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HARDLINES DESIGN COMPANY
Architecture·Cultural Resources Management·Planning

Moisture Assessment
Canal Fulton Public Library

154 MARKET STREET NE
CANAL FULTON, OH 44614

SEPTEMBER 3, 2013



September 3, 2013

Moisture Assessment
Canal Fulton Public Library

154 Market Street NE
Canal Fulton, OH 44614

SUBMITTED BY
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ARCHITECTURE
CULTURAL RESOURCES MANAGEMENT
PLANNING

SUBMITTED TO
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HDC 1271

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OHIO HISTORY

With the support of the
U.S. Department of the Interior's
Historic Preservation Fund
and the
Ohio Historic Preservation Office
of the Ohio Historical Society

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Cover Photograph	Canal Fulton Public Library, view of southeast corner. Photograph by Charissa Durst, Hardlines Design Company, March 2013.

ABSTRACT

The Canal Fulton Library occupies a split-level structure consisting of multiple additions that has been renovated into a single complex. The original building was constructed in 1879 as a residence known as the Sullivan-Held House. The library moved into the house in 1949 and constructed an addition in 1958. The library is a contributing element of the Canal Fulton Historic District, which was listed in the National Register of Historic Places on December 2, 1982. In 1992, the library constructed a second addition and in 2003 underwent a complete renovation along with the construction of a third addition.

The building has been experiencing water infiltration in various locations resulting in deterioration of interior finishes and a "musty" smell emanating from the basement level to the first floor level. The frequency and extent of moisture infiltration is causing nuisances and often disrupts operations of the facility.

Hardlines Design Company was commissioned to perform an investigative assessment of the complex's exterior barrier envelope. The purpose of the assessment was to identify deficiencies that cause moisture intrusion through the building's exterior envelope and to provide corrective recommendations (with cost estimates) that comply with the Secretary of the Interior's Standards for Rehabilitation.

Exterior envelope deficiencies were observed in the original 1879 building as well as the 1992 and 2003 additions. Damage to the building is minor but the reoccurrence of moisture intrusion continues to damage interior ceiling, wall, and resilient floor finishes. All of the moisture infiltration has occurred in useable space within the building except at the unfinished basement level.

Roofing deficiencies are causing problems to 540 square feet of the overall roof with failed protective paint coatings affecting 2,805 square feet of exterior wood siding on the original building. Repair/replacement of the damaged areas, including remedial work in the basement not related to moisture damage, is estimated at **$50,564.00**. Corrective actions should be implemented in phases to minimally impact the use of the facility. Implementation should be based on severity and potential to damage other building components. Upon completion, the exterior envelope will be restored to a manageable condition requiring normal periodic maintenance.

At the Library's request, a more substantial project to replace deteriorated areas to minimize future maintenance, including remedial work in the basement not related to moisture damage, is estimated at **$69,687.00**. However, this work does not meet the Secretary of the Interior's Standards for Rehabilitation and is not recommended.

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ASSESSMENT OF EXISTING CONDITIONS

The original two and a half story structure is an Italianate style house known as the "Sullivan-Held House" constructed in 1879 in a T-shaped configuration with the long axis running east to west and short leg running north to south. Between 1879 and 1890 flat roof additions were constructed on the north and south sides, which modified the footprint into an L-shaped configuration.

After the residence was donated for use as a public library in 1949, a series of additions and renovations were constructed in 1958, 1992, and 2003. The additions each extended the residence further to the west, creating a long and linear structure.

The original portion of the building has conventional 19th century residential construction consisting of balloon-framed wood studs, floor joists, and roof rafters. Its foundation and footing are composed of Ohio limestone. The recent additions feature light commercial construction consisting of concrete floor slabs on metal decking supported by steel beams with exterior walls and roofs constructed with wood studs and rafters.

The exterior envelope includes painted wood lap siding, pre-finished standing seam steel metal roofing, architectural dimensional asphalt shingles, and single-ply elastomeric roofing.

The assessment process included review of pertinent design construction drawings, interviews with building staff, visual inspection of the exterior envelope and building interior, and minor destructive physical evaluations. Construction drawings of the 1992 and 2003 additions were provided by Marsha Wagner, the director of the library. Ms. Wagner also provided a tour of the building interior and a history of the construction additions that occurred in 1992 and 2003. She also identified locations that have experienced water leaks and musty odors.

Library staff identified evidence of moisture penetration at four (4) locations within the building. Water infiltration was not constant but occurred several times per year. These locations consisted of: (1) interior face of the north wall near the window on the main floor level of the original residence; (2) ceiling near the Circulation Counter of the 2003 addition; (3) gypsum board ceiling in the Passage Hall above the opening between the original residence and the 2003 addition; and (4) wall surface near the arched window on the south exterior wall of the 2003 addition.

Of the four areas, two are not related to moisture at this time. Area (1) no longer appears to be a moisture problem, as repair of a window sill seems to have resolved it. The crack at Area (4) appears to have been caused be settling, not moisture penetration. The problems at the remaining two areas are caused by improper roof design and/or installation of the 1992 and 2003 additions, both of which can be repaired.

The musty smell experienced at the main floor of the original residence is likely due to moisture penetration at the stone basement walls below. The basement space vents directly to the main floor and any musty smell in the basement would emanate through the vents.

Visual inspection of the building's exterior was conducted on the various roof levels and at ground level using ladders. Inspections of the interior were performed on each floor level including the basement level. Minor destructive investigations were performed on the roofing systems and exterior protective paint coatings. Moisture readings of the wood siding on the original building were taken on July 12, 2013, on each elevation.

Minor destructive inspections consisted of pull tests, roofing core examination, and assessing the concealed fasteners of shingle roofing system. Pull tests consist of testing the single-ply roofing lap seams. Cores were taken of the single-ply membrane and its substrate. The shingle concealed fasteners and underlayment were inspected using a "slate ripper" tool.

Roof and Roofing Systems

The building contains a variety of roof types, including: (1) hip roofs with standing seam metal roofing system; (2) gable roofs with architectural dimensional asphalt shingles; and (3) low slope (flat) roofs with single-ply elastomeric non-reinforced Ethylene Poly Diene Monomer (EPDM) membrane roofing.

Standing seam metal roofing is located on hip roofs of the original residence and the clerestory of the 2003 addition. Architectural dimensional asphalt shingles are present on gable roofs of the 1992 and 1958 Additions. Single-ply EPDM membrane roofing system is on the low-slope roof portions of the original residence and the 2003 addition.

The standing seam metal roofing consists of pre-finished galvanized steel panels with double locked seams over a 50-pound asphalt-impregnated underlayment with self-adhered elastomeric membrane ice dams at roof eaves, hips and ridges. The roof drainage system consists of a perimeter built-in gutter and external downspouts draining into the storm sewer and adjacent low-slope roofs. Stains at the built-in gutters are from the external fasteners and are not the result of overflowing. The gutters sit over interior space and there is no evidence of water damage at these locations inside the building. The standing seam roofing and drainage system is in good condition having 20 years of remaining life expectancy.

The architectural dimensional asphalt shingle roofing system is complete with 15-pound asphalt impregnated underlayment and self-adhered elastomeric membrane ice dams installed at roof eaves and rakes. The roof drainage consists of external and built-in gutters and external downspouts. External pre-finished aluminum gutters with downspouts were installed at the 1958 addition while built-in gutters with external downspouts were installed in the 1992 addition. All of the downspouts are connected to the site's storm sewer system. The roofing system is in good condition except for the insufficient flashing at the eave of the northernmost valley. The absence of flashing in this location is causing the leak near the arched window on the south wall in the 1992 addition. The remaining life expectancy of the roofing and drainage system is approximately 10 years.

The low-slope portions of the original residential roof are single-ply EPDM with granular surfacing. The single-ply EPDM membrane roofing system is a fully adhered system where the membrane is secured to 3/4-inch thick mineral composition board insulation. The board insulation is mechanically fastened to the plywood roof deck using screws with 2-inch diameter metal disk. Roof drainage consists of built-in gutters and external downspouts that

drain into the site's storm sewer. The built-in gutter lining was replaced with welded stainless steel lining in 2003. The roofing system and its drainage system are in good condition having approximately 10 years of remaining life expectancy.

The low-slope portion of the 2003 addition has single-ply EPDM non-reinforced membrane. The roof drainage system is comprised of 3-inch internal drain and 3-inch overflow drain. This roofing system has a variety of problems that have resulted in water infiltration. Water leaks have been experienced in the Circulation Room and Passage Hall. The problems associated with this roofing system are due to to inferior roof and roofing system installation and improper selection of roof drains.

The deficiencies with the roofing system include: (1) poor design configuration; (2) poor roof drain and overflow drain selection and locations; (3) improper membrane seam lap installation; and; (4) improper intersection of single-ply EPDM membrane with asphalt shingle roofing systems.

The design of the roof slope and drainage flow configuration is insufficient to direct water to the roof and overflow drains. The tapered roof sheathing should be placed so that the roof drainage does not come into contact with exterior walls.

The tapered sheathing needs to be directed away from the clerestory's exterior walls and the "saddle" needs to extend further out onto the low-slope roof. In *Figure 1* the yellow line represents the present lowest point of the roof. Arrows represent the slope of the roof created by the roof structure.



Figure 1. Insufficient roof slope and saddle; yellow line represents lowest point on roof

The roof and overflow drains are improper for this type of roof design and were also installed incorrectly. The drains were installed too high off the roofing surfaces and the clamping ring is too high. The roof drains and overflow drains should be slightly recessed into the roof sheathing allowing unobstructed flow into the drains. *Figure 2* illustrates clamping rings obstructing all water to drain.

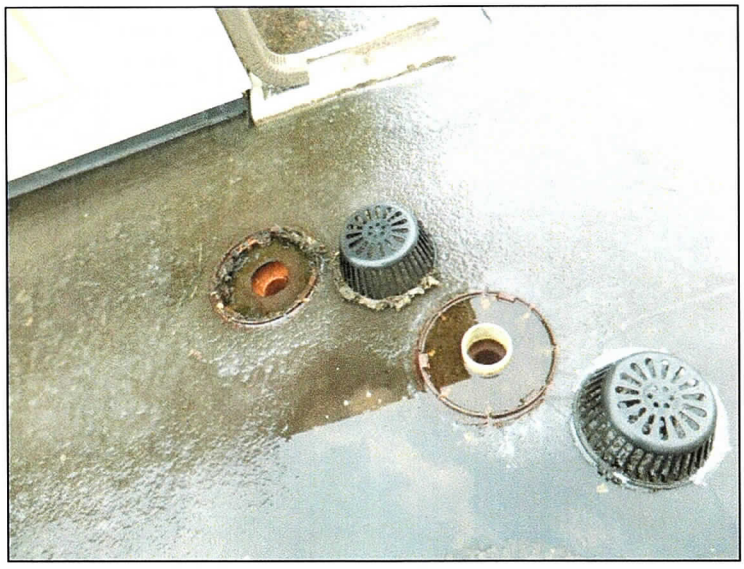


Figure 2. Improper roof drain and overflow drain; clamping ring preventing complete drainage

Failed lap seams of the roofing membrane are directly contributing to the leak in the Circulation Room. Pull tests were performed on the lap joints of the roofing membrane. *Figure 3* provides an example of failed roof membrane lap joint. Seams near the large rooftop mechanical unit failed under normal hand pressure. Additional pull tests revealed that the seams located in the area where water is ponding are failing as well. The membrane roofing seams where drainage is adequate is in good condition.

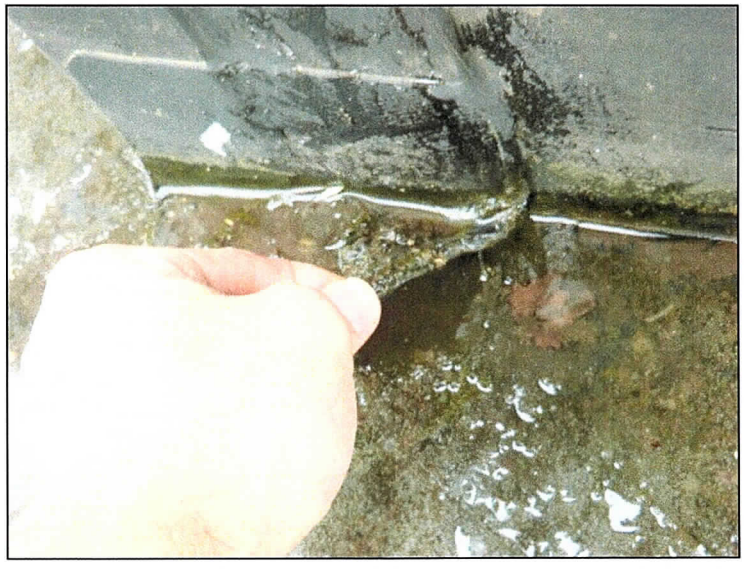


Figure 3. Failed Roof Membrane Lap Seam; by normal hand pressure lap joint at the rooftop mechanical unit could be pulled apart.

The single-ply EPDM membrane was installed incorrectly where it intersects with the shingle roof. The EPDM membrane was installed over a first row of shingles and under the second row but not under the underlayment. The single-ply membrane installed over the shingle roofing underlayment presents the potential for moisture intrusion. When condensation develops between the two roofing systems water will flow underneath the single-ply EPDM membrane and into the building interior. *Figure 4* shows the single-ply membrane overlapping a row of shingles.



Figure 4. The first row of shingles is telegraphing through the single-ply EPDM membrane

The condition of the roof plywood sheathing was found to be in satisfactory condition with the exception of water staining at near the rooftop mechanical unit. The single-ply EPDM membrane base flashing seams had failed, allowing moisture to infiltrate into the building interior. Intrusion of water will continue and escalate due to these numerous problems of the single-ply EPDM membrane and its drainage system deficiencies.

The roof plan provided as *Figure 5* illustrates the size and location of the original residence and the subsequent building additions by a dotted line. Each roofing system is identified along with the direction of slope and pitches. The yellow dots represent the locations of moisture issues identified by library staff. The bubbled area on the low-slope roof of the 2009 addition indicates the extent of water ponding. A larger size plan is Appendix A.

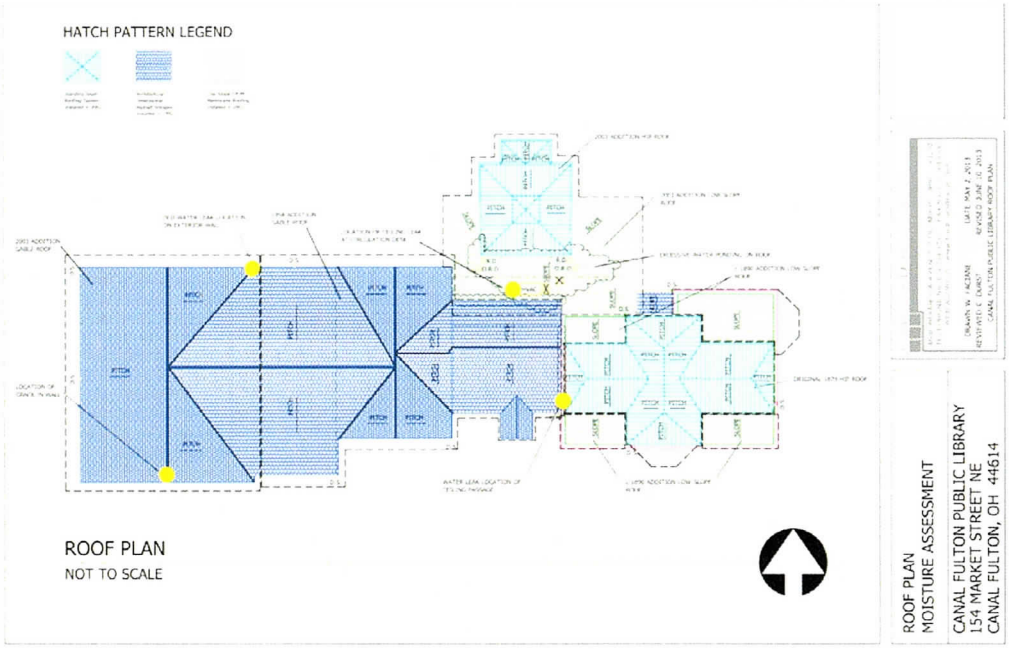


Figure 5. Existing Roof Plan

Exterior Painted Wood Siding

The exterior walls of the entire building are clad in painted wood lap siding of variable exposures. The original residence portion of the building has a 4-inch exposure and the 1958, 1992 and 2003 additions have 5-inch exposures. The siding on the original residence appears to have been replaced sometime after 1882, as shown in a historic photograph on the Canal Fulton Library Flickr site (see *Figure 6*) that shows 15 exposed boards between the first floor and second floor bay windows where there are only 12 exposed boards today (see *Figure 7*). The remaining wood siding dates from the construction of the additions.

The wood species of the exterior construction components include yellow pine wood siding with vertical grain (also called edge-grain) with Douglas fir used for exterior trim. White Oak is used in cornice and window surrounds and Douglas Fir for flat soffit boards, external and internal corner boards, and window and door casings. Exterior wood stairs and railings are yellow pine. All wood surfaces are painted (see *Figure 8*)and some of the earlier paint layers are presumed to be lead-based paint.

The wood siding on the original residence does have an asphalt impregnated felt vapor barrier. The felt is in brittle condition and its properties to resist vapor transmission is not considered dependable. Although not critical at this time, the replacement of the vapor barrier should be a planned maintenance item for the near future. The diagonal wood substrate and wood stud framing are in fair condition. The wood siding on the remainder of the building is in good condition, with an intact vapor barrier and sheathing substrate. Overall, the wood siding is in good condition; the paint system at the original residence is in poor condition but in good condition at the additions.

