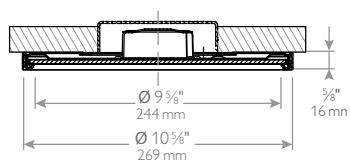
SlimSurface LED 5" downlight



SlimSurface LED 7" downlight



SlimSurface LED 10" downlight



LIGHTOLIER
by  Signify

Downlighting

CorePro LED 4"

CP4 Downlight



Core value LED downlight for new construction and remodel applications that installs in many existing residential and commercial applications.

Project: _____
Location: _____
Cat.No: _____
Type: **D1**
Lamps: _____ Qty: _____
Notes: _____



Ordering guide

example: CP4RB07830W

Catalog Number	Aperture	CRI	CCT	Lumens	System Watts (Max)	Efficacy (lm/W)	Voltage
CP4RB07830W	4-inch	80	3000K	800lm	11	73	120
CP4RB07930W	4-inch	90	3000K	750lm	11	68	120
CP4RB07840W	4-inch	80	4000K	850lm	11	77	120

Features

- Reflector/Flange:** One piece self flange cast aluminum, powder coated, non yellowing, white baffle and flange.
- Lens:** High transmittance lens allowing for smooth, diffused light pattern.
- Power supply:** Class 2 driver. Factory wired electronic LED driver (see Electrical section for specifications).
- LED board:** Light emitted source.
- Friction spring:** Stainless steel.
- Power connection:** Trim features quick connect plug installed as standard installation into CP4RN and CP4RR housings with mating connector. Trim ships with a medium base socket adapter whip for installation into 4" incandescent housings with medium base sockets.
- Lifetime:** Expected lifetime 50,000 hours and backed by a 5-year warranty (see Philips.com/warranties for details).

Electrical

Electronic power supply: RoHS compliant* Class 2 power unit for use in a dry and damp locations. Complies with FCC.

Dimming: All luminaires are intended for use with TRIAC type dimmers. Go to <http://www.lightolier.com/MKACatpdfs/LED-DIM.PDF> for the latest dimming switch capability information. 10%-100% dimming range.

Lumen Output	Input Voltage	Input Frequency	Max. Input Current	Max. Input Power	Max THD	Power Factor	Min. Temp. Operating
800lm	120V	50/60Hz	0.09A	11W	< 30%	> .9	-20° C

Performance data based on 80 CRI 3000K.

* Restrictions on Hazardous Substances (RoHS) is a European directive (2002/95/EC) designed to limit the content of 6 substances [lead, mercury, cadmium, hexavalent chromium, polybrominated biphenyls (PBB), and polybrominated diphenyl ethers (PBDE)] in electrical and electronic products. For products used in North America compliance to RoHS is voluntary and self-certified.

Labels

cULus listed for **wet locations**.
Energy Star certified.

Title 24 Certified to meet high efficiency requirements; 90 CRI configuration only.

CP4 CorePro LED 4"

Downlight

CP4RN: 4" IC/Airseal frame-in kit housing

Housing - Constructed of formed aluminum. For use in direct contact with thermal insulation. Adjusts vertically in plaster frame to accommodate ceilings 1/2" to 1-1/2" thick. Ceiling opening 4 1/2".

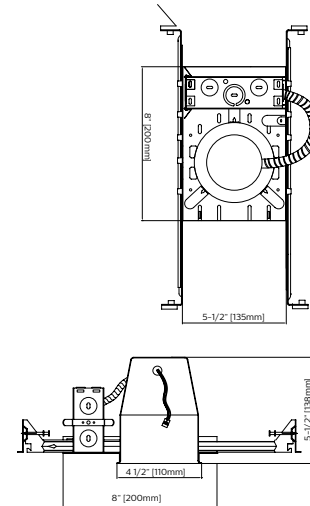
Electrical Connection - LED quick-connect adapter

Junction Box - galvanized steel with two snap-on covers and grounding pigtail. Knockouts for 1/2" & 3/4" conduit and Romex knockouts with strain relief

Bar Hangers: Pre-installed pre-nailed style bar hangers telescope from 16" to 24". Vertical design of interlocking bar hangers prevents sagging even at full 24" extension. Style bar hangers may be used on either long or short axis of housing.

