CLARENDON COUNTY FIRE STATION

ASSESSMENT REPORT:
EXAMINATION OF EXTERIOR CURTAIN WALL AND ROOF SYSTEMS

PREPARED BY: JEREMY TATE, FILLMORE WILSON, & MIKE HANCE

MEADORS

RESTORATION ARCHITECTURE CONSTRUCTION DESIGN SERVICES ARTISANS

January 22, 2013

Thomas Harvin
Facilities Manager
Clarendon County
411 Sunset Drive
Manning, SC 29102

RE: Assessment of the Clarendon County Fire Station

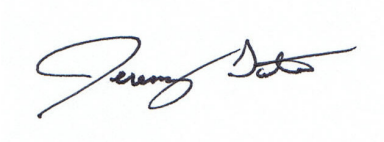
Dear Mr. Harvin,

Thank your for giving Meadors Construction the opportunity to work with you.

Please accept the following assessment report for the Clarendon County Fire Station. The following report is a collaborative effort between Meadors and Michael H. Hance, PE LLC, Structural Design and Consulting. The report is for your use in soliciting appropriate bidders in an effort to select a contractor(s) to complete the repair work. We suggest that all contractors allowed to submit sealed bids be prequalified.

Again, thank you for giving us the opportunity to work with you. Should you have any questions or concerns, please don't hesitate to contact me.

Sincerely,



Jeremy Tate
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Introduction

On Wednesday, October 10, 2012, Meadors conducted a field assessment on the Clarendon County Fire Station. Fillmore Wilson and Jeremy Tate represented Meadors and Mike Hance (Michael H. Hance PE, LLC Structural Engineers) was also part of the team. The object of this assessment was to inspect both the roof and exterior curtain walls of the structure. The roof has had numerous patches/repairs and yet it still leaks water into the building. The curtain walls show cracks in both the structural concrete masonry unit walls and the brick and split-face veneer walls. The following report and annotated photographs explain and illustrate our findings.

Methodology

The assessment consisted of selective non-structural demolition and photographic documentation of visual observation. Assesssment of the curtain wall system began with a visual observation and notation of the existing cracks and definciencies of the exterior walls along with a comparison of the existing construction with the original architect's drawings. Small holes were drilled into selected exterior curtain walls from the interior side of the wall at select locations to determine whether the cells of the concrete masonry unit blocks were grouted solid as indicated on the architectural plans. At two locations, a 1 inch diameter hole was drilled to accommodate the head of a camera to explore the condition of a concrete masonry unit cell. To assess the condition of the roof, a 40 foot articulating lift was used to give access to view the roof from above.

Building Chronology

The Clarendon County Fire Station was designed by Stewart Cooper Architects (License #190) in May of 1998 and the structural engineer was A. Daniel Coggin, PE (License #12562). The building is a pre-engineered metal building with a concrete masonry unit curtain wall veneered with a combination of brick and split-face. The building is one story, with a height of 21'-0" and area of 19,634 square feet. A soil bearing capacity of 2500 pounds per square feet was reported in the architect's drawings. The foundation is a combination of isolated column footings and 6" concrete slab with edge turn-down. The foundation is not supported on piles. Foundation design was based on a subsurface exploration by Geo-Systems Design & Testing Inc. dated December 12, 1997.

The Clarendon County Sheriff's Department was designed by Stewart Cooper Architects (License #190) in May of 2000 and the structural engineer was A. Daniel Coggin, PE (License #17886). The building is built directly adjacent to the Clarendon County Fire Station and is connected to the fire station by way of a 1" expansion joint. The sheriff's department is a two story structure with 11,428 sf on the first floor and 11,428 sf on the second floor for a total of 22,856 sf. The building is a structural steel framed building, with light-guage metal stud exterior walls veneered in a combination of brick and split-face block. The building height is 30'-0". A soil bearing capacity of 2500 psf was reported in the architect's drawings. The foundation is a combination of reinforced concrete spread footings and 4" concrete slab with edge turn-down. The foundation is not supported on piles. Foundation design was based on a subsurface exploration by Geo-Systems Design & Testing Inc. dated November 24, 1999.