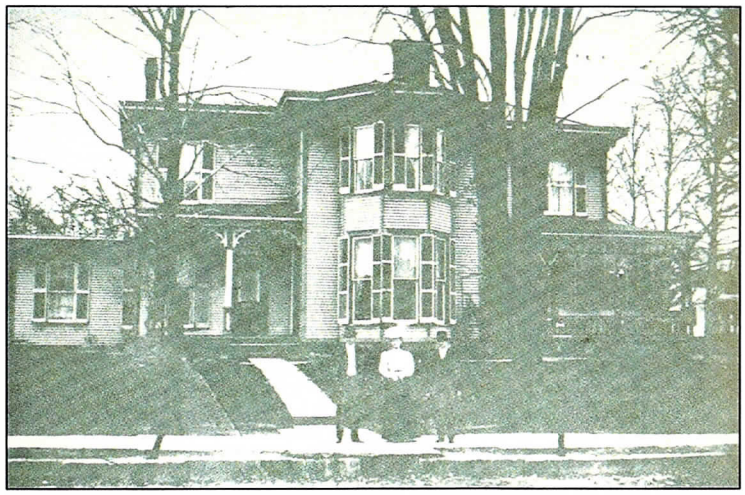


Figure 6. Photograph of the south elevation, c. 1882.



Figure 7. Photograph of the south elevation, 2013.



Figure 8. Typical paint conditions, south elevation.

The wood siding on the original residence where it abuts the shingle roofing on the 1992 addition needs attention. The wood siding is in direct contact with the shingle roof surface; the untreated surfaces of the wood siding can absorb moisture, which causes premature deterioration. *Figure 9* shows the wood siding in contact with the shingle roof. This condition is not causing any moisture penetration, but it is accelerating the deterioration of the wood siding.



Figure 9. Wood siding in contact with shingle roofing

The most recent paint finishes consist of an intermediate and finish coat of exterior grade latex paint. No primer was detected in samples of the paint system and the butt joints were not treated with primer or sealant. The paint system on the original residence portion of the building is problematic and the remainder of the building is in fair condition.

The paint finish on the original residence has widespread peeling, cracking, blistering, alligatoring and loss of adhesion due to multiple layers of old paint, improper surface preparation, incompatibility between existing and new paint coatings, and absence of a primer paint coating. Also, the most recent paint coating is over five years old and has surpassed its intended life expectancy.

Multiple Paint Layers

Upon microscope examination of the paint chips removed from the original residence and discounting the two top paint layers, a total of eleven to fifteen layers of paint exist. As a result, it is presumed that the earlier layers consist of lead-based paint. Protective paint coatings should be elastic and breathable so they allow vapor absorbed into the wood to evaporate without damaging the waterproofing properties of the paint. Typically, after a surface has been painted four times, the previous layers should be removed back to bare wood and primed before being painted again. More than four layers results in paint that is too thick to be able to evaporate vapor out of the wood.

The moisture content of the wood was measured with a Tramex non-destructive moisture detector calibrated for wood and timber. The readings were taken on July 12, 2013, between 10:30 AM and 11:00 AM under sunny conditions with a temperature of 72 degrees F at 50% humidity. Generally, moisture content of 10% to 15% is considered normal, depending on humidity levels. Moisture of content in excess of 23% to 25% is susceptible to rot. Moisture content in excess of 18% to 20% can support mold/biological growth and may provide an environment for wood-boring insects to thrive. The readings show that only the north elevation can be considered normal, and this may be because it faces the parking lot with minimal shading obstructions and alterations. *Table 1* lists the moisture content readings:

Location	Percentage	Notes
North elevation	12%	
East elevation main wall	10%	
East elevation bay - north	10%	
East elevation bay - east	20%	
East elevation bay - south	Over 30%	May be due to fire department connection
South elevation column	Over 30%	
South elevation west of bay	30%	
South elevation east of bay	14%	
South elevation bay - west	Over 30%	
South elevation bay - south	Over 30%	
South elevation bay - east	16%	
South elevation under stair	8%	
West elevation second floor	Over 30%	Where siding is in contact with roof

Table 1. Moisture content readings of wood siding on original portion of building

Visual examination of the paint system over the exterior wood siding, trim work, and cornice revealed that areas where *multiple layers of paint* exist have lost their waterproofing protection properties. Excessive cracking, peeling and loss of adhesion are allowing moisture to come into direct contact with unprotected wood surfaces. When loose paint was removed the wood siding surface was damp but not deteriorated. *Figure 10* shows the older multiple paint coatings reacting to excessive moisture resulting in cracking and alligatoring, which are the advanced stages of crazing. This process has already reached the most advanced stage of deterioration evident by cracking that is horizontal to the grain of the wood siding.



Figure 10. Worst case illustration of paint failure due to multiple layers of aged paint coatings

The 2003 construction drawings did not indicate any paint removal on the original residence. The amount of surfaces having excessive aged paint coatings is approximately 85 percent (85%) of the painted wood surfaces of the original residence portion of the building.

Insufficient Surface Preparation and Paint Incompatibility

Another common cause for paint failure is insufficient surface preparation resulting in intercoat peeling. Intercoat peeling occurs when previously painted surfaces are improperly prepared. If the existing paint coating is not sufficiently clean, the new paint coating will not adhere properly and both the new paint surface and the previous one will peel. Secondary to improper surface preparation would be *paint incompatibility*, typically latex paint used over oil paint. *Figure 8* shows latex paint applied over old, chalky oil paint. The chalky surface is preventing the new latex paint from forming a good adhesive bond.



Figure 11. Intercoat peeling can be seen where the new paint applied over the older causing cracking

Absence of Primer Coat

Where a new paint coating was directly applied to unpainted wood surfaces, a paint primer was not used. Without a primer to provide a base for the subsequent layers of paint, the paint will lose its adhesion properties and fail. The new paint system used was exterior latex.

Age of Underlying Paint Layers

It is evident that the entire paint system for the original residence has reached the most advance stage of deterioration due to age.

Stone Foundation

The foundation of the original residence is constructed of Ohio species limestone that is 16-inches thick. The stone foundation is exposed at the basement level. There were no indications of active water intrusion; however the mortar joints are in friable condition due to moisture damage. There is also some efflorescence on the stone foundation basement walls but only at locations where the mortar is disintegrating. The moisture that is affecting the mortar is ***not*** sufficient to affect the limestone units or its structural integrity. *Figure 12* shows the buildup of efflorescence and moist wall surfaces. During the inspection, a 16-inch metal mortar joint probe was used to rake out the mortar 8-inches deep into the foundation wall. The head and bed mortar joints were found to be less in height revealing that inner wythes of stone were dry-laid, in which stone is directly bearing on stone without the use or mortar. Given the width of the mortar joints and lack of spacers, the interior stone wall is assumed to have always had mortar.

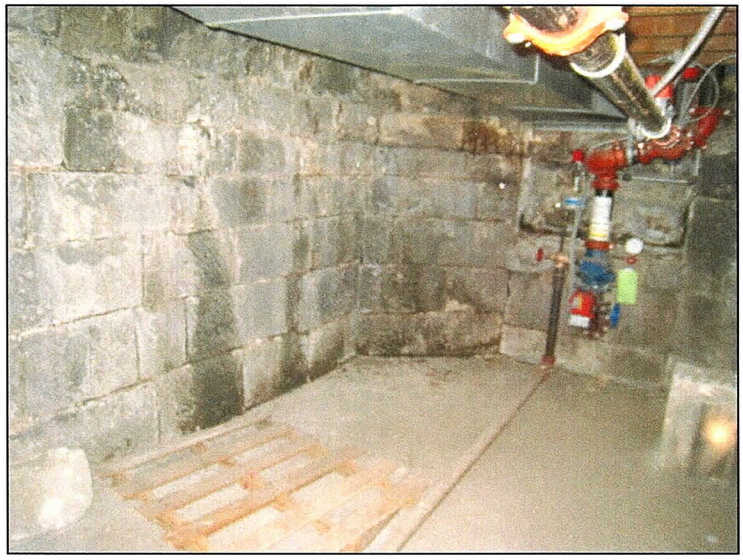


Figure 12. Limestone foundation walls with running bond

Damp mortar joints are probably causing high humidity in the basement level. In addition, humidity from an unconditioned crawl space at the front of the building is likely entering the basement from an opening in the wall. Humidity is currently being controlled by a properly-sized dehumidifier. The air has a slight musty smell that is attributed to the dampness of the walls.

There are no indications that the site is sloping towards the building and downspouts are not directing water along the foundation. The dampness of the south foundation wall may also have been reduced by the removal of a large tree in the past year, exposing this wall to more sunlight. The exterior side of the foundation was not evaluated as excavation was not included in the scope of work. It is unknown if the exterior surfaces have a lime-cement parging, dampproofing, and/or perimeter foundation drain system. There are no construction documents addressing this portion of the basement.

RECOMMENDATIONS

Roof

The single-ply EPDM membrane roofing system on the 2003 addition needs to be removed and replaced, including proper roof drains and overflow drains. The replacement roofing system should be 60 mil single-ply reinforced EPDM membrane with tapered polyisocyanurate insulation. The tapered insulation should be configured to flow water directly to the roof drains without ponding water. The roof drains and overflow drains need to be recessed into the insulation and roof sheathing with each having a sump measuring 2 feet square.

A termination bar with sheet metal termination flashing should be placed where the asphalt shingle roof ends and the membrane roofing terminates at the shingle roof. Walk pads should be placed to create a path to facilitate maintenance of rooftop mechanical units without excessive pressure on the roofing membrane. The roofing system should be a fully adhered system with a 25-Year Full System, No Dollar Limit, Non-Prorated warranty.

The roofing work should be completed first to prevent moisture from continuing to impact the walls and to allow the exterior wall system to dry out before embarking on siding work.

Wood Siding / Paint System

As previously stated, the wood siding is in good condition; it is the condition of the paint finish system that needs attention. The multiple layers of paint on the wood siding of the original residence needs to be removed and replaced. Given the age of the paint layers, it is assumed that lead based paint (LBP) is present without the need for testing, and the multiple paint layers should be removed to bare wood. The paint contractor must following protective paint removal guidelines set by OSHA (Occupational Safety and Health Administration) and U.S. EPA (Environmental Protection Agency). In some situations the contractor must be licensed to remove LBP.

The method of removal would be *thermal* or *chemical* in order achieve total paint removal. Thermal method consists of softening and raising the paint layers by applying heat followed by scraping and sanding and is typically used for large surfaces such as siding. Chemical method consists of softening the paint layers with chemical strippers followed by scraping and sanding and is typically used on small surfaces such as ornate scrollwork and trim.

Chemical removal methods may be preferred for this project as it may not require abatement of LBP the way a heat-based removal would. Abatement is typically required when LBP is sanded, scraped, burned, or otherwise impacted in a way that creates dust. The newer gel products are able to remove the paint in large chunks without creating any dust and can be disposed of without special precautions. Prior to removal, the multiple layers of paint should be examined to determine the history of the paint colors applied over the years. Or, a section of original paint can be left intact for future reference.

Work on the exterior paint finish system should be completed a few months after the roofing work has been completed, to give the exterior wood siding time to dry out. Prior to applying a new paint system, the moisture content of the siding should be tested to ensure that it is dry enough for a good bond.

The new paint system should consist of a primer, intermediate coat, and a finish coat. The National Park Service recommends that primer be an oil-based product. However, this recommendation is dated 1982 and acrylic paint technology has improved significantly. Today, an exterior grade acrylic latex primer is recommended, followed by intermediate and finish coats of exterior acrylic latex paint. Latex primer and paint are the better selections as they will allow any moisture trapped in the wood siding to evaporate, are less expensive products, and takes less time to dry, thereby reducing labor costs.

The wood siding on the original residence exposed to sunlight will require repainting every 3 to 5 years. The shaded sides may go as long as 4 to 20 years before requiring repainting, depending on the quality of the original preparation and finish work. Proper preparation and application under appropriate environmental conditions are key to a quality paint job. The wood siding should be monitored for deterioration that may require replacement with in-kind materials. After the initial paint job, future repainting projects can be phased on an elevation-by-elevation basis.

The siding that is in contact with the asphalt shingle roof should be trimmed so that there is a one-inch clearance between the bottom surface and the shingles. It cannot be more than one inch since the flashing under the siding is only 1.5 inches high. The newly exposed bottom surface of the siding should also be painted.

At the request of the Library, HDC was asked to consider the feasibility of replacing the wood siding with a product that would not require as much maintenance as the periodic repainting of wood siding. HDC considered replacing the wood siding with prefinished fiber cement board siding having a face exposure, profile, texture, and trim details similar to the current wood siding, along with new felt membrane underlayment. It should be noted that the underlayment is redundant to the system and is not needed as long as the siding and paint finish system are maintained in good condition. It should also be noted that replacement of wood siding with a fiber cement product ***does not*** meet the Secretary of the Interior's Standards for Rehabilitation and is not recommended.

In summary, removal of the multiple paint layers and repainting the original wood siding is the recommended action for the walls of the original portion of the Library. Lead paint testing is not needed and, if a gel-based chemical paint removal product is used, lead paint abatement is likely not required.

Stone Foundation

The stone foundation walls are not contributing to the building's moisture problems and the following recommended work is low priority.

The openings between the basement and the crawl space should be closed off to prevent humidity and musty smells from migrating from the crawl space into the basement. The stone basement walls should be cleaned and all mortar joints repointed. Repointing should be done in accordance with the *National Park Service, Preservation Brief No. 2 and ASTM E2270.*

The mortar needs to be analyzed to determine which modern mortar mix would match with the existing in strength and provide excellent adhesion to both the stone and remaining mortar. The repointing process should remove at least 1-1/2-inches of the mortar joint and the new mortar should be applied in layers.

Clean the stone with a detergent solution and not an acid solution solvent. The stone can be easily brushed down to reveal its actual surface and remove efflorescence. Efflorescence will not harm the stone but if left in place it slowly develops into a hard cementous material that will take mechanical means to remove and may damage the limestone. The stone should also be checked periodically for the presence of new efflorescence, which could indicate the presence of moisture due to an increased humidity level.

Cost Estimate – Retain Wood Siding at Original Building

Single-ply EPDM Roof Replacement.....	$17,810.00
Remove lead paint, remove 1" of siding at roof, repaint.....	$18,464.00
Provide roof valley eave flashing.....	$ 320.00
Close existing openings to crawl space with masonry & access door....	$ 5,760.00
Clean and repoint stone foundation walls.....	$ 8,210.00
Total Estimate	$50,564.00

Table 2. Cost Estimate with repaint wood siding at the original building

Cost Estimate - Replace Wood Siding at Original Building

Single-ply EPDM Roof Replacement.....	$17,810.00
Remove wood siding.....	$ 8,555.25
Replace vapor barrier.....	$ 9,957.75
New prefinished fiber cement siding.....	$19,074.00
Provide roof valley eave flashing.....	$ 320.00
Close existing openings to crawl space with masonry & access door....	$ 5,760.00
Clean and repoint stone foundation walls.....	$ 8,210.00
Total Estimate	$69,687.00

Table 3. Cost Estimate with replace wood siding with fiber-cement board siding at the original building

CONCLUSION

The majority of the building exterior envelope is in good enough condition to repel moisture intrusion except for the single-ply EPDM membrane roofing system on the 2003 addition and exterior paint system on the original residence. Both conditions are in an active state of deterioration and addressing them can be done in phases or as a singular project without disrupting the building's functions and public access.

The deficient EPDM roofing should be repaired first to prevent future moisture penetration and to give the wooden siding a chance to dry out. After a few months, the paint system on the original building should be removed. The wooden siding should be tested again at this point to ensure that it is sufficiently dry for a new paint system to properly bond.

REFERENCES CITED

Canal Fulton Library Photo Archives
1882 Sullivan House. http://www.flickr.com/photos/canalfultonlibrary/ accessed June 26, 2013.