IC frame-in Kit - Housing is cULus Listed for direct contact with thermal insulation cULus Listed for Damp Locations and Through Branch Wiring, 4 in/4 out.

AirSeal™: Fixture is AirSeal™ rated according to ASTM E283 to no more than 2.0 cubic feet of air per minute at 75 pascals. Fixture meets Washington State Energy Code and Energy Conservation Code.



CP4RR: 4" IC/Airseal Remodeler Housing

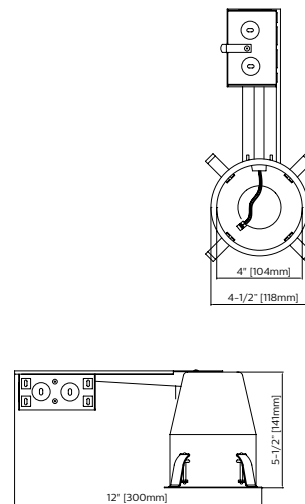
Housing - Constructed of formed aluminum. Adjusts vertically in plaster frame to accommodate ceilings 1/2" to 1-1/4" thick. Housing can be pulled through plaster frame for access to junction box. Ceiling opening of 4-1/2".

Electrical Connection - LED quick-connect adapter

Junction Box - galvanized steel with two snap-on covers and grounding pigtail. Knockouts for 1/2" & 3/4" conduit and Romex knockouts with strain relief

IC Frame-in Kit - Housing is cULus Listed for direct contact with thermal insulation cULus Listed for Damp Locations and Through Branch Wiring, 4 in/4 out.

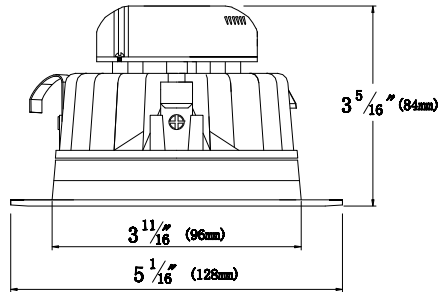
AirSeal™: Fixture is AirSeal™ rated according to ASTM E283 to no more than 2.0 cubic feet of air per minute at 75 pascals. Fixture meets Washington State Energy Code and Energy Conservation Code.



CP4 CorePro LED 4"

Downlight

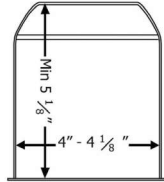
Dimensions



E26 Compatibility*

Manufacturer	Model
Philips	CP4RN, CP4RR, FDIC4V50, P4, P4R, P4ASIC, P4GU, P4RGU, R4, RR4, R4ASICG,
Halo	H991CAT, H99T, H99RT,
Seagull	1179, 1105
All-Pro	E1400ATSB

* Any other luminaires meeting these dimensions as shown are also compatible.



4\" unit shown with standard (E26) adapter to fit medium base sockets

CP4RN: IC c/w LED Connector
New Construction Housing



CP4RR: IC c/w LED Connector
Remodeler Housing

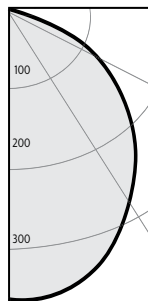


CP4 CorePro LED 4"

Downlight

CP4RB07830W

Candela Curves



Report: BTS165311

Output lumens:	806.9 lms	Efficacy:	75.4 lm/w
Input Watts:	10.7W	CCT:	3000K
Spacing Criterion:	1.2	CRI:	>80

Angle	Mean CP	Lumens
0	343	32
5	342	
10	338	
15	329	91
20	316	
25	301	134
30	282	
35	261	157
40	239	
45	214	155
50	186	
55	156	127
60	125	
65	93	79
70	63	
75	34	27
80	13	
85	5	4
90	0	

Single unit data

Height to Lighted Plane	Initial center beam foot-candles	Beam dia. (ft)*
5'	14	6.0
6'	10	7.2
7'	7	8.4
8'	5	9.6
9'	4	10.8

* Beam diameter is where foot-candles drop to 50% of maximum.