The combined square footage of the Fire Station and Sheriff's department is 30,991 sf first floor

and 11,428 sf second floor for a total of 42,419 sf. Only the Clarendon County Fire Station was inspected for this report.

Roof Assembly

Investigation

The roof of the Clarendon County Fire Station is a Structural Standing Seam Metal Roof panel assembly (SSSMR). The finish roof panels are supported by a premanufactured metal/steel roof framing system consisting of steel purlins running north to south spaced 5'-0" on center. The purlins are installed to give the roof a pitch of 1/4" per foot running from the high side (east) to the low side (west). The SSSMR roof panels run perpindicular (east to west) to the roof purlins.

Due to the length of the roof system, the SSSMR panels are installed in shorter segments. At the roofs deepest dimension, there are four segments of roof panels which equates to three end lap conditions in the length of those roofing panels (see drawing A104). Where an end lap between two panels occur, the panels are positively lapped and the lap is covered by a lockbar as shown in photos 3 & 4. Each lock bar is face-fastened with sheet metal fasteners and gasketed neoprene or rubber (EPDM) washers. Each panel has a lockbar in the pan of the panel that also folds over the northern standing seam rib of the panel. Each lockbar has nine (9) fasteners. This process repeats across the standing seam panels resulting in approximately 157 lockbars in the roof assembly and 1,413 lockbar gasketed fasteners.

The western edge of the roof (lowest section of roof) terminates at the surface attached box gutter. At this location, there are 10 face fasteners per standing seam roof panel and there are 96 standing seam roof panels along the western edge of the building which equates to 960 gasketed face fasteners at the roof edge. The outside edge of the surface attached box gutter is installed higher than the metal standing seam roof panels as shown in illustration (drawing A1).

The roof has six (6) HVAC exhaust fan penetrations, four (4) gas heater vent penetrations, and six (6) plumbing vent penetrations. These are illustrated on the roof plan (drawing A104).

The southern, eastern, and northern edges of the roof are enclosed by a short parapet wall. The parapet wall is capped by a non-continuous metal cap flashing. Each segment of the cap flashing is butted next to the adjacent section with a backup plate of metal spanning under the joint between the two cap flashings. The cap flashing covers over the face fastened 26 guage painted metal panels that clad the vertical portion of the parapet wall. The base of the vertical metal wall cladding panels terminate at an 'L' shaped metal leader counterflashing that laps over the ribs of the metal standing seam roof panels. Between the ribs of the standing seam panels there is a metal roof pan closure panel installed at the base of the perimeter walls. See photos 15 & 16 for an illustration.

Findings

Structural Standing Seam Metal Roof panels are designed to resist the passage of water at joints, junctures, and laps under hydrostatic pressure. They are capable of spanning structural members without continuous support of a roof deck and do not require a roof underlayment. These types of roofs are prone to leaks over time due to the expansion and contraction process which elongates the fastener holes and loosens the fasteners. These fasteners depend on a gasketed neoprene or EPDM washer to create a tight seal. Wind uplift and foot traffic due to maintenance and inspection can also deflect the roof panels. Due to these considerations, the US Army Corps of Engineers, in regards to their building projects, only recommend this type of roof application for agricultural, industrial, warehouse, or utility metal buildings and not for office, classroom, or other conditioned spaces.

Visual inspection reveals that the SSSMR panels have deflected and are holding water on the eastern side of the end lap lockbars and the eastern side of all rooftop penetrations such as plumbing vents, gas vents, and HVAC ventilators. There is evidence that water has and continues to enter the building through the various roof fastenings and penetrations. The metal standing seam roof system is not adequately pitched to ensure the proper runoff of the water. The National Roofing Contractors Association (NRCA) recommends that an SSSMR system be installed on roofs equal to or greater than 1/2" per foot. This type of roofing system is not appropriate for a 1/4" per foot roof slope which is the pitch of the existing Fire Department roof. Due to the deflection in the roof panels, the lockbars act as a dam to prevent the discharge of even the smallest amount of water (morning condensation). As the water sits, the fasteners degrade and begin leaking. In many instances, the fasteners were loose and/or missing leaving a void and path for water to enter the building. There are roof patches that were installed at various times to prevent the water intrusion. These patches appear to be an elastomeric coating and should only be considered as temporary repairs.