Mack, M.C.
1998 *National Park Service, U.S. Department of the Interior: Brief 2 Repointing Mortar Joints in History Masonry Buildings.*

Sub-Committee E06.24
2012 *American Society for Testing and Materials (ASTM): Standard Guide for Repointing (Tuckpointing) Historic Masonry:* ASTM E2270

Weeks, W.D.
1982 *National Park Service, U.S. Department of the Interior: Brief 10 Exterior Paint Problems on Historic Woodwork.*

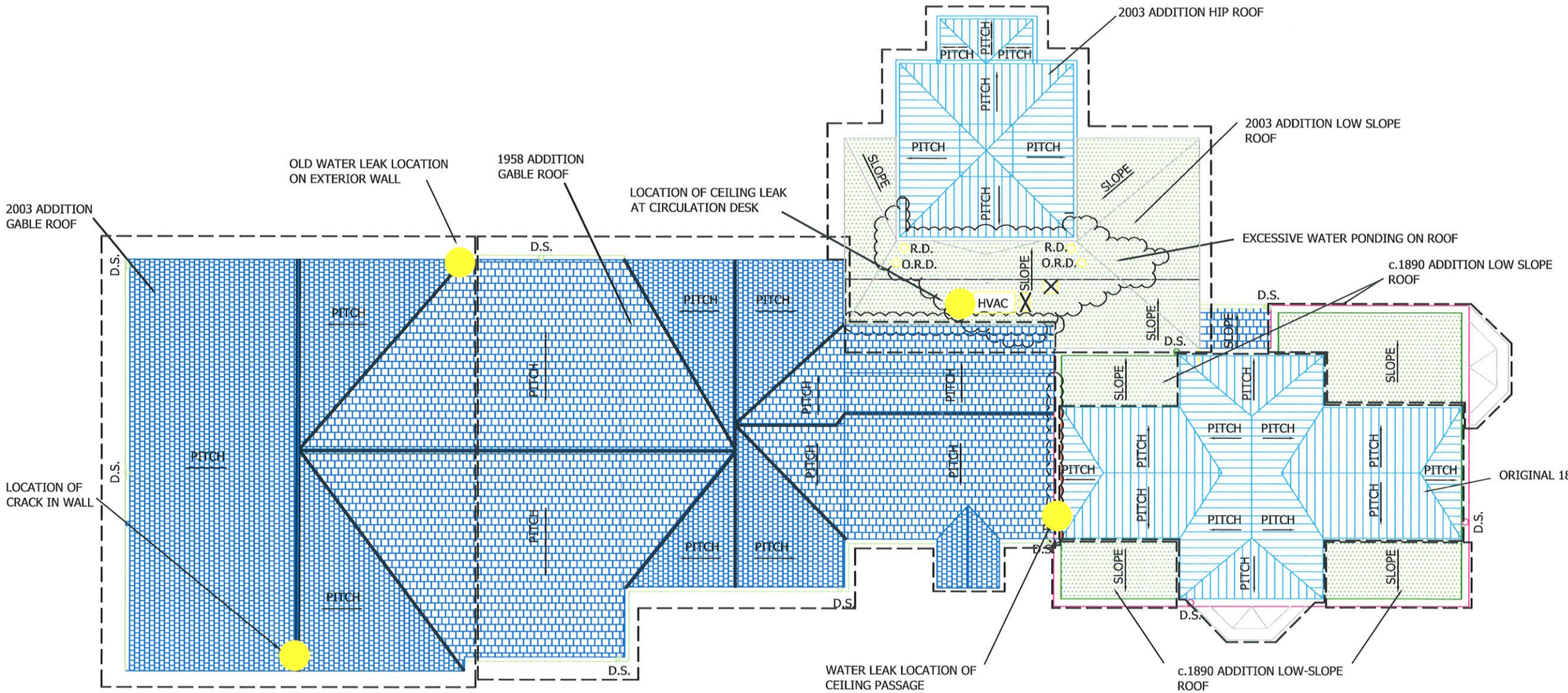
APPENDIX A – ROOF PLAN

HATCH PATTERN LEGEND

Standing Seam Roofing System Installed in 2003

Architectural Dimensional Asphalt Shingles Installed in 1992

Low-Slope EPDM Membrane Roofing installed in 2003



ROOF PLAN

NOT TO SCALE

HARDLINES DESIGN COMPANY
4608 INDIANOLA AVENUE, COLUMBUS, OHIO 43230
TELEPHONE No: 614.784.8733 FAX No: 614.784.9336
WEB ADDRESS: www.hardlinesdesign.com

DRAWN: W. FACIANE
REVIEWED: C. DURST
DATE: MAY 2, 2013
REVISED: JUNE 10, 2013

CANAL FULTON PUBLIC LIBRARY ROOF PLAN

ROOF PLAN
MOISTURE ASSESSMENT

CANAL FULTON PUBLIC LIBRARY
154 MARKET STREET NE
CANAL FULTON, OH 44614

APPENDIX B – TECHNICAL SPECIFICATIONS

SECTION 04 01 00
EXISTING AND RESTORED BRICK AND STONE MASONRY CLEANING

PART 1 GENERAL

1.1 SUMMARY

A. Section includes cleaning of existing and restored exterior brick and stone masonry surfaces.

B. Related Sections:
1. Section 04 05 13- Brick and Stone Masonry Restoration Mortaring (Repointing)

1.2 REFERENCES

A. American Concrete Institute:
1. ACI 530 - Building Code Requirements for Masonry Structures.
2. ACI 530.1 - Specifications for Masonry Structures.

B. American Society for Testing and Materials
1. ASTM E1857-97 Cleaning Masonry Surfaces

1.3 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Submittal procedures.

B. Product Data: Submit data on cleaning compounds and cleaning solutions.

C. Manufacturer's Preparation and Application Instructions: Submit surface preparation and application instructions, perimeter conditions requiring special attention.

1.4 QUALITY ASSURANCE

A. The intent of this Section is to clean designated portions existing brick masonry and new brick masonry providing uniform appearance of the overall building exterior.

B. Perform Work in accordance with product manufacturer's instructions and their recommendations.

1.5 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum five consecutive years experience.

B. Applicator: Company specializing in performing Work of this section with minimum five (5) years experience.

1.6 MOCKUP

A. Section 01 40 00 - Quality Requirements: Mockup requirements.

B. Brick Masonry:
1. Clean a wall panel, 10 feet wide x 30 feet height to determine extent of cleaning, cleaning methods and cleaning products, and ascertain maintaining uniform appearance over the entire building exterior.

C. Stone Masonry:
1. Clean exterior stone wall surfaces, 8 feet wide by 5 feet height to determine extent of cleaning, cleaning methods and cleaning products, and ascertain maintaining uniform appearance wherever exterior stone surfaces are exposed.

D. Repeat, using different cleaning methods, until acceptable.

E. Locate where directed by Architect.

F. Acceptable panel illustrating cleaning will become standard for work of this Section.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Section 01 60 00 - Product Requirements: Product storage and handling requirements.

1.8 ENVIRONMENTAL REQUIREMENTS

A. Cold Weather Requirements: In accordance with ACI 530.1 when ambient temperature or temperature of masonry units is less than 40 degrees F.

1.9 SEQUENCING

A. Section 01 10 00 - Summary: Work sequence.

B. Perform cleaning repointing and restoring masonry surfaces.

PART 2 PRODUCTS

2.1 MASONRY RESTORATION AND CLEANING

A. Manufacturers:
1. Diedrich Technologies Inc., Deidrich 101 Masonry Restorer.
2. ProSoCo Inc.
3. American Building Restoration Products, Inc.

2.2 COMPONENTS

A. Cleaning Agent: Detergent.

PART 3 EXECUTION

3.1 EXAMINATION

A. Section 01 30 00 - Administrative Requirement: Coordination and project conditions.

B. Verify surfaces to be cleaned are ready for work of this Section.

3.2 PREPARATION

A. Protect elements surrounding work of this section from damage or disfiguration.

B. Immediately remove stains, efflorescence, or other excess resulting from work of this section.

C. Carefully remove and store fixtures, fittings, finishing hardware, and accessories.

D. Close off, seal, mask, and board up areas, landscaping, materials, and surfaces not receiving work of this section to protect from damage.

E. Protect ferrous and non-ferrous metals surfaces during cleaning operations to prevent damage and corrosion.

3.3 INSTALLATION

A. Cleaning Existing Masonry:

1. Prior to application of detergent or chemical cleaning, remove loose surface foreign debris and matter by high –pressure water and allow surfaces to dry.
2. Cleaning Detergent: Brush clean type masonry surfaces at locations with detergent type. Saturate masonry with clean water before and after application of cleaning detergents and flush loose mortar and dirt.
3. Chemical Cleaning: Chemical solution for brick masonry surfaces at visible locations to remove existing paint and other applied coatings and leave surface with uniform, natural color and texture.

B. Cleaning Repointed Masonry:

1. Verify mortar is fully set and cured.
2. Clean surfaces and remove large particles with wood scrapers, brass or nylon wire brushes.
3. Use acid solution mixed with water. Apply acid solution and scrub masonry with stiff fiber brushes. Do not scrub mortar joints.
4. Protect area below cleaning operation and keep masonry soaked with water and flushed free of acid and dissolved mortar continuously for duration of cleaning.
5. Before solution dries, rinse and remove acid solution and dissolved mortar, using clean, pressurized water.

C. Restoration Cleaning:
   1. Clean surfaces and remove large particles with wood scrapers or non-ferrous wire brush.
   2. Brush masonry with restoration cleaner, mixed into solution identical to solution required for sample area.
   3. Provide second application when required by preliminary test of sample area.
   4. Allow sufficient time for solution to remain on masonry and agitate with soft fiber brush or sponge.
   5. Rinse from bottom up with potable water applied at 400 psi and at rate of 4 gal/min.

3.4 CLEANING

A. Section 01 73 00: Final cleaning.

B. As work proceeds and on completion, remove excess mortar, smears, and droppings.

C. Clean surrounding surfaces.

END OF SECTION

SECTION 04 05 14
BRICK AND STONE MASONRY MORTARING (REPOINTING)

PART 1 -- GENERAL

1.1 DESCRIPTION

A. This section includes guidance on repointing brick and stone mortar of existing exterior masonry barrier walls indicated and noted on the drawings.

1. Repointing is the process of removing partially deteriorated mortar from a masonry joint and replacing the old mortar with new sound mortar to provide a uniform mortar joint including existing and new mortar.

1.2 RELATED WORK

A. Section 04 01 00 - Existing and Restored Brick and Stone Masonry Cleaning

1.3 APPLICABLE PUBLICATIONS

A. Publications listed below form a part of this specification to extent referenced. Publications are referenced in the text by basic designation only.

B. American Society for Testing and Materials (ASTM):

C67 - 03	Brick and Structural Clay Tile, Sampling and Testing
C216 - 04	Facing Brick (Solid Masonry Units Made From Clay or Shale)
E2260 - 03	Standard Guides for Repointing (Tuckpointing) Historic Masonry
E1857 - 97	Standard Guide for Selection of Cleaning Techniques for Masonry, Concrete, and Stucco Surfaces

C. International Masonry Institute: Recommended Practices and Guide Specifications for Cold Weather Masonry Construction.

D. National Park Service (U.S. Department of the Interior), Preservation Brief: Repointing Mortar Joints in Historic Masonry Buildings.

1.4 SUBMITTTALS

A. As specified in Section 01 33 00 - Submittals.

B. Samples:

1. Dry mortar materials and cured mortar samples of proposed mix(es).
2. 3 samples each of replacement brick.

B. Certificate: Manufacturer's certification that materials and products meet specified requirements.

C. Contractor Qualifications

1. Provide list of five (5) projects of similar nature to this project scope and size. Provide with each project:

a. Name and address of each project.
b. Name, address and phone number of facility owner.
c. Name, address and phone number of General Contractor, if any.
d. Project cost and detailed description of Work.
e. Photographs to include before commencement of work and after completion of work.

1.5 TESTING

A. Tests: Report of tests conducted by an independent testing laboratory certifying that mortar meets specified requirements. Testing will be at no additional expense to the Owner.

1.6 PRODUCT HANDLING

A. Delivery: Deliver materials in manufacturer's original, unopened, protective packaging.

B. Storage: Store cementitious materials in a dry area, under cover, and off the ground.

1.7 PROJECT CONDITIONS

A. ENVIRONMENTAL CONDITIONS

1. Do not proceed with brick removal and/or replacement under inclement weather conditions, or when temperatures are below acceptable levels for mortar. Proceed only when forecasted weather conditions are favorable for proper cure.

2. Wet Weather: Do not apply or mix mortar on outside surfaces with standing water or outside during rain.

3. Cold Weather: Construction is not allowed when surface temperature of masonry is below 40 deg F or air temperature is predicted to be below 40 deg F within 48 hours. Comply with applicable sections of "Recommended Practices for Cold Weather Construction" as published by International Masonry Industry All Weather Council. Maintain existing surfaces at temperatures to prevent mortar from freezing or causing other damage to mortar until mortar has become sufficiently hard to withstand below freezing temperatures

4. Hot Weather: The surface temperature of the work, not the ambient temperature, should not be higher than 100 deg F. Mortar mixing should be done in the shade. Cover mortar with water-misted burlap in hot weather to reduce evaporation. Pointing work should be done in the shade or provide shielding of direct sunlight.

5. All materials must be kept above 40 deg F.

6. Special Precaution: Do not allow masonry to freeze until mortar is thoroughly dry and hardening almost complete (approximately 3 days time).

Note: The setting of lime mortar is slower than cement mortar because the curing requires the absorption of carbon dioxide to form hard lime carbonates. Keep moist by use of dampened burlap during curing process.

1.8 VERFICATION AREAS

A. Provide verification areas for in-place mortar to demonstrate repointing mortar and provide the accepted level of appearance and workmanship. Locations of verification areas to be located on exterior wall surfaces having different compass directions. Coordinate with Architect for approved location of verification areas.

1. Variable masonry composite will include:
   a. Exterior wall assemblage consisting of brick masonry.
   b. Exterior wall assemblage consisting of stone.
   c. Exterior wall assemblage consisting of stone panels.

2. Demonstrate proficiency with joint raking tools and ability to not damage masonry units with either hand or power tools.

3. Mix and cure test batch of repointing mortar and place in joints. Repeat mix until mortar color and texture is approved. Test mortar should be matched, dried, and approved before placing in joints.

4. Demonstrate workmanship of repointing procedures including mortar joint removal, repointing, joint finishing, cleaning and application of water repellant to provide a complete finish appearance.

5. Gain written approval from Architect before proceeding with remaining work.

6. Repointing Raking Method: Rake joints by hand or by mechanical tools manufactured specifically for this purpose.

7. Repointing Method: Repoint joints by hand only using acceptable pointing trowels. No "bagging" or caulking gun pointing methods will be acceptable.

PART 2 -- PRODUCTS

2.1 MORTAR

A. Refer to Section 04 11 00.11 - Mortar (Repointing) – Repointing, for mortar requirements.

2.2 WATER REPELLANT

A. See Section 07 19 00 l- Water Repellents

PART 3 -- EXECUTION

3.1 GENERAL

A. ASTM E2260-03 Standard Guide for Repointing (Tuckpointing) Historic Masonry shall be used to outline repointing procedures in addition to this Section.

B. Terminology – Definitions

1. Terms used herein shall be as defined in ASTM E2260-03, Section 3 Terminology.

3.2 PREPARATION

A. Preparing the Joints

1. Clean area of loose dirt and debris using a stiff bristle brush and remove all extraneous fastenings and devices.

2. Install necessary protection of adjacent building materials, property and persons from joint cleaning work and dirt.

3. Control dust and dirt from raking work. Dampen area being worked. Use tarpaulin curtains or other means to limit spread of dust and other airborne particulates from joint raking and cutting operations from spreading beyond work area.

B. Select amount of exterior mortar joints that can be repointed in one (1) working day. If repointing can be accomplished in one (1) working, provide protection to area raked to be weathertight.

C. Joint Cutting and Raking

1. Cut and rake old mortar from existing joints by manual hand or mechanical tools specifically manufactured for repointing. Mechanical tools include pneumatic and electrical equipment specifically manufactured for repointing mortar joints.

2. Begin cutting and raking out old mortar by center cutting the mortar joint no more than one-third (1/3) the width of the mortar joint. Remove remainder of the mortar by use of small wheel grinder. Extreme care shall be used not to injure, damage, scoring to existing brick. Brick injured, damaged, or scoring resulting in removal of mortar shall result in the Contractor removing and replacing the brick to match existing with no additional cost to the Owner.

3. Remove mortar residue in head and bed joints by use of hammer and chisel. Gently remove mortar residue from joints leaving brick clean of mortar in joint that will be repointed. Use only "no-bounce" hammer when striking chisel until mortar residue disintegrates.

4. Removal of existing mortar either by manual or mechanical methods shall be such not to damage existing masonry brick units and adjacent mortar joints to remain. Avoid overcutting ends of vertical joints, widening joints or cutting into bedding faces of masonry, terra cotta or stone units.

5. Rake out the loose material to a depth of 2-1/2 times the width of the existing mortar joint. Rake out 1-3/8 inch of the existing mortar joint at minimum and 1-5/8 inch at maximum. Leave a clean, square face at the back of the joint to provide optimum contact with the new mortar.

6. While raking out joints, remove all metal fittings such as nails, brackets and clips on other horizontal and vertical surfaces.

7. Carefully clean out the prepared face with a soft or stiff bristle brush and blow out the joints clean with low-pressure compressed air (40-60 psi).

8. Thoroughly flush out joint with clean, clear water by widespread misting with pressure no greater than 50 psi using ordinary garden hose and adjustable spray nozzle.

3.4 INSTALLATION AND APPLICATION OF MORTAR

A. Filling Joints

1. Dampen masonry surfaces and joints to control suction and evaporation before placing repointing mortars. THERE SHOULD BE NO FREE WATER PRESENT WHICH MAY CAUSE VOIDS IN THE MORTAR.

2. Using pointing tool, push the mortar into the joint form a board and iron with the maximum possible pressure. The mortar should be applied in layers, each to a maximum of 3/8 inch.
Note: The pointing tool should be about 1/16 inch narrower than the joint being filled to achieve good compaction. In some cases, the joints will be so thin that a standard pointing tool will need to be ground down to fit the joint.

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

4. Continuously keep all excess and spilled mortar brushed off the masonry face. Avoid leaving a joint which is visually wider than the actual historical appearance.

5. Care shall be taken to avoid mortar on face of brick, terra cotta and stone.

6. Final application of mortar shall be such that it will extend 1/8 inch beyond the face of the type of masonry and stone being repointed. Allow mortar to set to thumbprint hardness and rake the mortar flush with the face of the masonry, terra and stone. Allow the mortar to set for 3 hours before finishing.

B. Joint Finishing

1. Begin when mortar attains "thumb print" hardness.

2. Tool the joint to match the old mortar. NOTE: IT IS IMPORTANT TO TOOL THE JOINT AT THE RIGHT STAGE. IF THE JOINT IS TOO SOFT, THE COLOR WILL BE LIGHTER THAN EXPECTED AND HAIRLINE

SHRINKAGE CRACKS ARE LIKELY TO OCCUR. IF THE JOINT IS TOO HARD WHEN TOOLED, DARK STREAKS MAY APPEAR (TOOL BURNING) AND GOOD CLOSURE OF THE MORTAR AGAINST THE MASONRY WILL NOT BE ACHIEVED. EXCESSIVE TOOLING MAY BRING LIME AND FINE AGGREGRATES TO THE SURFACE, CREATING A VISUAL CHANGE IN THE TEXTURE AND A SURFACE SUBJECT TO EARLY DETERIORATION.