Multiple unit data - RCR 2

Spacing on center	Initial center beam foot-candles	Watts per sq.ft.
33.6	0.47	0.55
22.1	0.31	0.36
15.8	0.22	0.26
13.1	0.19	0.21
10.5	0.15	0.17

38"x38"x10" Room, Workplane 2.5' above floor, 80/50/20% Reflectances

Coefficients of utilization

Ceiling	80%				70%				50%				30%				0%
Wall	70	50	30	10	50	10	50	10	50	10	50	10	50	10	50	10	0
RCR	Zonal cavity method - Effective floor reflectance = 20%																
Room Cavity Ratio	0	119	119	119	119	116	116	111	111	106	106	100	100	106	106	100	0
	1	110	106	102	99	104	97	100	94	96	91	87	87	96	91	87	
	2	101	94	88	82	92	81	88	80	85	78	74	74	85	78	74	
	3	93	83	76	70	82	69	79	68	76	67	63	63	76	67	63	
	4	85	74	66	60	73	59	70	58	68	58	55	55	68	58	55	
	5	79	67	58	52	65	52	63	51	61	50	48	48	61	50	48	
	6	73	60	52	46	59	45	57	45	56	45	42	42	56	45	42	
	7	68	55	46	40	54	40	52	40	51	40	38	38	51	40	38	
	8	63	50	42	36	49	36	48	36	47	36	34	34	47	36	34	
	9	59	46	38	33	45	33	44	33	43	32	30	30	43	32	30	
	10	55	43	35	30	42	30	41	30	40	29	28	28	40	29	28	

Zonal lumens & percentages

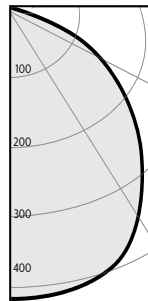
Zone	Lumens	%Luminaire
0-30	258	31.9%
0-40	414	51.3%
0-60	696	86.3%
0-90	807	100.0%

Adjustment factors

Color temperature (CCT)
4000K = 105%

CP4RB07930W

Candela Curves



Report: BTS165312

Output lumens:	742.7 lms	Efficacy:	68.8 lm/w
Input Watts:	10.8W	CCT:	3000K
Spacing Criterion:	1.1	CRI:	>90

Angle	Mean CP	Lumens
0	377	35
5	370	
10	358	
15	340	98
20	317	
25	289	140
30	259	
35	228	154
40	195	
45	160	139
50	125	
55	92	100
60	64	
65	40	54
70	22	
75	10	18
80	4	
85	1	3
90	0	

Single unit data

Height to Lighted Plane	Initial center beam foot-candles	Beam dia. (ft)*
5'	15	5.5
6'	10	6.6
7'	8	7.7
8'	6	8.8
9'	5	9.9

* Beam diameter is where foot-candles drop to 50% of maximum.

Multiple unit data - RCR 2

Spacing on center	Initial center beam foot-candles	Watts per sq.ft.
5'	33.6	0.47
6'	22.1	0.31
7'	15.8	0.22
8'	13.1	0.19
9'	10.5	0.15

38"x38"x10" Room, Workplane 2.5' above floor, 80/50/20% Reflectances

Coefficients of utilization

Ceiling	80%				70%				50%				30%				0%
Wall	70	50	30	10	50	10	50	10	50	10	50	10	50	10	50	10	0
RCR	Zonal cavity method - Effective floor reflectance = 20%																
Room Cavity Ratio	0	119	119	119	119	116	116	111	111	106	106	100	100	106	106	100	0
	1	111	107	103	100	105	99	100	96	97	93	88	88	97	93	88	
	2	102	95	90	85	94	84	90	82	87	80	76	76	87	80	76	
	3	94	85	78	73	84	72	81	71	78	70	66	66	78	70	66	
	4	87	77	69	63	75	63	73	62	71	61	58	58	71	61	58	
	5	81	69	61	55	68	55	66	55	64	54	52	52	64	54	52	
	6	75	63	55	49	62	49	60	49	59	48	46	46	59	48	46	
	7	70	58	50	44	57	44	55	44	54	43	41	41	54	43	41	
	8	65	53	45	40	52	40	51	39	50	39	37	37	50	39	37	
	9	61	49	41	36	48	36	47	36	46	36	34	34	46	36	34	
	10	58	45	38	33	45	33	44	33	43	33	31	31	43	33	31	

Zonal lumens & percentages

Zone	Lumens	%Luminaire
0-30	274	36.9%
0-40	428	57.6%
0-60	667	89.8%
0-90	743	100.0%

1. Correlated Color Temperature within specs as defined in ANSI_NEMA_ANSI C78.377-2008: Specifications for the Chromaticity of Solid State Lighting Products.