The surface attached box gutter has been installed along the western edge of the roof. The top of the gutter is set higher than the lowest pan of the standing seam metal roof panels. At the gutter, the edge of the metal standing seam roof panels do not have a closure strip and allow free movement of air and moisture under the metal standing seam panel and into the wall assembly. There is evidence that the gutters may have backed up during heavy rain events in the past. Such a backup of the gutter, would result in water standing on the roof edge and water would enter the building via the fasteners and the lack of a proper closure strip.

The metal copping along the top of the parapet wall has failed in many instances thus allowing water to infiltrate the wall assembly. The metal wall cladding below the parapet cap and just above the metal standing seam roof panels appears to be in good condition. However, it is believed that many of the face fasteners have degraded and are currently allowing water to infiltrate the wall assembly.

Recommendations

Even with all of the existing roof flaws, we do not at this time recommend wholesale removal of the roof assembly. Instead we propose the consideration of the following options:

Option A:

This option consists of a structured topical coating to be applied to the entire roof assembly from the parapet cap, wall cladding, counterflashing, metal standing seam panels, and all roof penetrations. We also propose the lowering of the western outside edge gutter to prevent backups from allowing water to sit on the roof. The topical coat, as outlined later in the roofing section, utilizes a Sealoflex system as a basis of design. Further description of this option is found in the Roofing section of this report.

Option B:

This option consists of applying Foam Flute Filler to be installed over the existing metal standing seam panels. The flute filler shall be mechanically fastened to the existing metal standing seam roof. Once the flute filler is installed, a 1/2" layer of High Density Board shall be mechanically installed over the entire roof area. Finally, a fully adhered 60 mil Thermoplastic Polyolefin (TPO) membrane roofing system shall be installed over the high density board. The TPO membrane roofing system shall be properly installed to suit the existing job conditions with respect to corners, curbs, edges, expansion joints, penetration pockets, pipes, seams, wall termination, etc. Plywood sheathing shall be installed over top of the existing metal parapet wall cladding and TPO membrane installed on top of plywood to full height of parapet wall. The existing metal

coping cap shall be removed and replaced with a new coping cap. We also propose the lowering of the western edge gutter to prevent backups from allowing water to sit on the roof. Further description of this option is found in the Roofing section of this report. Meadors recommends the implementation of Option B.

Option C:

This option consists of continued ongoing maintenance and responding to leaks as they occur. The County should hire a certified roofing contractor to inspect all areas of the roof to develop a maintenance plan for moving forward with until funds are available for implementation of either Option A or Option B above. Further description of this option is found in the Roofing section of this report with a full outline of maintenance inspection items.

Structural Masonry Curtain Wall

The Executive Summary for this section is provided by Michael Hance and is found on page 9.

Non-structural Veneer Cracks

Investigation

The exterior curtain walls are clad with a combination of split-face masonry block and red clay brick. According to the architect's drawings, the brick is from the Pine Hall Brick Company and is the Dan River Handcraft Series. The mortar selection and mortar composition is unknown at the time of this report. The split face block mentioned in the architect's drawings is from the Adams Products Company or Metromont, with the color being the Metromont Gun Powder/Gray color-L-8B and mortar to match the color of the split face block.

According to the architect's typical wall sections (wall seciton 3 on sheet A7 for veneer on concrete masonry and wall section 3 on sheet A8 for veneer on light guage metal studs), the split face block sits on the cast-in-place concrete footing and runs vertically six (6) courses. After the sixth course, the veneer transistions into brick where it runs another 27 courses and then transitions into one course of split face. Above the one course of split face, the brick continues for another 33 courses where it transitions again into one course of split face block. Above that one course of split face block, the brick continues vertically another 19 courses where it is capped by two courses of split face block before the metal parapet cap terminates the wall assembly.