3. To produce a roughen texture, lightly spray the mortar with water after the initial set, stipple the mortar with a stiff bristle brush.

4. Protect finished work from direct sun and rain until face has dried and hardened.

3.5 ADJUSTING/CLEANING

A. Cleaning Up

1. Use masking tape and drop cloths to prevent mortar stains on adjacent work and ledges.

2. Keep work areas clean and free from mortar drips, spills and residue of waste mortars or wash-off.

3. Clean off excess mortar as work proceeds using masonry brushes before mortar sets.

4. Wash completely repointing work when finished mortar joints are set with clean water and masonry brushes, scrubbing only as required to clean mortar stains off masonry without scouring the units and joints faces.

5. Do not use acid or detergent cleaning agents to aid mortar removal and clean-up without written authorization and approval by the Architect.

B. Curing

1. Schedule work only when moderate weather is forecasted.

2. Protect completed work from adverse weather, heavy rainfall, freezing, and drying by direct sunlight and winds until cured.

3. Sprinkle or mist repointed mortar as required to achieve cure in mortar joints for a minimum of 72 hours after completion.

4. Lime Mortar: Cures by drying and crystallization, not by hydration; and can be washed out of joints if not protected before it cures.

C. Final Cleaning

1. After mortar has fully hardened, thoroughly clean exposed masonry and stone surfaces of excess mortar and foreign matter using stiff bristle brushes and clean water spray applied at low pressure 35 psi.
NOTE: USE OF METAL SCRAPERS OR BRUSHES IS NOT PERMITTED.

2. Wash mortar joints surface with diluted solution of 15 parts water and 1 part muriatic acid. Wash surface using soft nylon bristle brush exposing mortar aggregate. Care shall be taken as not to wash face of brick masonry, terra cotta or stone. It is the intent of washing the mortar joint to expose aggregate to reveal color of the mortar joint.

3. Clean mortar joints the areas in the project boundaries as indicated on the drawings and 10 feet in all directions to blend new work with existing.

4. Wash brick masonry as specified in Section 04 11 00 - Existing and Restored Brick Masonry Cleaning where indicated on the Drawings.

D. Water Repellent

1. After mortar has cured and work surfaces thoroughly cleaned of mortar and other foreign material, apply water repellant in accordance with manufacturer's application recommendations. See Section 07 14 16 - Cold Fluid-Applied Waterproofing.
2. Apply water repellent over existing and restored brick masonry where repointing is indicated on Drawings.

E. Efflorescence

1. Two (2) months after completion of the work, return to the project site and inspect for efflorescence appearing on the surface of the work areas. Remove efflorescence with dry stiff bristle brush.

END OF SECTION

SECTION 06 40 07
CHEMICALLY REMOVING PAINT FROM WOOD FEATURES

PART 1 GENERAL

1.1 SUMMARY

A. This procedure includes guidance on removing paint from interior wood features using chemical methods.

B. Chemical strippers should be used on extremely intricate details that might be scorched by too long of an exposure to the blast from a heat gun. They are also useful as final cleanup after paint removal using one of the thermal methods. Follow manufacturer's instructions.

C. Safety Precautions:

1. Workers shall wear appropriate clothing to protect themselves against the harmful effects of paint stripping activity. Old paint layers will likely contain lead. Avoid breathing paint dust during removal.

2. No food or drink shall be allowed near any work station so as to prevent contamination from paint chips, dust or chemical removers which contain lead and other toxic substances.

3. Protective clothing shall be removed at the end of each day and kept at the site to prevent workers from tracking dust and paint chips to other parts of the site or to their homes.

4. Wash hands and face often, especially before eating and at the end of the day.

D. For additional information on the history and properties of paint along with general procedures for paint removal, see 09900-01-S, "Preservation Brief 28, Painting Historic Interiors", and 09910-01-S, "Preservation Brief 10, Exterior Paint Problems on Historic Woodwork".

1.2 REFERENCES

A. AWI Quality Standard: Comply with applicable requirements of "Architectural Woodwork Quality Standards" published by the Architectural Woodwork Institute (AWI), except as otherwise indicated.

1.3 DEFINITIONS

A. Chemical Methods: as used herein shall apply to the use of commercial chemical paint strippers.

1. "Do-it-yourself" chemicals available through local paint stores, hardware stores, building supply centers.

2. Professional, heavy-duty type used by paint removal contractors, generally only available through the manufacturer and/or qualified contractors. May also be available by special order from local paint stores.

B. Chemical paint strippers are divided into solvent-based, caustic-based, and alternative-based strippers.

1. Solvent-based: Most use methylene chloride to dissolve and swell varnish and/or paint film for removal. Some are water-rinsable.

a. Liquid: fast working; best used on horizontal surfaces, or for clean-up when using thermal methods.

b. Semi-paste: good for vertical and overhead surfaces, rounded features, intricate details.

c. Will soften oil-based paints, lacquers, varnishes and synthetic baked finishes.

d. Can be used on both hardwoods and softwoods without changing the color of the wood so that the feature can be refinished with a clear finish if desired.

e. Non-water rinsable products are safe for use on most water-based wood glues.

f. Before refinishing, surface must be completely cleaned of stripper residue but neutralization of the surface is not required.

g. Benzol is another solvent often used in the past in formulating solvent-based paint and varnish removers. IT IS HIGHLY FLAMMABLE AND HIGHLY TOXIC AND ITS USE IS NO LONGER RECOMMENDED.

2. Caustic-based: Use sodium hydroxide, and to a lesser extent potassium hydroxide, to decompose the binder in the coating. Proprietary products are mostly for commercial rather than "do-it-yourself" use.

   a. Liquid: used for dip-stripping of shutters, doors, furniture, etc.

   b. Semi-paste: basis for most professional proprietary products; good or horizontal, vertical and overhead surfaces, also intricate details.

   c. Will work on most types of coatings from oil-based and latex paints to sophisticated epoxy-ester finishes. Check with manufacturer for appropriate usage.

   d. Will darken hardwoods so should not be used on features made from oak, walnut, mahogany, and other hardwoods if a clear finish is to be used.

   e. Because they are water-rinsable, caustic strippers will likely raise the grain on many woods so extra finish steps, such as sanding, may be required regardless of whether the surface is to be painted or given a clear finish.

   f. Caustic strippers will dissolve many types of wood glues--a problem when stripping shutters, wood veneers, plywood, etc.

   g. Surface must be neutralized with mild acid wash before refinishing.

3. Alternative-based: Water-based products which use nonflammable, biodegradable active ingredients to soften the paint. Most are water-rinsable, or removed with common household cleaners. Active ingredients include dibasic acid esters. Semi-paste form.

   a. Separate formulas for clear finish removal versus paint removal.

   b. Require considerably more time to soften the old finish than either methylene-chloride-based or caustic-based strippers.

   c. Can be used on both hardwoods and softwoods without discoloring the wood.

1.4 DELIVERY, STORAGE AND HANDLING

A. Storage and Protection: All chemicals shall be stored in metal cabinets. No cans shall be left open or out of the cabinet overnight.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. For Chemical Paint Removers:

AFM Enterprises, Inc.
1140 Stacy Ct.
Riverside, California 92507
714/781-6860

Bix Manufacturing Co.
P.O. Box 69
Ashland City, TN 37015
615/792-3260

Diedrich Technologies, Inc.
7373 South 6th Street
Oak Creek (Milwaukee), WI 53154
800/323-3565 or 414/764-0058

Availability: Through contractors licensed by manufacturer, and authorized paint supply centers.

Dumond Chemicals, Inc.
501 Broadway
New York, NY 10036
212/840-2666

Availability: Through contractors licensed by manufacturer, and authorized paint supply centers.

Klean-Strip
P.O. Box 13146
Memphis, TN 38113
901/775-0100

Master Products, Inc.
P.O. Box 274
Orange City, IA
800/747-3436 or 712/737-3436

Distributors: Martin Paint or Herb Saltzman, Flushing, NY.

3M D-I-Y Division Wood Refinishing Products
P.O. Box 33053
St. Paul, MN 55133-3053
800/364-3577 or 612/737-6501

ProSoCo, Inc.
755 Minnesota Avenue
P.O. Box 1578
Kansas City, KS 66117
800/255-4255 or 913/281-2700

Availability: Through contractors licensed by manufacturer.

Red Devil, Inc.
2400 Vauxhall Road
Union, NJ 07083
800/423-3845 or 201/688-6900

Reliable Remover & Lacquer Corporation
62 Woolsey Street
Irvington, NJ 07111
201/399-2121

Distributor: Pacoa, 133-36 36 Road, Flushing, NY.

Savogran Company
P.O. Box 130
Norwood, MA 02062
800/225-9872 or 617/762-5400

Specialty Environmental Technologies, Inc.
4520 Glenmeade Lane
Auburn Hills, MI 48326
810/340-0400

Star Bronze Co.
P.O. Box 2206
Alliance, OH 44601
216/823-1550

B. For Fumed Silica:

Miller-Stephenson
P.O. Box 950
Danbury, CT 06813
203/743-4447
(distributors of epoxy materials)

Samuel Cabot, Inc.
100 Hale Street
Newburyport, MA 01950
508/465-1900
"Cab-o-sil"

2.2 MATERIALS

NOTE: Chemical products are sometimes sold under a common name. This usually means that the substance is not as pure as the same chemical sold under its chemical name. The grade of purity of common name substances, however, is usually adequate for stain removal work, and these products should be purchased when available, as they tend to be less expensive. Common names are indicated below by an asterisk (*).

A. Solvent-based chemical paint remover such as any of the following, or approved equal:

1. Strypeeze Semi-paste (Savogran Company)
2. Super Strip Non-flammable and Zip Strip (Star Bronze Co.)
3. All Purpose Kwik Paint and Varnish Remover, Non-Flammable Sprayable Paint Remover, KS-3 Semi-Paste Paint Remover, Heavy Bodied Paint Remover (Klean-Strip, Inc.)
4. Peel Away II and III (Dumond Chemicals, Inc.)
5. Rock Miracle
6. Old Master's TM-4 Paint Remover (Master Products, Inc.)
7. Reliable #78 Liquid No-wash Paint Remover (Reliable Remover & Lacquer Corporation)
8. Semi-Paste #77, Liquid #99, Water-soluble #122 (Red Devil)
9. Spray-On Stripper (Bix)
10. 509 Paint Stripper (ProSoCo, Inc.)
11. 505 (Diedrich Chemicals)

-OR-

Caustic-based chemical paint strippers such as any of the following, or approved equal:

1. Peel Away I (Dumond Chemicals, Inc.)
2. 404 Rip Strip, 606/606X (Diedrich Chemicals)

-OR-

Alternative-based such as any of the following, or approved equal:

1. Safest Stripper (3M)
2. MF, Stripper 66 (AFM Enterprises, Inc.)

B. Plastic sheeting

C. Cornstarch or fumed silica such as "Cab-o-sil" (Samuel Cabot, Inc.), or approved equal.

1. Used to thicken chemicals so they will adhere to vertical surfaces and ceilings.
2. Fumed silica is also used as a filler in epoxy repairs.
3. Available from grocery store.

D. Denatured alcohol: (to remove last traces of chemical residue)

1. Other chemical or common names include Methylated spirit*.
2. Potential hazards: TOXIC AND FLAMMABLE.
3. Available from hardware store, paint store or printer's supply distributor.
4. Denatured alcohol should be a satisfactory substitute for ethyl alcohol for stain removing
5. purposes.

E. For Caustic-based paint strippers, neutralizer as recommended by paint stripper manufacturer, to return surface to neutral pH prior to refinishing.

F. Steel wool, cheese cloth, or other cloths for final clean-up.

G. Phenolphthalein: Used to test pH of a surface after stripping with alkaline chemicals. Available at some drug stores or chemical supply houses

2.3 EQUIPMENT

A. Steel wool, scrapers and small picks to remove sludge

B. Metal containers such as old coffee cans to dispose of sludge

C. Putty knives and paint scrapers (of different shapes and flexibility)

D. Natural bristle brushes or plastic spatulas as recommended by paint stripper manufacturer to apply stripper.

E. Duct tape

F. Spray equipment (only if recommended or provided by manufacturer)

PART 3 EXECUTION

3.1 EXAMINATION

A. One of the main reasons for paint failure is excess moisture, both from internal and external sources. Before work is begun on removing the existing paint film or otherwise preparing the surface, all flashing and gutters and downspouts shall be inspected and repaired or replaced as required. Make provisions as required for removing excess moisture from areas of high humidity.

B. All wood elements shall be carefully inspected for rot and, if deteriorated, marked for later replacement, after the paint has been removed.

3.2 PREPARATION

A. Protection:

1. General: Comply with recommendations of manufacturers of paint strippers for protecting surrounding building surfaces against damage from exposure to their products.

2. Protect adjacent surfaces, including grass, shrubs and trees with paper, drop cloths and other means. Items not painted which are in contact with or adjacent to painted surfaces shall be removed or protected prior to surface preparation and painting operations.

3. All waste material shall be collected at the end of each work day and disposed of in a manner consistent with local environmental regulations. It is considered Hazardous Waste.

4. Work area shall be sealed to prevent the spread of paint dust and debris beyond the work site.

5. All rags shall be disposed of nightly and removed from the building.

6. Adequate ventilation should be provided in each area where solvents and strippers are used.

7. A fully charged fire extinguisher suitable for solvent fires shall be kept in each area where work is going on.

8. Contractor shall provide multiple fans with high CFM to move fumes out of the building and away from areas where work is being done.

9. Compressor motors, heat lamps, etc., must be of explosion proof type.

10. No spraying of solvents or strippers permitted unless specifically allowed by the manufacturer of the product being used.

11. Do not operate a building's central heating system while stripping interior wood features using chemicals, or for several days afterwards. Chloride compounds in the vapors of these removers can combine with the combustion air and move into the furnace-burner compartment of the heating system. Chemical reactions occur with the flue gasses which create highly corrosive acids which can condense on the heat exchanger, vent piping, etc. Once started, the corrosion created by this acid, cannot be stopped.

12. After paint removal is complete, all areas around the site shall be cleaned of all paint dust and debris, and such debris shall be properly disposed of in a manner consistent with local environmental regulations. Vacuums used to clean up dust shall be equipped with High Efficiency Particulate Air (HEPA) filters.

B. Surface Preparation: Use scrapers of a variety of sizes and shapes, whose edges have been rounded, to remove loose paint before removal using chemicals.

3.3 ERECTION, INSTALLATION, APPLICATION

NOTE: WORK IN WELL-VENTILATED AREA TO AVOID INHALATION OF TOXIC FUMES.

A. Lay the chemicals onto the surface in the manner and amount recommended by the manufacturer.

B. Allow to sit or "dwell" according to the manufacturer's instructions. If required, cover with plastic wrap.

C. Remove the sludge using scrappers and steel wool. A second application may be required on those areas where paint is especially thick and/or the detail is intricate.

D. After removal has been completed, rub all surfaces down with denatured alcohol or water (for water rinsable strippers only) to remove all traces of chemical residue.

1. For solvent-based strippers:

a. Most solvent-based chemicals also contain wax to help retard evaporation during the dwell period. Unless completely removed, this wax will inhibit the performance of the newfinish.

b. Thoroughly rub all surfaces, and especially deep crevices, with denatured alcohol to remove all traces of remover. Mineral spirits will work as well, but it may also leave a somewhat oily residue.

E. For caustic-based strippers:

1. Carefully and completely neutralize feature as directed by manufacturer to return surfaces to a neutral pH.

2. To test whether all chemicals have been removed dissolve a 2" piece of phenolphthalein in denatured alcohol.

3. Brush the solution onto the surface. If it turns a shade from pink to magenta there is still chemical residue.

4. Treat the surface with additional neutralizer and continue testing until there is no color change in the phenolphthalein solution. This test will work with any alkaline product.

5. Testing the damp surface with litmus paper until a pH level of 7 is achieved will also work if phenolphthalein is not available.

F. For alternative-based strippers:

1. These products contain neither waxes nor strong alkalies so clean-up is simplified. Follow manufacturers instructions for removal or residue.

3.4 ADJUSTING/CLEANING

A. Upon completion of this work, all floors, walls and other adjacent surfaces that are stained, marred, otherwise damaged by work shall be cleaned and repaired and all work and the adjacent areas shall be left in a clean and orderly condition.

B. All completed work shall be adequately protected from damage by subsequent building operations and effects of weather. Protection shall be by methods recommended by the manufacturer of installed materials and as approved by the Architect.

END OF SECTION

SECTION 07 25 00
WEATHER BARRIERS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. All of the Contract Documents, including General and Supplementary Conditions and Division 1 General Requirements, apply to the work of this section.

1.2 SUMMARY

A. The work of this section includes, but is not limited to, the following:
   1. Weather barrier membrane
   2. Seam tape
   3. Flashing
   4. Fasteners

B. Related Sections: Other specification sections that directly relate to the works of this section include, but are not limited to, the following:
   1. Section 07 46 60 – Fiber Cement Siding

1.3 REFEERNCES

A. American Society for Testing and Materials (ASTM)
   1. C920: Standard Specification for Elastomeric Joint Sealants
   2. C1193: Standard Guide for Use of Joint Sealants
   3. D882: Test Method for Tensile Properties of Thin Plastic Sheeting
   4. D1117: Standard Guide for Evaluating Non-woven Fabrics
   5. E84: Test Method for Surface Burning Characteristics of Building Materials
   6. E96: Test Method for Water Vapor Transmission of Materials
   7. E1677: Specification for Air Retarder Material or System for Framed Building Walls
   8. E2178: Test Method for Air Permeance of Building Materials
   9. E2357: Standard Test Method for Determining Air Leakage of Air Barrier Assemblies

B. American Association of Textile Chemists and Colorists (AATCC)
   1. Test Method 127 Water Resistance: Hydrostatic Pressure Test

C. TAPPI
   1. Test Method T-410; Grams of Paper and Paperboard (Weight per Unit Area)
   2. Test Method T-460; Air Resistance (Gurley Hill Method)

1.4 SUBMITTALS

A. Product Data: Submit manufacturer current technical literature for each component.

B. Samples: Weather Barrier Membrane, minimum 8-1/2 inches by 11 inch.

C. Quality Assurance Submittals
   1. Design Data, Test Reports: Provide manufacturer test reports indicating product compliance with indicated requirements.
   2. Manufacturer Instructions: Provide manufacturer's written installation instructions.