2. Wattage: controlled to within 5%

3. Tested using absolute photometry as specified in LM79: IESNA Approved Method for the Electrical and Photometric Measurements of Solid-State Lighting Products.



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Telephone 855-486-2216

Signify Canada Ltd.
281 Hillmount Road,
Markham, ON, Canada L6C 2S3
Telephone 800-668-9008



Available: 12

— 1 +

♥ Add To Wish List

Add to Cart



PRODUCT DETAILS

A classic country lighting fixture designed to illuminate your bathroom with the ease and charm of days gone by. With a handpainted and slightly distressed wooden back, this wonderful vanity light is sure to compliment your decor.

Direct wired with four E12/Candelabra sockets, 60 watts max. per arm. Black over Red body color. Textured black arms with crimped pans. Handcrafted in Pennsylvania. This vanity light is UL-CUL listed and has a 5 year guarantee.

- Measures 9-Inches high and 24-Inches wide and 8.5-Inches deep
- Direct hardwire; 4 E12/Candelabra sockets, 4 x 60 watts maximum wattage
- UL-CUL listed for dry locations
- Textured black over red painted finish and textured arms with crimped pans
- Made in the USA

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Available: 13

— 1 +

♥ Add To Wish List

Add to Cart



PRODUCT DETAILS

Beautiful in its simplicity, the warm glow of our sconces provide a hearty country welcome to every room in your home from entryway to family room. A versatile decorating accessory, it is perfect either alone on a wall or as part of a wall grouping.

Direct wired with two E12/Candelabra sockets, 60 watts max. per socket. Country Tin finish. Handcrafted in Pennsylvania. This light is UL-CUL listed and has a 5 year guarantee.

- Measures 11-Inches high and 6-Inches wide and 3.25-Inches deep
- Direct hardwire; 2 E12/Candelabra sockets, 2 x 60 watts maximum wattage
- UL-CUL listed for dry locations
- Made in the USA

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RPR.10.18.18

CONSTRUCTION

- Ultra Slim diecast aluminum LED emergency exit lighting system; the wall mount profile is 1/2" above the surface.
- The diecast outer housing contains a closely fitted acrylic lens. An LED array is recessed into the housing. The assembly is extremely rugged and can withstand severe impact and vibration without damage.
- For even further protection, clear polycarbonate security covers are available.



ELECTRONICS

- Universal 120/ 277 VAC input for standard battery or AC unit, or 12- 24 VDC input for remote configuration with Central Battery System.
- Remotes may be connected to one of the following:
 - Series CBL or CBM UNIVERSAL CENTRAL BATTERY SYSTEM
 - Series MTL MASTER-REMOTE SYSTEM
- Power supply is surge and spike protected, with a low voltage disconnect.
- The complete power supply module with optional NICAD battery pack is sealed within a phenolic plastic enclosure, which fits inside a standard 4" square deep J- box. AC and DC wiring is quickly attached with plug connectors.

DIAGNOSTICS OPTION

- In standard battery modes, an advanced microprocessor monitors all charger functions and battery condition continuously and automatically performs all tests and visual indications required by UL Standard 924 and NFPA 101.

CODES

- Manufactured and tested to UL Standard 924. Conforms to NFPA Life Safety Code 101, UBC and NEC.

WARRANTY

- 5 year total customer satisfaction warranty. For details see product catalog technical data section.

U.S. Patent 5, 276, 591

FIXTURE SCHEDULE

MODEL	CATALOG NO
APPROVAL	JOB INFORMATION





Rapier

Die Cast LED Exit Series RPR

RPR.10.18.18

SUGGESTED SPECIFICATIONS:

Supply and install Signtex RAPIER Series LED exit signs, available as unit equipment or as a remote device connected to a central battery power source. The face and housing shall be of diecast aluminum with maximum thickness of 5/8" (single face). Lighting uniformity shall be better than 4:1 when measured over any illuminated area and average brightness will exceed 6 ft Lambert (21 Cd/m2). Life expectancy of the LEDs shall be in excess of 20 years. The power supply and charger shall be an isolated digital type with regulated current and voltage output to the lamp load and batteries (emergency models). AC supply shall be universal 120/277 VAC input via two-wire feed. One standard power supply shall be capable of driving up to 5 single face remote signs in addition to the master, with emergency operation at least 90 minutes for each sign. Battery charge time to restore full capacity after discharge shall be less than 24 hours.