At wall section 3 on sheet A7, the split face block and brick veneer is tied to the concrete masonry wall by the use of Duro-wall horizontal joint reinforment at 16" on center vertically. Continuous through wall flashing with weeps at 32" on center horizontally is called out above the second course of split face block above the footing with four more couses of split face block above. Visual observation did not reveal that this continuous through wall flashing exists in the wall, nor are there any weeps visible.

At wall section 3 on sheet A3, the split face block and brick veneer is tied to the light guage metal stud wall by the use of adjustable masonry veneer ties at 16" on center both vertically and horizontally. Continuous wall flashing and weeps at the base of the wall are not called out in this wall section and were not visible in the field.

Findings

Minor cracks were noted throughout the structure along the split face block 6 course high wainscot at the base of the structure. The vertical cracks in the split face block veneer are located just above grade and do not extend into the brick veneer above. Other cracks are visible in the split face block banding which occurs towards the upper section of the wall assembly. Again, the cracks seem to occur mostly in the split face block and do not extend down or up into the brick veneer sections. Please see illustration (drawing A7) for the extents of the cracking.

Based on field observations and lack of evidence supporting differential settlement occurring at the structure, it appears the cracks in the split face block veneer are most likely attributed to the connection methods to the substrate, improper ratios in the mortar mix, loading of the veneer above the split face, and/or differential movement. Differential movenement is not the same as differential settlement. Differential settlement refers to the unequal settling of a building's piers or foundation that can result in damage to the structure. The damage occurs when the foundation sinks in different areas at different times. However, differential movement is where two or more different masonry materials in the same veneer wall may move at different rates of expansion and contraction. Split face masonry blocks may shrink while the brick veneer expands.

Recommendations

The non-structural veneer cracks appear to be the result of poor workmanship. As such, we recommend the removal of cracked and damaged mortar and the repointing of the affected areas with mortar that matches the consistency, texture, composition, and color of the existing mortar. We further recommend the installation of crack monitors in selected areas to track any further and future movement of the veneer. Should the cracks persist in the future, another repair method should be employed. A possible repair would include the installation of Spira-Lok helical wall ties at a space specified by the manufacturer, Blok-Lok. Any broken blocks should be replaced.

Effluorescence

Investigation

Efflorescence is a fine, white, powdery deposit of water-soluble salts left on the surface of masonry as the water evaporates. Three conditions must exist before efflorescence will occur. First, there must be water-soluble salts present somewhere in the wall. Second, there must be sufficient moisture in the wall to render the salts into a soluble solution. And, third, there must be a path for the soluble salts to migrate through to the surface where the moisture can evaporate, thus depositing the salts which then crystallize and cause efflorescence.

Presence of Water-Soluble Salts in the Wall assembly

Many materials in a masonry wall can contain water-soluble salts. Those materials include Portland cement, the natural clay of the brick itself, sand used for the mortar and grout, and water

used for the mortar or grout during construction. Any one of these or a combination of these materials can contribute to efflorescence.

Presence of Moisture in the Wall Assembly

Even if soluble alkali sulfates exist in a masonry wall, before the sulfates can cause efflorescence the salts must be dissolved into solution by water. If no moisture reaches the sulfates then they cannot be rendered into solution and migrate to the surface where the water will evaporate, leaving the sulfate salts on the surface to crystallize and become efflorescence. Mosture can enter a wall assembly during and after construction. If the mason does not do a sufficient job in keeping excess moisture out of the wall during construction, efflorescence will present itself. Also, if water migrates into the wall assembly after construction via cracks, improper flashing and roofing details, and leaking gutters (to name a few), efflorescence will be present on the masonry surface.

Migration of Soluble Salts to the Surface

Brick veneer is a porous unit of material that is assembled with porous mortar and grout. There are numerous paths for water to migrate through from cavity to exterior face, while bringing along the soluble solution to be deposited on the surface of the masonry.