3. Manufacturer's Field Service Reports: Provide site reports from authorized field service representative, indicating observation of weather barrier assembly installation.

D. Weather Barrier Warranty: Manufacturer's executed warranty form with authorized signatures and endorsements indicating date of Substantial Completion..

1.5 QUALITY ASSURANCE

A. Qualifications
   1. Installer shall have experience with installation of commercial weather barrier assemblies under similar conditions.
   2. Installation shall be in accordance with weather barrier manufacturer's installation guidelines and recommendations.
   3. Source Limitations: Provide commercial weather barrier and accessory materials produced by single manufacturer.

B. Mock-Up
   1. Install mock-up using approved weather barrier assembly including fasteners, flashing, tape and related accessories per manufacturer's current printed instructions and recommendations.
      a. Mock-up size: 10 feet by 10 feet
      b. Mock-up Substrate: Match wall assembly construction, including window opening.
      c. Mock-up may remain as part of the work.
   2. Contact manufacturer's designated representative prior to weather barrier assembly installation, to perform required mock-up visual inspection and analysis as required for warranty.

C. Pre-Installation Meeting
   1. Hold a pre-installation conference, two weeks prior to start of weather barrier installation. Attendees shall include Contractor, Architect, Engineer, Installer, Owner's Representative, and Weather Barrier Manufacturer's Designated Representative.
   2. Review all related project requirements and submittals, status of substrate work and preparation, areas of potential conflict and interface, availability of weather barrier assembly materials and components, installer's training requirements, equipment, facilities and scaffolding, and coordinate methods, procedures and sequencing requirements for full and proper installation, integration and protection.

1.6 DELIVERY, STORAGE AND HANDLING

A. Deliver weather barrier materials and components in manufacturer's original, unopened, undamaged containers with identification labels intact.

B. Store weather barrier materials as recommended by weather barrier manufacturer.

1.7 SCHEDULING

A. Review requirements for sequencing of installation of weather barrier assembly with installation of windows, doors, louvers and flashings to provide a weather-tight barrier assembly.

B. Schedule installation of weather barrier materials and exterior cladding within nine months of weather barrier assembly installation.

1.8 WARRANTY

A. Special weather-barrier manufacturer's warranty for weather barrier for a period of ten (10) years from date of purchase.

B. Pre-installation meetings and jobsite observations by weather barrier manufacturer for warranty are required.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Dupont Tyvek: 4417 Lancaster Pike, Chestnut Run Plaza 728, Wilmington, DE 19805; 1-800-44-TYVEK (8-9835); http://www.construction.tyvek.com

B. CertainTeed Weather-Protection Membrane: P.O. Box 860, Valley Forge, PA 19482; 1-800-233-8990; http://www.certainteed.com/products/housewrap

C. Dow Chemical Company Weathermate Housewrap: 100 Independence Mall West, Philadelphia, PA 19106; 1-215-592-3000; http://www.dow.com/products/product/weathermate-housewrap/

PART 3 EXECUTION

3.1 EXECUTION

A. The installer shall examine conditions of substrates and other conditions under which this work is to be performed and notify the contractor, in writing, of circumstances detrimental to the proper completion of the work. Do not proceed with work until unsatisfactory conditions are corrected.

3.2 INSTALLATION

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. Window and 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: Attach weather barrier to studs through exterior sheathing. Secure using weather barrier manufacturer recommended 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.

3.4 OPENING PREPARATION

A. Flush cut weather barrier at edge of sheathing around full perimeter of opening.

B. Cut a head flap at 45-degree angle in the weather barrier at window head to expose 8 inches of sheathing. Temporarily secure weather barrier flap away from sheathing with tape.

3.5 FLASHING

A. Cut flashing a minimum of 12 inches longer than width of sill rough opening. Apply primer as required by manufacturer.

B. Cover horizontal sill by aligning flashing edge with inside edge of sill. Adhere to rough opening across sill and up jambs a minimum of 6 inches. Secure flashing tightly into corners by working in along the sill before adhering up the jambs.

C. Fan flashing at bottom corners onto face of wall. Firmly press in place. Mechanically fasten fanned edges.

D. Apply flashing strips at jambs. Align flashing with interior edge of jamb framing. Start flashing at head of opening and lap sill flashing down to the sill.

E. Spray-apply primer to top 6 inches of jambs and exposed sheathing.

F. Install flashing at opening head using same installation procedures used at sill. Overlap jamb flashing a minimum of 2 inches.

G. Coordinate flashing with window installation.

H. On exterior, install backer-rod in joint between window frame and flashed rough framing. Apply sealant at jambs and head, leaving sill unsealed. Apply sealants in accordance with sealant manufacturer's instructions and ASTM C 1193.

I. Position weather barrier head flap across head flashing. Adhere over the 45-degree seams.

J. Tape top of window in accordance with manufacturer recommendations.

K. On interior, install backer rod in joint between frame of window and flashed rough framing. Apply sealant around entire window to create air seal. Apply sealant in accordance with sealant manufacturer's instructions and ASTM C 1193.

3.6 PROTECTION AND CLEANING

A. Protect installed weather barrier from damage.

B. Schedule work to ensure that the weather barrier is covered as soon as possible after installation. Protect weather barrier from damage during subsequent operations. If the weather barrier cannot be covered within 30 days after installation, apply temporary UV protection such as dark plastic sheet or tarpaulins.

END OF SECTION

SECTION 07 46 23.01
WOOD SIDING REPAIR

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 his Section.

1.2 SUMMARY

A. This procedure provides guidelines to be used when specifying any type of repair to damaged woodwork. Guidelines for materials, fabrication and general guidelines for installation are included.

B. Specifications for the repair of woodwork shall include all work, materials and equipment required to:
   1. Carefully remove required woodwork and securely reinstall it to its origi= nal place and position. Use experienced riggers for the removal and transportation of woodwork.
   2. Repair woodwork to conservator quality standards.
   3. Document work done through photography.

1.3 REFERENCES

A. American Society for Testing and Materials (ASTM), 100 Barr Drive, West Conshohocken, PA 19428, (610) 832-9585or FAX (610) 832-9555

1.4 QUALITY ASSURANCE

A. Installer Qualifications: Arrange for installation of architectural woodwork by a firm that can show successful experience in installing architectural woodwork items similar in type and quality to those required for this project.

B. Architectural Woodwork Institute (AWI) Quality Standard: Comply with applicable requirements of "Architectural Woodwork Quality Standards" published by the Architectural Woodwork Institute unless otherwise indicated.

C. Testing and Site Inspection: Conduct tests in the presence of the Architect, using all procedures, materials and equipment needed to carry out the work.

1.5 SUBMITTALS

A. Wood Treatment Data: Submit chemical treatment manufacturers' instructions for handling, storing, installation, and finish of treated material.

1. Non-Pressure Preservative Treatment: Include certification stating chemical solution and submersion period used and affirming compliance with indicated treatment standards.
2. Fire-retardant treatment data for material impregnated by pressure process to reduce
combustibility. Include certification by manufacturer that treated materials comply with requirements.

B. Restore twenty square feet or five linear feet (or quantity as appropriate) of each wood type to be restored for review by the Architect before proceeding with all restoration. Where new wood must be used to match existing to repair or infill damaged wood, install twenty square feet or five linear feet (or quantity as appropriate) in its final location for review by the Architect before proceeding with all repair.

C. Shop Drawings: For new woodwork, submit shop drawings showing location of each item, dimensional plans and elevations, large scale details, attachment devices and other components.

D. Quality Certification: Submit woodwork manufacturers' (fabricator's) certification, saying that fabricated woodwork complies with quality grades and other requirements suggested.

E. Field Measurements:
1. Where woodwork is shown to be fitted to other construction, check actual dimensions of other construction by accurate field measurements before manufacturing woodwork; show recorded measurements before final shop drawings. Coordinate manufacturing schedule with construction progress to avoid delay of work.
2. Where field measurements cannot be made without delaying the work, guarantee dimensions and proceed with manufacture of woodwork without field measurements. Coordinate other construction to ensure that actual dimensions correspond to guaranteed dimensions.

1.7 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Packing and Shipping: Do not deliver woodwork until painting, wet work, grinding, and similar operations that could damage, soil or deteriorate new woodwork have been completed in installation areas.

B. Storage and Protection: If woodwork must be stored in other than installation areas, store only in areas whose environmental conditions meet requirements specified in 1.8 Project/Site Conditions below.

1.8 PROJECT/SITE REQUIREMENTS

A. Environmental Requirements:
1. Provide adequate ventilation, use of respirators and protective clothing by workers, and sealing off work areas during the removal process.
2. Woodwork manufacturer and installer shall advise contractor of temperature and humidity requirements for woodwork installation and storage areas. Do not install woodwork until required temperature and relative humidity have been

stabilized and will be maintained in installation areas.

3. Environmental Conditions: Obtain and comply with woodwork manufacturers' and installers coordinated advice for optimum temperature and humidity conditions for woodwork during its storage and installation. Do not install woodwork until these conditions have been attained and stabilized so that woodwork is within plus or minus 1.0% of optimum moisture content from date of installation through remainder of construction period

1.9 SEQUENCING AND SCHEDULING

A. Coordinate the work in this specification with appropriate work of other specifications to ensure proper scheduling for fabrication and installation of the work specified herein.

B. Verify all dimensions in the field before fabrication of all architectural woodwork to assure proper fit.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Wood Moisture Content: Provide kiln-dried lumber with an average moisture content range of 6% to 11% for interior work. Maintain temperature and relative humidity during fabrication, storage and finishing operations so that moisture content values for woodwork at time of installation do not exceed the above range.

B. Replacement Wood: Match species, grade, grain pattern, and other special characteristics of woodwork.

C. Provide wood blocking, anchorages and fasteners for above:

1. Screws:
   a. Select material, type, size and finish required for each use and as recommended by the Architect.
   b. For metal framing supports, provide screws as recommended by metal framing manufacturer.
2. Nails: Select material, type, size and finish required for each use and as recommended by the Architect.
3. Anchors: Select material, type, size and finish required by each substrate for secure anchorage. Provide nonferrous metal or hot-dip galvanized anchors and inserts on inside face of exterior walls and elsewhere as required for corrosion resistance. Provide toothed steel or lead expansion bolt devices for drilled-in-place anchors. Furnish inserts and anchors, as required, to be set into concrete or masonry work for subsequent woodwork anchorage.

D. Fire-Retardant Materials:

1. Fire-retardant treated lumber shall be lumber and plywood with fire-retardant chemicals to comply with ASTM C20 and C27, respectively; provide materials which are pressure impregnated with fire-retardant chemicals and comply with the following requirements.
   a. Fire-Retardant Chemicals: Use chemicals of type which do not bleed through or otherwise adversely affect finishes. Do not use colorants in solution to distinguish treated lumber from untreated lumber.
      1) Low Hygroscopic Type: Halogen and sulfate-free solution intended for interior applications not exposed to relative humidity more than 95%; with treated material having an equilibrium moisture content of not over 28% per ASTM D3201 at 92 =F1 2% relative humidity.
   b. Available Products: Subject to compliance with requirements, products which may be incorporated in the work include, but are not limited to, the following:
      1) "Dricon" (Koppers Co., Inc.).
      2) "Flameproof LHC" (Osmose Wood Preserving Co. of America, Inc.).
      3) "Protex" (Hoover Universal, Wood Preserving Division).
2. Fire Performance Characteristics: Provide materials which are ident= ical to those tested per ASTM methods and are marked and listed for fire performance characteristi= cs by Underwriters Laboratories, Inc. or other testing and inspecting agency acceptable to authorities having jurisdiction, and comply with the following requirements:
   a. Mill lumber after treatment, within limits set for wood removal that does not affect listed fire performance characteristics, using a woodworking plant certified by testing and inspection agency.
   b. Marking: Identify treated lumber with separable paper classification marking of inspecting and testing agency, unless otherwise indicated.
   c. Surface Burning Characteristics: Not exceeding values shown below, tested per ASTM E84 for 30 minutes with no evidence of significant combustion.
      1) Flame Spread: 25.
      2) Smoke Developed: 50.
   d. Kiln-dry woodwork after treatment to levels required for non-fire-retardant woodwork materials. Maintain moisture content required by kiln drying, before and after treatment.
   e. Discard treated lumber that does not comply with requirements of referenced woodworking standard. Do not use twisted, warped, bowed, discolored, or otherwise damaged or defective lumber.

2.2 FABRICATION

A. Wood Moisture Content: Comply with requirements of referenced quality standard for moisture content of lumber in relation to relative humidity conditions existing during time of fabrication and in installation areas.

B. Fabricate woodwork to dimensions, profiles, and details provided and approved by the Architect.

C. Complete fabrication, including assembly, finishing and hardware application, before shipment to project site to maximum extent possible. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.

D. Wood Surrounds and Trim: Fabricate to profiles required in single lengths for jamb and head conditions. Provisions for securing through face of trim shall include plugs to match surface.

E. Factory-cut openings, to maximum extent possible, to receive hardware, 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. Smooth edges of cutouts and, where located in countertops and similar exposures, seal edges of cutouts with a water-resistant coating.

F. Measurements: Before proceeding with fabrication of woodwork required to be fitted to other construction, obtain field measurements and verify dimensions and shop drawing details as required for accurate fit.
   1. Where the sequence of measuring substrates before fabrication would delay the project, continue with fabrication (without field measurements) and provide ample borders and edges to allow for subsequent scribing and trimming of woodwork for accurate fit.

G. Preservative Treatment by Non-Pressure Method: Comply with requirements of referenced woodworking standard for non-pressure treatment of woodwork with non-aqueous water repellent solution, except as indicated. Treat units of woodwork after cutting, machining, sanding, gluing and assembling has been completed to the greatest extent possible. Coat surfaces cut after treatment with heavy brush coating of same preservative.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Conserve as much of the original material as possible, repairing and restoring damaged existing woodwork rather than replacing it wherever practicable. Use salvaged material where practical in spaces with some existing woodwork to remain. If not practical, replace all woodwork with new materials that replicate the existing items; maintain Architect's approval.

B. Do a thorough examination of the existing wood condition. Do any necessary tests on an inconspicuous surface to learn the current condition and appropriate steps and materials necessary for restoration of all existing wood surfaces.

3.2 PREPARATION

A. Protection:
   1. Protect adjacent surfaces with polyethylene covers during wood removal operations.
   2. Protect persons and surrounding surfaces of building interiors whose wood surfaces are being restored from damage resulting from wood restoration work.

B. Surface Preparation:
   1. Condition woodwork according to average prevailing humidity conditions in installation areas before installing.
   2. Before installing architectural woodwork, examine shop-fabricated work for completion and complete work as required, includi= ng back priming and removal of packing.
   3. Pre-Installation Meeting: Meet at project site before delivery of architectural woodwork and review coordination and environmental controls required for proper installation and ambient conditioning in areas to receive work. Include in meeting the contractor, the Architect, the Owner's representative, installers of architectural woodwork, wet work such as plastering, other finishes, painting, mechanical work and electrical work, and firms or persons responsible for continued operation (whether temporary or permanent) of HVAC system as required to maintain temperature and humidity conditions.Proceed with woodwork installation only when everyone concerned agrees that required ambient conditions can be maintained.
   4. Deliver concrete inserts and similar anchoring devices to be built into substrates, well ahead of time substrates are to be built.

3.3 ERECTION, INSTALLATION, APPLICATION

A. General:
   1. Quality Standard: Install woodwork to comply with AWI Section 1700 for type of woodwork involved.
   2. Carefully remove at locations indicated any damaged or deteriorated woodwork. Unless indicated otherwise, replace the entire length of the existing damaged piece to the next butt joint.
   3. For partial replacement of existing pieces, use a neat, well-fitted level cut with grain aligned in transparent finish wood.

B. Replacing Deteriorated Material: Install new pieces as follows:
   1. Install the work plumb, level, true and straight with no distortions. Shim as required using concealed shims. In= stall to a tolerance of 1/8" in 8'-0" for plumb and level; and with 1/16" maximum offset in flush adjoining surface, 1/8" maximum offsets in revealed adjoining surfaces.
   2. Cut to fit unless specified to be shop-fabricated or shop-cut to exact size. Where woodwork abuts other finished work, scribe and cut for accurate fit. Before making cutouts, drill pilot holes at corners.
   3. Standing and Running Trim: Install with minimum number of joints possible, using full-length pieces (from maximum length of lumber available) to the greatest extent possible. Stagger joints in adjacent and related members. Cope at returns, miter at corners, and comply with Quality Standards for joinery.

a. Reuse salvage material as required. Use only trim that can be reinstalled and refinished to an acceptable condition consistent with the existing trim to remain.

b. Where salvage material will not match existing, remove and replace with new to replicate existing.

4. Anchor woodwork to anchors or blocking built-in or directly attached to substrates. Secure to grounds, stripping and blocking with countersunk, concealed fasteners and blind nailing as required for a complete installation. Except where prefinished matching fasteners heads are required, use fine finishing nails for exposed nailing, countersunk and filled flush with woodwork, and matching final finish where transparent finish is suggested.