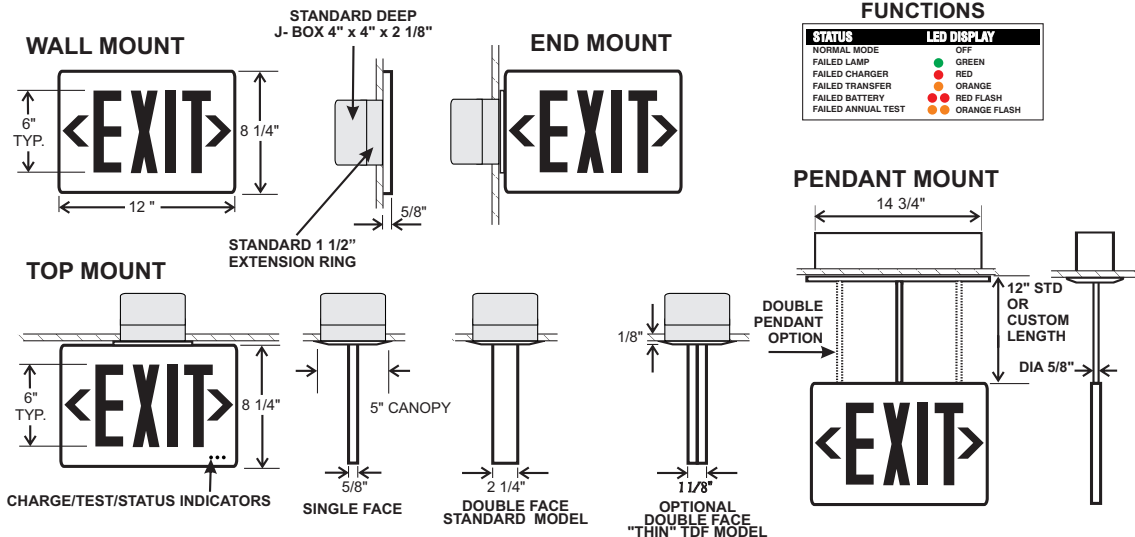
OPTIONS:

Damp Location DP
Battery Diagnostics DG
Dual AC Input (120 VAC) DAC
End Mount (Left/ Right) LE/ RE
Polycarbonate Security Cover PSR*
Polycarbonate Face
Single Face PF1*
Double Face PF2*
Wire Guard WG
Pendant MT 12" PEN
Thin Double Face TDF
Recessed Mount REC
Satin Black B
Satin Bronze BZ
*See data sheet Series PSR
For other Custom Colors Contact Factory

CODE

NOTE: PRE- INSTALL 4" X 4" X 2 1/8" DEEP J- BOX WITH 1 1/2" EXTENSION RING FOR BB & NB MODELS

MOUNTING DATA & DIMENSIONS:



ORDERING INFORMATION: EXAMPLE: RPRBB1GW-TW-DG

MODEL SERIES	OPERATION	NO. of FACES	LETTER COLOR	FACE COLOR	MOUNT	OPTIONS
RPR=THIN PROFILE DIECAST	BB= Battery Backup NB= No Battery (Ac Only) REC=Remote w/ Central Battery System REM=Remote w/ Master Remote System	1= SINGLE 2= DOUBLE	R=RED G=GREEN	BA=BRUSHED ALUMINUM W= WHITE FOR CUSTOM COLORS CONTACT FACTORY	TW=UNIVERSAL TOP OR WALL	SEE LIST ABOVE

Emergency Power Rating:
Single Face: 2 Watts
Double Face: 4 Watts

Signtex Inc
LIGHTING
220 VFW Avenue, Grasonville, MD 21638
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sales@signtexinc.com www.signtexinc.com

DISTRIBUTOR:

Specifications and Dimensions subject to change without notice.