Findings

The west side of the office area of the Fire Station has significant efflorescence present on the surface of the masonry. See attached photographs in this section of the report for illustrations (photographs start at the south end of the affected west wall with photo 62 and move towards the north end of west wall and end with photo 69). It cannot be determined whether the efflorescence is a result of the construction process or has developed more recently. However, given the condition of the gutter and roof edge along the west wall, as well as the condition of the HVAC fresh air intake vents, it is more likely that the efflorescence is a result of ongoing water intrusion into the wall assembly. Once the water enters the wall assembly, its only way out is either through the weep holes above the windows and doors (a visual inspection did not reveal any weep holes at the base of the wall) and through migration of the moisture from the cavity to the face of the masonry via cracks, crevices, and the porosity of the masonry. The ongoing moisture intrusion into the wall will need to be corrected to prevent further efflorescence.

Recommendations

Once the issues with the surface applied box gutter and roof panel surface fasteners are addressed and the roof panel end closures installed under the western edge of the standing seam roof panels, the moisture intrusion into the wall assembly should be prevented. The wall assembly should be cleaned. As a further precaution, weep holes should be drilled in the second course of mortar from the base of the exposed wall. The weep holes should be drilled with a 3/8” bit and run the full depth of the veneer to gain access to the cavity. The weeps should be spaced at 32” on center.

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November 27, 2012

DRAFT COPY

James C. Meadors
Meadors, Inc.
2811 Azalea Drive
Charleston SC 29407

SUBJECT: **Structural Investigation – Exterior Wall Components**
Clarendon County Fire Department
Manning, South Carolina

EXECUTIVE SUMMARY:

The following is an executive summary identifying findings and recommendations regarding the condition of the exterior wall components and foundation at the Clarendon County Fire Station in Manning, SC. The findings described within this outline are limited to visual observations of existing structural components obtained during the October 10th, 2012 site inspection performed with Meadors, Inc. An invasive investigation of the exterior curtain walls was also performed using non-structural demolition methods to verify wall reinforcement and grouting patterns. While a complete description of our findings can be found in the detailed body of this report, this brief executive summary is provided to facilitate a quick overview of our findings and provide recommendations for additional stabilization of the subject property.

The existing structure consists of a pre-engineered metal building enclosed with a masonry block curtain wall at the bay areas and metal stud curtain wall at office space locations. The structure abuts the two story Clarendon County Sheriff's Department facility. The exterior curtain walls are covered with a combination of brick veneer and split-face block veneer. The roof system is supported by pre-engineered steel purlins covered with insulation and metal panel sheeting. The rigid frame columns at the exterior and interior of the structure are supported by isolated spread footings. Exterior curtain walls are supported by a continuous reinforced footing along the building perimeter. The floor of the structure consists of slab-on-grade construction at the bay areas and enclosed office space. In the truck bay area, interior mezzanine walls are constructed of 8" masonry block. The office area and truck bays are separated by a 12" masonry block wall that extends from finish floor to the roof ceiling. Interior partition walls in the office areas are constructed of light gage metal studs covered with gypsum wall board.

A review of the architectural drawings was performed during the site investigation to verify wall reinforcement and rigid frame connection methods. To determine the presence of bond beams and reinforcement in the masonry walls, information provided in the architectural drawings was utilized to select areas for non-structural demolition. To limit damage to wall components, holes were drilled in selected areas to verify grouting patterns as well as camera scope placement in unfilled masonry cells. It should be noted that verification of structural components and rigid frame connections were limited to visible areas only. Details of the non-destructive testing are provided in the detailed body of this report.

FINDINGS:

The findings described below are based on field observations of the exterior wall components and selective non-structural demolition of the exterior masonry walls to determine the presence of grouted cells and reinforcement.

Field Observations:

In the truck bay area, cracks in the masonry block walls and exterior brick veneer was observed at the following locations.