5. Finish replacement woodwork to match adjacent woodwork surfaces.

3.4 ADJUSTING/CLEANING

A. Upon completion of this work, all floors, walls and other adjacent surfaces stained, marred, otherwise damaged by work under this section shall be cleaned and repaired and all work and the adjacent areas shall be left in a clean and perfect condition.

B. All completed work shall be adequately protected from damage by subsequent building operations and effects of weather. Protection shall be by methods recommended by the manufacturer of installed materials and as approved by the Architect.

C. Repair damaged and defective woodwork wherever possible to eliminate defects functionally and visually; where not possible to repair properly, replace woodwork. Adjust joinery for uniform appearance.

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

3.5 PROTECTION

A. Protect work of other trades, whether to be restored or not, against damage by restoration work. Correct any damage by cleaning, repairing or replacing, as acceptable to the Architect. At completion of work of other trades, restore all damaged or defaced surfaces.

B. Provide final protection and maintain conditions in a manner acceptable to manufacturer and installer, that ensures that woodwork is being without damage or deterioration at time of substantial completion.

END OF SECTION

SECTION 07 53 03
ELASTOMERIC MEMBRANE ROOFING - FULLY ADHERED

PART 1 GENERAL

1.1 SUMMARY

A. Low slope EPDM membrane roofing system including but not limited to insulation, flashings and termination bars to provide a complete roofing system over existing wood decking.

1.2 REFERENCES

A. ASTM International:
   1. ASTM C177 - Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded-Hot-Plate Apparatus.
   2. ASTM D412 - Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers-Tension.
   3. ASTM D624 - Standard Test Method for Tear Strength of Conventional Vulcanized Rubber and Thermoplastic Elastomers.
   4. ASTM D746 - Standard Test Method for Brittleness Temperature of Plastics and Elastomers by Impact.

B. National Roofing Contractors Association:
   1. NRCA - The NRCA Roofing and Waterproofing Manual.

C. Single Ply Roofing Institute:
   1. SPRI ES-1 - Wind Design Standard for Edge Systems Used with Low Slope Roofing Systems.

1.3 SYSTEM DESCRIPTIONS

A. Roof System:
   1. Elastomeric Sheet Membrane Conventional Roofing System: One ply membrane system over wood sheathing adhesive applied membrane.

B. Roof Drainage Gutter Lining Membrane:
   1. Elastomeric Sheet Membrane built-in guttering system lining.

1.4 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Submittal procedures.

B. All submittals shall be reviewed and approved by the roofing material manufacturer. Each submittal shall bear the seal of approval by the roofing material manufacturer. Submittals without the roofing material manufacturer's seal of approval will be rejected.

C. Shop Drawings: Indicate membrane layout and seam locations.

D. Product Data: Submit characteristics on membrane materials, adhesives and seaming materials.

E. Manufacturer's Installation Instructions: Submit special precautions required for seaming membrane.

F. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

1.5 QUALITY ASSURANCE

A. Perform Work in accordance with NRCA Roofing and Waterproofing Manual.

1.6 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.

B. Applicator: Company specializing in performing Work of this section with minimum five years documented experience and approved by material manufacturer.

1.7 PRE-INSTALLATION MEETINGS

A. Section 01 30 00 - Administrative Requirements: Preinstallation meetings.

B. Convene minimum one week prior to commencing Work of this section.

C. Review preparation and installation procedures and coordinating and scheduling required with related Work.

D. Roofing manufacturer's field representative shall attend the pre-installation meeting.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Section 01 60 00 - Product Requirements for transporting, handling, storing, and protecting products.

B. Deliver products in manufacturer's original containers, dry, undamaged, with seals and labels intact.

C. Store products in weather protected environment, clear of ground and moisture.

D. Protect foam insulation from direct exposure to sunlight.

1.9 ENVIRONMENTAL REQUIREMENTS

A. Section 01 60 00 - Product Requirements: Environmental conditions affecting products on site.

B. Do not apply roofing membrane during inclement weather and ambient temperatures below 42 degrees F or above 98 degrees F without proper weather protection.

C. Do not apply roofing membrane to damp or frozen deck surface or when precipitation is expected or occurring.

D. Do not expose materials vulnerable to water or sun damage in quantities greater than can be weatherproofed during same day.

1.10 COORDINATION

1. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.

B. Coordinate Work with installation of associated roof penetrations and metal flashings, as Work of this section proceeds.

1.11 WARRANTY

A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for warranties.

B. Total Roofing System Warranty

1. Furnish 20 year roofing manufacturer's Total Roofing System Warranty including material and workmanship for membranes, flashings, counterflashings, adhesives, sealants, insulation, recovery board, fasteners, fastener plates, fastening bars, metal edging, metal termination bars, and any other materials used in the roofing system installation.

C. Roofing Contractor's Warranty

1. Submit roofing Installer's warranty, in written form, signed by Installer, covering the Work of this Section, including components of membrane roofing system such as membrane roofing, base flashing, roof insulation, fasteners, cover boards, substrate boards, vapor retarders, roof pavers, and walkway products, for the following warranty period:
   a. Warranty Period: Two (2) years from date of Project completion.

PART 2 PRODUCTS

2.1 GENERAL

A. All components of the specified roofing system, asphalt shingle open valley membrane and guttering membrane shall be products of one (1) manufacturer or accepted as compatible and covered under the roofing membrane manufacturer's warranty.

B. EPDM Roofing System: Unless otherwise approved by the Architect and accepted roofing system manufacturer, all products (including insulation, adhesives, flashings, edging, and membrane) must be manufactured and supplied by the roofing manufacturer and covered by the warranty. Manufacturer shall ascertain in material submittals that all materials were manufactured in the United States of America (USA).

2.2 SINGLE PLY ROOFING - FULLY ADHERED

A. Manufacturers:

1. Firestone Building Products, 250 West 96th Street, Indianapolis, IN 46260, (317) 575-7000
2. Carlisle SynTec, P.O. Box 7000, Carlisle, PA 17013, (800) 479-6832
3. Versico, P.O. Box 1289, Carlisle, PA 17013, (800) 992-7663

2.3 COMPONENTS

A. All components of the roofing system shall be approved by the roofing material manufacturer for the type of installation, project location, roof deck system, drainage system, and method(s) of installation for a complete roofing system. All shop drawings submitted with this Section shall be reviewed and approved by the roofing material manufacturer and shall bear the seal of approval by the roofing material manufacturer.

B. Membrane: 060 inch thick reinforced EPDM (Ethylene Propylene Diene Terpolymer) in the largest sheet possible or as to conform to the conditions of the existing roof. The membrane shall conform to the minimum physical requirements of ASTM D 4637. ASTM D4637; conforming to the following criteria:

Properties	Test	Results
Tensile Strength	ASTM D412	1685
Elongation	ASTM D412	480
Tolerance	ASTM D412	10
Ozone Resistance	ASTM D1149	No Cracks
Brittleness	ASTM D746	-67 deg F
Water Vapor Permeance (perms)	ASTM E96/E96M [desiccant method] [water method]	.05
Exposure	ASTM G 155	No Cracks

C. Seaming Materials: As recommended by membrane manufacturer.

D. Insulation shall be polyisocyanurate, ASTM C1289, Type II, Class I, Grade 2; as supplied by the roofing manufacturer. Insulation shall consist of single layer 2-inch thick, providing R-Value of 12.10.
   1. Insulation Fasteners: Appropriate for purpose intended and approved by system manufacturer to yield 90 mph wind speed; length required for thickness of material with metal washers.
      a. Fasteners shall be of sufficient length and type approved by the roofing material manufacturer for the total amount of insulation thickness including tapered insulation. Fastener shall be selected and approved by the roofing material manufacturer for the type of insulation and thickness of insulation installed and type of roof deck in which the roofing system is being constructed upon.

E. Mechanical Fasteners:
   1. Nails, Galvanized, hot-dipped, size as required to suit application.
   2. Screws, galvanized, hot-dipped, type and size as required to suit application.

F. Washer Disc: Membrane material with adhesive backing.

G. Adhesive Materials:
   1. Surface Conditioner: type, compatible with membrane.
   2. Membrane Adhesives: As recommended by membrane manufacturer.

2.4 ACCESSORIES

A. Roofing Nails: Galvanized, hot-dipped or non-ferrous type, size as required to suit application.

B. Sealants: As recommended by membrane manufacturer.

PART 3 EXECUTION

3.1 REMOVAL OF EXISTING MEMBRANE ROOFING SYSTEM

A. Remove membrane, insulation and sheet metal work down to wood decking. Inspect wood decking for deterioration and loose sheathing. Re-fasten loose sheathing with nails of sufficient length to penetrate sheathing by 1-1/2 inch. Notify Architect and Construction Manager of deteriorated wood sheathing encountered.

3.2 REMOVAL OF EXISTING GUTTER MEMRANE

A. General: Remove only the amount of membrane that can be replaced in a watertight condition in one (1) calendar day.

B. Remove existing membranes, turn bars, nailing strips and fasteners down to wood surfaces.

3.3 EXAMINATION

A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.

B. Verify surfaces and site conditions are ready to receive Work.

C. Inspect wood surfaces, remove deteriorated wood members and replace with new wood members having same dimension and thickness to provide an overall uniform surface.

D. Verify deck is clean and smooth, free of depressions, waves, or projections, properly sloped to gutter downspouts.

E. Verify deck surfaces are dry and free of snow or ice.

3.4 PREPARATION

A. Wood Deck:
   1. Verify flatness and tight joints of wood decking.
   2. Seal joints of decking with tape.
   3. Fill knot holes with latex filler.

3.5 INSTALLATION

A. General
   1. Comply with material manufacturer's written instructions and recommendations for the installation of the membrane including proper substrate preparation, jobsite considerations and weather restrictions.

B. Insulation Installation:
   1. Ensure vapor retarder is clean and dry.
   2. Mechanically fasten insulation boards to deck.
   3. Tape joints of insulation.

C. Membrane Application:
   1. Apply primer.
   2. Placement and position membrane without stretching. Allow membrane to relax for approximately 30 minutes before bonding. Fold sheet back onto itself half of the underside of the membrane exposed.
   3. Apply bonding adhesive in accordance with material manufacturer's instructions, to underside of membrane and substrate. Allow adhesive to dry until tacky but will not stick to dry touch.
   4. Roll adhesive-coated membrane into the adhesive-coated substrate without wrinkling. Brush down bonded half of the membrane with manufacturer accepted broom brush to achieve maximum contact.
   5. Fold back unbounded half of membrane and repeat bonding procedure.

D. Membrane Splicing – Tap Splice Only
   1. Adjoining sheets of EPDM membrane shall be spliced together using splice tape and primer following roofing membrane manufacturer's written instructions.

E. Flashings And Accessories:
   1. Apply flexible flashings to seal membrane to vertical and sloped roof surfaces.
   2. Secure to flat metal nailing strips.

3.6 FIELD QUALITY CONTROL

A. Section 01 40 00 - Quality Requirements and 01 70 00 - Execution and Closeout Requirements: Field inspecting, testing, adjusting, and balancing.

B. Require site attendance of membrane materials' manufacturers daily during installation of the Work.

C. The roofing material manufacturer's field representative shall perform inspections on the work of this Section at the following sequences:
   1. Inspect roof deck conditions prior to roof insulation installation.
   2. Inspect roof deck insulation installation prior to installation of roofing membrane.
   3. Inspect roof membrane installation prior to completion of sheet metal installation.
   4. Inspect roofing system in its entirety for roof warranty.

3.7 CLEANING

A. Section 01 70 00 - Execution and Closeout Requirements: Final cleaning.

B. In areas where finished surfaces are soiled by Work of this section, consult manufacturer of surfaces for cleaning advice and conform to their documented instructions.

C. Repair or replace defaced or disfigured finishes caused by Work of this section.

3.8 PROTECTION OF INSTALLED CONSTRUCTION

A. Section 01 70 00 - Execution and Closeout Requirements: Protecting installed construction.

B. Protect building surfaces against damage from membrane Work.

END OF SECTION

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 roof drainage sheet metal fabrications.

1.3 PERFORMANCE REQUIREMENTS

A. General: Sheet metal flashing and trim assemblies as indicated 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. Fabricate and install copings capable of resisting the following forces according to recommendations in FMG Loss Prevention Data Sheet 1-49:
   1. Wind Zone 3: For velocity pressures of 46 to 104 lbf/sq. ft.: 208-lbf/sq. ft. perimeter uplift force, 312-lbf/sq. ft. corner uplift force, and 104-lbf/sq. ft. outward force.

C. Thermal Movements: Provide sheet metal flashing and trim that allows for thermal movements from ambient and surface temperature changes.
   1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.

1.4 SUBMITTALS

A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each manufactured product and accessory.

B. Shop Drawings: Show fabrication and installation layouts of sheet metal flashing and trim, including plans, elevations, expansion-joint locations, and keyed details. Distinguish between shop- and field-assembled work. Include the following:
   1. Identification of material, thickness, weight, and finish for each item and location in Project.
   2. Details for forming sheet metal flashing and trim, including profiles, shapes, seams, and dimensions.
   3. Details for joining, supporting, and securing sheet metal flashing and trim, including layout of fasteners, cleats, clips, and other attachments. Include pattern of seams.
   4. Details of termination points and assemblies, including fixed points.
   5. Details of expansion joints and expansion-joint covers, including showing direction of expansion and contraction.
   6. Details of edge conditions, including eaves, ridges, valleys, rakes, crickets, and counterflashings as applicable.

7. Details of special conditions.
8. Details of connections to adjoining work.
9. Detail formed flashing and trim at a scale of not less than 3 inches per 12 inches.

C. Samples for Initial Selection: For each type of sheet metal flashing, trim, and accessory indicated with factory-applied color finishes involving color selection.

D. Samples for Verification: For each type of exposed finish required, prepared on Samples of size indicated below:
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, Expansion Joints, Joint Intersections, and Miscellaneous Fabrications: 12 inches long and in required profile. Include fasteners and other exposed accessories.
3. Accessories and Miscellaneous Materials: Full-size Sample.
4. Anodized Aluminum Samples: Samples to show full range to be expected for each color required.

E. Qualification Data: For qualified fabricator.

F. Maintenance Data: For sheet metal flashing, trim, and accessories to include in maintenance manuals.

G. Warranty: Sample of special warranty.

1.5 QUALITY ASSURANCE

A. Fabricator Qualifications: Shop that 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.

B. Sheet Metal Flashing and Trim Standard: Comply with SMACNA's "Architectural Sheet Metal Manual" unless more stringent requirements are specified or shown on Drawings.

C. Preinstallation Conference: Conduct conference at Project site.
1. Meet with District, Architect, District's insurer if applicable, Installer, and installers whose work interfaces with or affects sheet metal flashing and trim including installers of roofing materials, roof accessories, unit skylights, and roof-mounted equipment.
2. Review methods and procedures related to sheet metal flashing and trim.
3. Examine substrate conditions for compliance with requirements, including flatness and attachment to structural members.
4. Review special roof details, roof drainage, roof penetrations, equipment curbs, and condition of other construction that will affect sheet metal flashing.
5. Document proceedings, including corrective measures and actions required, and furnish copy of record to each participant.

1.6 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 the extent necessary for the period of sheet metal flashing and trim installation.

1.7 WARRANTY

A. Special Warranty on Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace sheet metal flashing and trim that shows evidence of deterioration of factory-applied finishes within specified warranty period.

1. Exposed Panel Finish: Deterioration includes, but is not limited to, the following:

a. Color fading more than 5 Hunter units when tested according to ASTM D2244.
b. Chalking in excess of a No. 8 rating when tested according to ASTM D4214.
c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.

1. Finish Warranty Period: 10 years from date of Project completion.

PART 2 PRODUCTS

2.1 SHEET METALS

A. General: Protect mechanical and other finishes on exposed surfaces from damage by applying a strippable, temporary protective film before shipping.

B. Aluminum Sheet: ASTM B209, alloy as standard with manufacturer for finish required, with temper as required to suit forming operations and performance required.
1. As-Milled Finish: Mill finish.
2. Surface: Smooth, flat.
3. Exposed Coil-Coated Finishes:
a. Two-Coat Fluoropolymer (Unless Noted): AAMA 620. 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.
b. Siliconized Polyester (Gutters and Gutter Downspouts): Epoxy primer and silicone-modified, polyester-enamel topcoat; with a dry film thickness of not less than 0.2 mil for primer and 0.8 mil for topcoat.
4. Color: As selected by Architect from manufacturer's full range.
5. Concealed Finish: Pretreat with manufacturer's standard white or light-colored acrylic or polyester backer finish, consisting of prime coat and wash coat with a minimum total dry film thickness of 0.5 mil.

C. Stainless-Steel Sheet: ASTM A240/A240M or ASTM A666, Type 304, dead soft, fully annealed.
1. Finish: 2D (dull, cold rolled).
2. Surface: Smooth, flat.
3. Color: To be determined the Architect after contract award.

D. Stainless Steel Sheet: ASTM A167 – Sheet and Strip.

2.2 UNDERLAYMENT MATERIALS

A. Polyethylene Sheet: 6-mil- thick polyethylene sheet complying with ASTM D4397.

B. Felt: ASTM D226, Type II (No. 30), asphalt-saturated organic felt, non-perforated.

C. Self-Adhering, High-Temperature Sheet: Minimum 30 to 40 mils thick, consisting of slip-resisting polyethylene-film top surface laminated to layer of butyl or SBS-modified asphalt adhesive, with release-paper backing; cold applied. Provide primer when recommended by underlayment manufacturer.
   1. Thermal Stability: ASTM D1970; stable after testing at 240 deg F.
   2. Low-Temperature Flexibility: ASTM D1970; passes after testing at minus 20 deg F.
   3. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
      a. Carlisle Coatings & Waterproofing Inc.; CCW WIP 300HT.
      b. Grace Construction Products, a unit of W. R. Grace & Co.; Ultra.
      c. Henry Company; Blueskin PE200 HT.
      d. Metal-Fab Manufacturing, LLC; MetShield.
      e. Owens Corning; WeatherLock Metal High Temperature Underlayment.

D. Slip Sheet: Building paper, 3-lb/100 sq. ft. minimum, rosin sized.

2.3 MISCELLANEOUS MATERIALS

A. General: Provide materials and types of fasteners, solder, welding rods, protective coatings, separators, sealants, and other miscellaneous items as required for complete sheet metal flashing and trim installation and 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.
   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.
      b. Blind Fasteners: High-strength aluminum or stainless-steel rivets suitable for metal being fastened.
   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 B32, Grade Sn60, with an acid flux of type recommended by stainless-steel sheet manufacturer.

D. Sealant Tape: Pressure-sensitive, 100 percent solids, gray polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, non-sag, non-toxic, non-staining tape ½ inch wide and 1/8 inch thick.

E. Elastomeric Sealant: ASTM C920, elastomeric silicone polymer sealant; low modulus; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight.

F. Epoxy Seam Sealer: Two-part, noncorrosive, aluminum seam-cementing compound, recommended by aluminum manufacturer for exterior nonmoving joints, including riveted joints.

G. Bituminous Coating: Cold-applied asphalt emulsion complying with ASTM D1187.

H. Asphalt Roofing Cement: ASTM D4586, asbestos free, of consistency required for application.

2.4 FABRICATION, GENERAL

A. General: Custom fabricate sheet metal flashing and trim to comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, geometry, metal thickness, and other characteristics of item indicated. Fabricate items at the 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 without excessive oil canning, buckling, and tool marks and true to line and levels indicated, with exposed edges folded back to form hems.
   4. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces exposed to view.

B. Fabrication Tolerances: Fabricate sheet metal flashing and trim that is capable of installation to a tolerance of 1/4 inch in 20 feet on slope and location lines as indicated and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.

C. Fabrication Tolerances: Fabricate sheet metal flashing and trim that is capable of installation to tolerances specified in MCA's "Guide Specification for Residential Metal Roofing."

D. Sealed Joints: Form non-expansion but movable joints in metal to accommodate elastomeric sealant.

E. Expansion Provisions: Where lapped expansion provisions cannot be used, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with butyl sealant concealed within joints.

F. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal.

G. Fabricate cleats and attachment devices of sizes as recommended by SMACNA's "Architectural Sheet Metal Manual" and by FMG Loss Prevention Data Sheet 1-49 for application, but not less than thickness of metal being secured.

H. Seams: Fabricate nonmoving seams with flat-lock seams. Tin edges to be seamed, form seams, and solder.

I. Seams: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with elastomeric sealant unless otherwise recommended by sealant manufacturer for intended use. Rivet joints where necessary for strength.

J. Seams for Aluminum: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with epoxy seam sealer. Rivet joints where necessary for strength.

K. Do not use graphite pencils to mark metal surfaces.

2.5 ASPHALT SHINGLE OPEN VALLEY SHEET METAL

A. Open Valley Flashing: Fabricate from the following materials:
   1. Stainless Steel: 0.0187 inch thick.

B. Open valley flashing shall not be less than 4 inches (100mm) wide. The proper width shall be determined by the following rule: Starting at the top with a width of 4 inches (100mm), increase the width 1 inch (25mm) for every 8 feet (2.4 meters) of length of valley. Flashing pieces shall be full length sheets and of sufficient width to cover the open portion of the valley and extend up under the roofing not less than 6 inches (150mm) on each side.

C. Where two (2) valleys of unequal size come together; where the areas drained by the valley are unequal; where the slope of the valley is 26 degrees or less (6 inches or 150mm or less per foot;) V-joint 1 inch (25mm) high, shall be provided along the centerline of the valley, and edge of the valley, and the edge of the valley sheets shall extend 8 inches (200mm) under the roof covering.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, to verify actual locations, dimensions 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.

B. For the record, 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: Install underlayment as indicated on Drawings.

B. Polyethylene Sheet: Install polyethylene sheet with adhesive for anchorage to minimize use of mechanical fasteners under sheet metal flashing and trim. Apply in shingle fashion to shed water, with lapped and taped joints of not less than 2 inches.

C. Felt Underlayment: Install felt underlayment with adhesive for temporary anchorage to minimize use of mechanical fasteners under sheet metal flashing and trim. Apply in shingle fashion to shed water, with lapped joints of not less than 2 inches.

D. Self-Adhering Sheet Underlayment: Install self-adhering sheet underlayment, wrinkle free. Apply primer if required by underlayment manufacturer. Comply with temperature restrictions of underlayment manufacturer for installation; use primer rather than nails for installing

underlayment at low temperatures. Apply in shingle fashion to shed water, with end laps of not less than 6 inches staggered 24 inches between courses. Overlap side edges not less than 3-1/2 inches. Roll laps with roller. Cover underlayment within 14 days.

3.3 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, welding rods, 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 and levels indicated. 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. Provide continuous cleats. Anchor each cleat with fasteners, spaced at 12 inches on center, maximum.
   4. Install exposed sheet metal flashing and trim without excessive oil canning, buckling, and tool marks.
   5. Install sealant tape where indicated or required.
   6. Torch cutting of sheet metal flashing and trim is not permitted.
   7. Do not use graphite pencils to mark metal surfaces.

B. Metal Protection: Where dissimilar metals will contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with bituminous coating or by other permanent separation as recommended by SMACNA.
   1. Coat back side of aluminum and stainless-steel sheet metal flashing and trim with bituminous coating where flashing and trim will contact wood, ferrous metal, or cementitious construction.
   2. Underlayment: Where installing metal flashing directly on cementitious or wood substrates, install a course of felt underlayment and cover with a slip sheet or install a course of polyethylene sheet.

C. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet with no joints allowed within 24 inches of corner or intersection. Where lapped expansion provisions cannot be used or would not be sufficiently watertight, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with sealant concealed within joints.

D. Fastener Sizes: Use fasteners of sizes that will penetrate wood sheathing not less than 1-1/4 inches for nails and not less than 3/4 inch for wood screws and metal decking not less than recommended by fastener manufacturer to achieve maximum pull-out resistance.

E. Seal joints as shown and as required for watertight construction.
   1. Where sealant-filled joints are used, 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 moderate, 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 Division 07 Section "Joint Sealants."

F. Soldered Joints: Clean surfaces to be soldered, removing oils and foreign matter. Pre-tin edges of sheets to be soldered to a width of 1-1/2 inches, except reduce pre-tinning where pre-tinned surface would show in completed Work.
   1. Do not solder aluminum sheet.
   2. Do not use torches for soldering. 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 recommended 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.

G. Rivets: Rivet joints in uncoated aluminum where indicated and where necessary for strength.

3.4 ROOF FLASHING INSTALLATION

A. General: Install sheet metal flashing and trim to comply with performance requirements and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, set units true to line, and level as indicated. Install work with laps, joints, and seams that will be permanently watertight and weather resistant.

B. Roof Edge Flashing: Anchor to resist uplift and outward forces according to recommendations in SMACNA's "Architectural Sheet Metal Manual" and as indicated. Interlock bottom edge of roof edge flashing with continuous cleat anchored to substrate at staggered 3-inch centers.

C. Copings: Anchor to resist uplift and outward forces according to recommendations in SMACNA's "Architectural Sheet Metal Manual" and as indicated.
   1. Interlock exterior bottom edge of coping with continuous cleat anchored to substrate at 16-inch centers.
   2. Anchor interior leg of coping with washers and screw fasteners through slotted holes at 24-inch centers.

D. Pipe or Post Counterflashing: Install counterflashing umbrella with close-fitting collar with top edge flared for elastomeric sealant, extending a minimum of 4 inches over base flashing. Install stainless-steel draw band and tighten.

E. Counterflashing: Coordinate installation of counterflashing with installation of base flashing. Insert counterflashing in receivers and fit tightly to base flashing. Extend counterflashing 4 inches over base flashing. Lap counterflashing joints a minimum of 4 inches and bed with sealant. Secure in a waterproof manner by means of interlocking folded seam or blind rivets and sealant or anchor and washer at 36-inch centers.

F. Roof-Penetration Flashing: Coordinate installation of roof-penetration flashing with installation of roofing and other items penetrating roof. Seal with elastomeric sealant and clamp flashing to pipes that penetrate roof.

3.5 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 as indicated 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."

3.6 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 installation, remove unused materials and clean finished surfaces. Maintain in a 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

SECTION 09 91 50
EXTERIOR REPAINTING

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 his Section.

1.2 SCOPE

A. Section Includes: All labor, materials, tools and other equipment, services and supervision required to complete all exterior repainting work as indicated on Finish Schedules and to the full extent of the drawings and specifications.
   1. The intent of this Section is provide uniform painted surface appearance for:
      a. Repaint all previously painted exterior surfaces

B. Work under this Contract shall also include, but not necessarily be limited to:
   1. Surface preparation of substrates as required for acceptance of paint, including cleaning, small crack repair, patching, caulking, and making good surfaces and areas to the limits defined under MPI Repainting Manual Preparation requirements.
   2. Specific pre-treatments noted herein or specified in the MPI Repainting Manual.
   3. Sealing / priming surfaces for repainting in accordance with MPI Repainting Manual requirements.

C. Refer to drawings and schedules (e.g., Finish Schedule) for type, location and extent of exterior repainting required, and includes all touch-ups necessary to complete work shown, scheduled or specified.

D. This Section along with the drawings a form part of the Contract documents and is to be read, interpreted and coordinated with all other parts.

1.3 QUALITY ASSURANCE

A. Paint Contractor shall have a minimum of five (5) years proven satisfactory experience and shall show proof before commencement of work that he will maintain a qualified crew of painters throughout the duration of the work. When requested, Contractor shall provide a list of the last three comparable exterior repainting jobs including, name, location, Owner/Architect / project manager, start / completion dates and value of the work of the Paint Contractor.

B. Only qualified journeypersons, as defined by local jurisdiction, shall be engaged in exterior repainting work. Apprentices may be employed provided they work under the direct supervision of a qualified journeyperson in accordance with trade regulations.

C. All materials, preparation and workmanship shall conform to the standards contained in the latest edition of the Master Painters Institute (MPI) Maintenance and Repainting Manual (herein referred to as the MPI Repainting Manual).

D. All surfaces requiring repainting shall be inspected by the Painting Contractor who shall notify the Construction Manager, Architect, and General Contractor in writing of any defects or problems, prior to commencing repainting or after preparation work.

E. Where "special" coatings or decorating systems (i.e. textured coatings or non-MPI listed products or systems) are to be used in repainting, the paint manufacturer shall provide as part of this work, certification of all surfaces and conditions for specific paint or coating system application as well as on site supervision, inspection and approval of their paint or coating system application as required at no additional cost to the Owner.

F. Contractor shall maintain on site one (1) copy of the MPI Painting Manual, MPI Repainting Manual, and MPI Maintenance Repainting Manual at all times when painting work is in progress. Manuals shall be available for review where construction drawings and specifications are maintained.

1.4 REGULATORY REQUIREMENTS

A. Conform to work place safety regulations for storage, mixing, application and disposal of all paint related materials to requirements of those authorities having jurisdiction.

B. Conform to safety precautions in accordance with the latest requirements to Industrial Health and Safety Regulations, latest edition, of authorities having jurisdiction.

C. To reduce the amount of contaminants entering waterways, sanitary / storm drain systems or into the ground the following procedures shall be strictly adhered to:

1. Retain cleaning water for water-based materials to allow sediments to be filtered out. In no case shall equipment be cleaned using free draining water.
2. Retain cleaners, thinners, solvents and excess paint and place in designated containers and ensure proper disposal.
3. Return solvent and oil soaked rags used during painting operations for contaminant recovery, proper disposal, or appropriate cleaning and laundering.
4. Dispose of contaminants in an approved legal manner in accordance with hazardous waste regulations.
5. Empty paint cans are to be dry prior to disposal or recycling (where available).
6. Close and seal tightly partly used cans of materials including sealant and adhesive containers and store protected in well ventilated fire-safe area at moderate temperature.

D. Where paint recycling is available, collect waste paint by type and provide for delivery to recycling or collection facility.

1.5 MOCK-UPS

A. When requested by the Consultant or Paint Inspection Agency, prepare and repaint a designated exterior surface area or item to requirements specified herein, with specified paint or coating showing selected colors, gloss / sheen, texture and workmanship to MPI Repainting Manual standards for review and approval. When approved, exterior surface area and/or item shall become acceptable standard of finish quality and workmanship for similar on-site repainting work.

1. 20 linear feet of wood cornice work including fascia, crown mold, soffit, dentil and back band.
2. Wood window frame, exterior surfaces, one (1) entire unit, exterior sides.
3. Wood door frame, exterior surfaces, one (1) entire unit, exterior sides.

1.6 SUBMITTALS

A. All submittals shall be in accordance with the requirements of Section 01 30 00 - Submittals.

B. Submit written proof of ability to supply a 100% two (2) year Maintenance Bond, if Paint Association warranty option is not used with Bid Submission.

C. Submit a list of all painting materials to the Architect for review prior to ordering materials.

D. Submit two sets of Material Safety Data Sheets (MSDS) prior to commencement of work for review and for posting at job site as required.

E. Submit certification reports for ecologo paint products used.

F. Submit invoice list of all paint materials ordered for project work to Paint Inspection Agency indicating manufacturer, types and quantities for verification and compliance with specification and design requirements if requested.

G. Submit work schedule for various stages of work for the Architect's review and Owner's approval if requested.

H. At project completion provide an itemized list complete with manufacturer, paint type and color coding for all colors used for Owner's later use in maintenance.

I. At project completion provide properly packaged maintenance materials as noted herein and obtain a signed receipt.

1.7 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Deliver all painting materials in sealed, original labeled containers bearing manufacturer's name, brand name, type of paint or coating and color designation, standard compliance, materials content as well as mixing and/or reducing and application requirements.

B. Store all paint materials in original labeled containers in a secure (lockable), dry, heated and well ventilated single designated area meeting the minimum requirements of both paint manufacturer and authorities having jurisdiction and at a minimum ambient temperature of 45□ F (7□ C). Only material used on this project is to be stored on site.

C. Where toxic and/or volatile / explosive / flammable materials are being used, provide adequate fireproof storage lockers and take all necessary precautions and post adequate warnings (e.g. no smoking) as required.

D. Take all necessary precautionary and safety measures to prevent fire hazards and spontaneous combustion and to protect the environment from hazard spills. Materials

that constitute a fire hazard (paints, solvents, drop clothes, etc.) shall be stored in suitable closed and rated containers and removed from the site on a daily basis.

E. Comply with requirements of authorities having jurisdiction, in regard to the use, handling, storage and disposal of hazardous materials.

1.8 PROJECT/SITE REQUIREMENTS

A. UNLESS specifically pre-approved by the Architect and the applied product manufacturer, perform no exterior repainting work when the ambient air and substrate temperatures are below 50 degrees F (10 degrees C).

B. Perform no exterior repainting work unless environmental conditions are within MPI and paint manufacturer's requirements or until adequate weather protection is provided. Where required, suitable weatherproof covering and sufficient heating facilities shall be in place to maintain minimum ambient air and substrate temperatures for 24 hours before, during and after paint application.

C. Perform no exterior repainting work when the relative humidity is above 85% or when the dew point is less than 5 degrees F (3 degrees C) variance between the air / surface temperature.

D. Perform no exterior repainting work when the maximum moisture content of the substrate exceeds:
1. 15% for wood.

E. Conduct all moisture tests using a properly calibrated electronic Moisture Meter.

F. Test concrete and masonry surfaces for alkalinity as required.

G. Apply paint only to dry, clean, and adequately prepared surfaces in areas where dust is no longer generated by construction activities such that airborne particles will not affect the quality of finished surfaces.

1.9 SCHEDULING

A, Schedule repainting operations to prevent disruption of and by other trades when applicable.

B. Schedule repainting operations to prevent disruption of Owner's operations or building occupants. Obtain written authorization from Architect / Owner for changes in work schedule.

C. Phased work shall be in accordance with the requirements of Sections 01 01 00 - Summary of Work and Section 01 32 00 - Construction Progress Documentation.

1.10 GUARANTEE

A. Furnish a two (2) year Painting Association Guarantee or a 100% two (2) year Maintenance Bond both in accordance with MPI Repainting Manual requirements. The Maintenance Bond shall be obtained from an approved bonding company and shall warrant that all repainting work has been performed in accordance with MPI Repainting Manual requirements.

B. All exterior repainting work shall be in accordance with MPI Repainting Manual requirements and shall be inspected by the Painting Association whether using the Painting Association Guarantee or the Maintenance Bond option.

C. Painting Contractors choosing the Maintenance Bond option shall provide written proof of their ability to supply same at time of bidding.

1.11 MAINTENANCE MATERIALS

A. At project completion, furnish extra materials described below from same production run (batch mix) as materials applied and that are packaged for storage and identified with labels describing contents.
   1. Quantity: Furnish 5 gallons of each neutral color and 1 gallon of each other color for each material applied.
   2. Copy of written tinting schedule for all paint applied.

1.12 PRE-INSTALLATION CONFERENCE

A. Conduct conference at project site, in accordance with the requirements of Division 1 Section "Preinstallation Conference."

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers:
   1. Benjamin Moore
   2. PPG Architectural Finishes, Inc.
   3. Sherwin-Williams Company (The)

2.2 MATERIALS

A. All materials (primers, paints, coatings, varnishes, stains, lacquers, fillers, thinners, solvents, etc.) shall be products listed in the latest edition of the MPI Approved Product List and shall be from a single manufacturer for each system used.

B. Other paint materials such as linseed oil, shellac, turpentine, etc. shall be the highest quality product of an approved manufacturer listed in the MPI Approved Product List and shall be compatible with other coating materials as required.

C. All materials and paints shall be lead and mercury free.

D. Where required, paint products shall meet "MPI Environmentally Friendly" E2 ratings based on VOC (EPA Method 24) content levels.

E. All paint materials shall have good flowing and brushing properties and shall dry or cure free of blemishes, sags, air entrapment, etc. Refer to 3.5, Field Quality Control / Standard of Acceptance requirements.

2.3 EQUIPMENT

A. Painting Equipment: to best trade standards for type of product and application.

B. Spray-Painting Equipment: of ample capacity, suited to the type and consistency of paint or coating being applied and kept clean and in good working order at all times.

2.4 MIXING AND TINTING

A. Unless otherwise specified or pre-approved, all paints shall be ready-mixed and pre-tinted. Re-mix all paint in containers prior to and during application to ensure break-up of lumps, complete dispersion of settled pigment, and color and gloss uniformity.

B. Paste, powder or catalyzed paint mixes shall be mixed in strict accordance with manufacturer's written instructions.

C. Where thinner is used, addition shall not exceed paint manufacturer's recommendations.

D. If required, thin paint for spraying in strict accordance with paint manufacturer's instructions. If directions are not on container, obtain instructions in writing from manufacturer and provide copy of instructions to Consultant.

PART 3 - EXECUTION

3.1 PREPARATION OF SURFACES

A. Prepare all exterior surfaces for repainting in accordance with MPI Repainting Manual requirements. Refer to the MPI Repainting Manual in regard to specific requirements for the following:
1. environmental conditions.
2. rust stain removal.
3. mildew removal
4. dimension and dressed lumber.
5. wood doors.
6. wood windows
7. wood plywood, soffit

B. Sand, clean, dry, etch, neutralize and/or test all surfaces under adequate illumination, ventilation and temperature requirements.

C. Remove and securely store all miscellaneous hardware and surface fittings / fastenings (e.g. electrical lights, mechanical louvers, door and window hardware (e.g. hinges, knobs,

locks, trim, frame stops) and, removable hazard / instruction labels. from wall and soffit surfaces, doors and frames, prior to repainting and replace upon completion. Carefully clean and replace all such items upon completion of repainting work in each area. Do not use solvent or reactive cleaning agents on items that will mar or remove finishes (e.g. lacquer finishes). Doors shall be removed before repainting to paint bottom and top edges and then re-hung.

D. Protect all exterior surfaces and areas, including landscaping, walks, drives, all adjacent building surfaces (including glass, aluminum surfaces, etc.) and equipment and any labels and signage from repainting operations and damage by drop cloths, shields, masking, templates, or other suitable protective means and make good any damage caused by failure to provide such protection.

3.2 APPLICATION

A. Do not commence repainting unless substrates and all environmental conditions are acceptable for the application of products.

B. Apply primer and paint in accordance with MPI Painting Manual Premium Grade finish requirements.

C. Apply primer and paint in a workmanlike manner using skilled and trade qualified applicators as noted under Quality Assurance.

D. Apply primer and paint within an appropriate time frame after cleaning and preparation to prevent weathering or water staining of substrate or before environmental conditions encourage flash-rusting, rusting, contamination or when the manufacturer's paint specifications require earlier applications.

E. Primer and paint coats specified are intended to cover surfaces satisfactorily when applied at proper consistency and in accordance with manufacturer's recommendations.

F. Tint each coat of paint progressively lighter to enable confirmation of number of coats.

H. Sand and dust between each coat to provide an anchor for next coat and to remove defects (runs, sags, etc.) visible from a distance up to 39" (1000mm).

I. Do not apply finishes on exterior surfaces that are not sufficiently dry. Unless manufacturer's directions state otherwise, each coat shall be sufficiently dry and hard before a following coat is applied.

J. To avoid air entrapment in applied coats, apply materials in strict accordance with manufacturer's spread rates and application requirements.

3.3 EXTERIOR FINISH/COATING SYSTEMS

A. Repaint exterior surfaces in accordance with the following MPI Repainting Manual requirements:
   1. Dressed Lumber: (windows, smooth fascia, dentil, back band, crown molding, etc.); REX 6.3ALatex, G-5 finish for door frames, windows, and smooth cornice members
   2. Wood Paneling: (plywood soffits); REX 6.4A Latex, G-5 finish for plywood soffit and battens

.

3.4 FIELD QUALITY CONTROL/STANDARD OF ACCEPTANCE

A. All surfaces, preparation and paint applications shall be inspected.

B. Repainted exterior surfaces shall be considered to lack uniformity and soundness if any of the following defects are apparent to the Painting Inspection Agency inspector:
   1. brush / roller marks, streaks, laps, runs, sags, drips, heavy stippling, hiding or shadowing by inefficient application methods, skipped or missed areas, and foreign materials in paint coatings.
   2. evidence of poor coverage at rivet heads, plate edges, lap joints, crevices, pockets, corners and re-entrant angles.
   3. damage due to touching before paint is sufficiently dry or any other contributory cause.
   4. damage due to application on moist surfaces or caused by inadequate protection from the weather.
   5. damage and/or contamination of paint due to wind blown contaminants (dust, sand blast materials, salt spray, etc.).
   6. Repainted exterior surfaces shall be considered unacceptable if any of the following are evident under natural lighting conditions:
      a. visible defects are evident on vertical surfaces when viewed at 90 degrees to the surface from a distance of 39" (1000mm).
      b. visible defects are evident on horizontal surfaces when viewed at 45 degrees to the surface from a distance of 39" (1000mm).
      c. visible defects are evident on soffit and other overhead surfaces when viewed at 45 degrees to the surface
      d. when the final coat on any surface exhibits a lack of uniformity of sheen across full surface area.

C. Repainted surfaces rejected by the Architect shall be made good at the expense of the Contractor. Small affected areas may be touched up; large affected areas or areas without sufficient dry film thickness of paint shall be repainted. Runs, sags of damaged paint shall be removed by scraper or by sanding prior to application of paint.

3.5 PROTECTION

A. Protect all newly repainted exterior surfaces from rain and snow, condensation, contamination, dust, salt spray and freezing temperatures until paint coatings are completely dry. Curing periods shall exceed the manufacturer's recommended minimum time requirements.

B. Erect barriers or screens and post signs to warn, limit or direct traffic away or around work area as required.

3.6 CLEAN-UP

A. Remove all paint where spilled, splashed, splattered or sprayed as work progresses using means and materials that are not detrimental to affected surfaces.

B. Keep work area free from an unnecessary accumulation of tools, equipment, surplus materials and debris.

C. Remove combustible rubbish materials and empty paint cans each day and safely dispose of same in accordance with requirements of authorities having jurisdiction.

C. Clean equipment and dispose of wash water / solvents as well as all other cleaning and protective materials (e.g. rags, drop cloths, masking papers, etc.), paints, thinners, paint removers/strippers in accordance with the safety requirements of authorities having jurisdiction.

END OF SECTION

APPENDIX C – QUALIFICATIONS

HARDLINES DESIGN COMPANY
Architecture·Cultural Resources Management·Planning

Charissa W. Durst, AIA, LEED AP
Project Manager

Project Responsibility

Project Manager
Historic Architect

Education

Master of Architecture, 1990, The Ohio State University

B.S., Architecture 1988, University of Maryland

Work History

Years with HDC: 23

Prior Experience: 4

Registration

Registered Architect, Ohio, 1996; Maryland, 2011; West Virginia, 2012

National Council of Architectural Registration Boards (NCARB), 2003

Leadership in Energy & Environmental Design (LEED), 2002

CRM Qualifications

Historic Architect

Architectural Historian

Professional Affiliations

American Institute of Architects

U.S. Green Building Council

German Village Historical Commission

Columbus Landmarks Foundation

Relevant Project Experience

Ms. Durst, President of Hardlines Design Company, established the firm in 1990. She has a total of 27 years of professional experience in the assessment of existing and historic buildings. She has authored maintenance guidelines, conducted assessment and feasibility studies, developed architectural design standards, and done renovation master plans for educational, cultural, and community center projects.

Selected Projects

- *Historic Structure Report (HSR) for the Richmond-Hamilton House, New River Grge National River, WV:* Project Architect for the assessment and treatment plan of a historic house owned by the National Park Service. The project also included the production of CAD drawings, historical research, and the preparation of the National Register of Historic Places nomination.
- *Historic Structure Report (HSR) for the Lathrop House, Sylvania, OH:* Project Architect for the assessment and rehabilitation master plan of a mid-19th century Greek Revival style timber house significant as part of the Underground Railroad. The HSR documented the physical condition of the building, its various eras of significance, and identified associated historic features. The project also included implementing Phase I Exterior Stabilization, which included a new roof, structural stabilization of the first floor, and restoration of the siding, windows, and doors.
- *Historic Structure Report (HSR) for the MHSA Building, McAlester, OK.* Project Architect for an HSR of an early-20th century brick building that has been the home of federal mine inspectors since 1915. The HSR documented the history of the building and community, its physical condition, and provided a phased plan to rehabilitate the building. The project also included implementing Phase I Exterior Stabilization, which included masonry repointing and repair, a new EPDM roof, new windows to replace the 1970s era units, and sitework.
- *Historic Building Maintenance Plan, WPAFB, OH.* Developed preservation plan for the treatment of historic building materials and features at Wright-Patterson Air Force Base. Targeted areas include brick masonry, reinforced concrete, steel industrial sash windows, clay tile roofs, stone walls, slate roofs, terra cotta tile cornice details, aluminum panels, and stained glass.
- *Infrastructure Condition Assessment, Air Force Materiel Command.* Project Architect for the building assessments of various historic and modern facilities on air force bases nationwide. Researched and documented building conditions using digital photographs, construction drawings, work order requests, and interviews with building managers. Work also included development of software program to assist maintenance personnel in the building audit process.
- *Historic Preservation Plans at Various Installations Nationwide.* Project Architect in preparation of master plans and building-specific recommendations for historic military buildings in Ohio, Indiana, Illinois, Utah, Florida, Georgia, Mississippi, and Louisiana.
- *Woodward Opera House, Mount Vernon, OH.* $14 million 8-phase renovation of an 1850s National Register listed, mixed-use building that includes the renovation of one of the oldest theatres in the United States. Multi-use program includes first floor retail and restaurants, leased offices, and the two-story theatre. Project included code review, programming, and building assessments for the entire structure.
- *Davis-Shai Community Center, Heath, OH.* Completion of an assessment and feasibility study and subsequent architectural rehabilitation of a 6,000-square-foot building. Ms. Durst led the design team in implementing the report's recommendations into construction drawings that addressed deficiencies and renovated a historic 1860s brick home into a contemporary Community Center. The project included a new two-story addition that contains public restrooms, elevator, and meeting rooms.

HARDLINES DESIGN COMPANY
Architecture-Cultural Resources Management-Planning

William G. Faciane, AEI, CSI
Facilities Planner

Project Responsibility

Building Assessor, Exterior Enclosure Specialist, and Estimator

Education

2000-Present – Coursework to complete B.S. in Structural Engineering, The Ohio State University

1983 – Certificate in Commercial Building HVAC

1977 – Diploma in Heavy Construction and Residential Construction

1974-1977 - Coursework for B.S. in Architectural Engineering, Virginia Polytechnic Institute

1973 - U.S. Navy Seabee Construction "A" School, Gulfport, Mississippi.

Work History

Years with HDC: 16

Prior Experience: 24

Professional Affiliations

Naval Reserve: Senior Chief Petty Officer Builder (Grade E-8) with non-billet status to Naval Mobile Construction Battalion 23.

Constructions Specifications Institute, (CSI)

American Society of Civil Engineers

Architectural Engineering Institute (AEI)

Relevant Project Experience

Mr. Faciane is an Architectural Engineer and Facilities Planner with 39 years of experience in the construction industry as a heavy commercial contractor, an owner's representative, and as a designer. He prepares specifications, cost estimates, engineering design, and does document coordination on projects at Hardlines Design Company. Mr. Faciane served as the building engineering member of the infrastructure assessment team that visited 13 AFMC bases nationwide. As the Senior Facilities Planner for the City of Hampton, Virginia, Mr. Faciane conducted building audits of and wrote reports for city buildings ranging from modern to masonry structures built in the 17th century.

Selected Projects

- *Historic Structure Report (HSR) for the Richmond-Hamilton House, New River Gorge National River, WV:* Prepared treatment recommendations and cost estimates for a historic house owned by the National Park Service. The project also included the production of CAD drawings, historical research, and the preparation of the National Register of Historic Places nomination.
- *Infrastructure Condition Assessment of 13 AFMC Bases, Nationwide.* Architectural Engineer for $1.25-million, 3-year project to provide baseline assessment of the condition of buildings, pavement/grounds, airfields, water/wastewater, and utility systems at all AFMC bases nationwide. Work covered historic early twentieth-century masonry structures as well as modern laboratories.
- *OSU Baker Hall Exterior Rehabilitation, Columbus, OH.* Project to solve on-going moisture penetration problems with a historic masonry bearing wall high-rise dormitory. Completed non-destructive exploratory demolition and in-depth inspection of problem wall and roof areas and prepared documents to correct the problems. Project will be used as model to solve similar problems at other historic high-rise facilities.
- *OSU Faculty Club Window Replacement, Columbus, OH.* Project to replace historic steel window units with new ones. Completed cost-benefit analysis of repairing existing units, using new aluminum units, and using new steel units. Coordinated construction around building activities and tenants. As part of this work HDC also conducted an assessment of the building's exterior masonry needs.
- *Woodward Opera House, Mount Vernon, OH.* $14 million, 8-phase renovation of an 1850s National Register listed, mixed-use building that includes the renovation of one of the oldest theatres in the United States. Multi-use program includes first floor retail and restaurants, leased offices, and the two-story theatre. Project included code review, programming, and building assessments for the entire structure.
- *727 East Main Street, Columbus, OH.* Completed an assessment report of existing architectural and engineering systems. Report included description of existing systems, identification of remaining life cycle, and recommendations with cost estimates to renovate the facility. This information aided the Department of Administrative services in their decision to purchase the facility.
- *Assessment of the South Dorm, Columbus, OH.* Conducted existing conditions assessment of historic South Dorm facility for the city of Columbus Department of Public Health. Work also included repair recommendations and cost estimates for adaptive reuse as offices.
- *Highland Elementary School Roof, Columbus, OH.* Manager project to replace roof of historic 1890s masonry school for Columbus Public Schools. Work included a detailed assessment of roof and masonry wall conditions, preparation of three-dimensional details, and construction administration.

HARDLINES DESIGN COMPANY
Architecture·Cultural Resources Management·Planning

Feliciano K. Rahardjo, LEED BD+C
Intern Architect

Project Responsibility
Fieldwork, CAD Production

Education
Master of Architecture, 2009
Boston Architectural Center

B.S. Architecture, 2001
The Ohio State University

Work History
Years with HDC: 9
Prior Experience: 2

Registration
Leadership in Energy & Environmental Design (LEED), 2004

Professional Affiliations
U.S. Green Building Council

Relevant Project Experience

Mr. Rahardjo has conducted multiple assessments of exterior masonry construction and roofs and been responsible for the production of as-built drawings and construction documents. He is proficient in a variety of computer modeling and rendering applications, and he is experienced in the development of architectural details.

Selected Projects

- *Columbus City Schools Roof Assessment, Columbus, OH.* Conducted **assessment** of three schools and two maintenance buildings. Compiled recommendation report and cost estimates. Complete construction documents for three buildings on a fast-track basis to complete replacement work during summer break.
- *Baltimore & Ohio Railroad Depot, Mount Vernon, OH.* Exterior Specialist for the adaptive reuse of a historic railroad station into a facility to house conferences, offices, and a railroad museum. Work involved new HVAC, electrical, plumbing, and fire alarm systems, new restrooms, **ADA upgrades**, structural reinforcement, **code research**, and coordination for historic building variances.
- *Woodward Opera House, Mount Vernon, OH.* $14 million, 8-phase renovation of a 1850s National Register listed, mixed-use building that includes the renovation of one of the oldest theatres in the United States. Multi-use program includes first floor retail and restaurants, leased offices, and the two-story theatre. Project included **code review**, programming, and **building assessments for the entire structure**.
- *Lincoln Theatre Renovation & Addition, Columbus, OH.* Exterior Specialist for a $10.8 million renovation to convert a 1920s downtown theatre into a state-of-the-art facility that can serve as a multi-purpose performing arts center. Project involved **a building assessment,** rehabilitation of the existing theatre, construction of a new balcony, and additions to the west and south to house modern and **code-compliant** patron and performer amenities.
- *Waterworks Building, S. Charleston, OH.* Complete schematic and design development drawings for the renovation of a waterworks building constructed in 1916. The facility will be converted into a park facility with restrooms and a multi-purpose space.
- *Renovation of Five Group Homes, Columbus, OH.* Project to renovate five homes for the ADAMH Board of Franklin County. One home was located in a City historic district and the design had to be submitted through the preservation committee. Work include roof repairs, finish repairs, restrooms, **ADA upgrades**, site improvements, and **moisture penetration repairs**.
- *Oyler School, Cincinnati, OH.* Exterior Specialist for the renovation of a 1930s glazed terra cotta masonry school for Cincinnati Public Schools. Work included **detailed assessment** of roof and wall conditions, detail drawings to repair and restore terra cotta masonry back to the original finish, and construction administration.
- *Westwood School, Cincinnati, OH.* Exterior Specialist for the renovation of an $8 million restoration and addition to a glazed terra cotta masonry school for Cincinnati Public Schools. Work included **a detailed assessment** to identify structural deficiencies and to locate moisture intrusions, cost estimates, and design work; including an entire roof replacement, and the repair and reinforcement of the solid brick masonry walls and terracotta parapets.