1. *Northeast corner at the front of the truck bay area:* Stepped cracking in the masonry block wall and brick veneer was observed above the right corner of the bay opening and extends downward to the northeast corner above the single door.
2. *Southeast corner at the front of the truck bay area:* Stepped cracking in the masonry block wall and brick veneer was observed above the left corner of the bay opening and extends downward to the southeast corner.
3. *Southwest corner at the rear of the truck bay area:* Stepped cracking in the upper portion of the masonry block wall and brick veneer was observed between the bay opening and the southwest corner.
4. *Northwest corner at the rear of the truck bay area:* Minor cracking in the upper portion of the masonry block wall and brick veneer was observed between the bay opening and the northwest corner.
5. *Split Face Masonry Veneer:* Minor cracks were noted along the split face 2'-8" high wainscoat at the base of the structure throughout. The vertical cracks in the masonry veneer are located just above grade and do not extend into the brick veneer above. Based on field observations and lack of evidence supporting differential settlement occurring at the structure, it appears the cracks in the masonry veneer are most likely attributed to the connection methods to the substrate and loading of the veneer above.

Based on the field observations and non-structural demolition investigation describe within this report, the masonry curtain walls at the corners of the truck bay area do not have adequate lateral bracing and are not properly tied into the rigid frame steel columns that support the roof structure. The absence of proper vertical reinforcement, bond beams and rigid frame connections between the building corner and bay opening can result in lateral deflection of masonry curtain walls of this height and allow cracking to develop in masonry mortar joints and exterior brick veneer. In addition, stepped cracking in the masonry block was limited to the areas described above.

No evidence indicating major differential settlement of the foundation that would cause step cracks of this nature was observed along the building perimeter during the field investigation. In addition, no sign of differential settlement at the concrete slab floor, interior masonry walls or rigid frame columns was found during the site investigation. Based on these observations, it was determined invasive testing at the foundation is not required at this time.

Minor cracks were noted along the split face 2'-8" high wainscoat at the base of the structure throughout. The vertical cracks in the masonry veneer are located just above grade and do not extend into the brick veneer above. Based on field observations and lack of evidence supporting differential settlement occurring at the structure, it appears the cracks in the masonry veneer are most likely attributed to the connection methods to the substrate and loading of the veneer above.

Recommendations:

The following bulleted items are recommendations for stabilizing the exterior masonry curtain walls at the building corners in the truck bay area of the structure.

- To improve the lateral stability of the masonry curtain walls, consideration should be given to installing a 4x4x1/4" steel column with channel bracing between the bay opening and endwall at each building corner in the truck bay area. The column should be installed adjacent to the exterior masonry curtain wall and extend from the floor slab to the steel wind beam at the upper portion of the wall. At each side of the column, a 10" steel channel is to be set above the bay opening and extend to the rigid frame column at each side of the corner bay. The steel channel will be welded to the existing rigid frame columns and bolted to the masonry curtain wall with 5/8" epoxy anchors @ 3'-0" on center. Based on the architectural drawings, a footing for the new column will be required at these locations. It is recommended the new footing be 1'-6" x1'-6" x 12" deep and reinforced with (2) #4 bars each way.

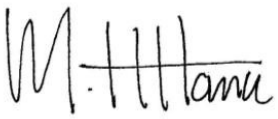
- It is recommended the existing wind girts located at the front (East) and rear (West) wall of the truck bay area be attached in accordance with the architectural drawings. Wind girt may be fastened to the masonry curtain wall with 5/8" dia. epoxy anchors at 4'-0" on center.

- Following the installation of steel columns and additional bracing as described above, it is recommended all masonry curtain wall components be monitored closely to verify if further cracking develops. If additional cracking is observed in these areas, further stabilization of the masonry curtain walls might be required.

- Although no signs of differential settlement at the perimeter walls and interior columns were observed during the investigation, it is recommended all floor slabs and walls be checked periodically for evidence of movement in the foundation system.

We encourage that interested parties review all the documents presented in our report to obtain a complete overview of the scope work that is recommended at this property. I appreciate the opportunity to provide you with this executive summary and if I can answer any questions or provide any additional services, please contact my office.

Respectfully yours,



Michael H. Hance, PE
Michael H. Hance PE LLC

ROOF

Photo 1: The roof of the fire station is a structural standing seam metal roof. The roof panels are set on premanufactured roof purlins spaced 5'-0" on center and the slope of the roof is 1/4" per 1'-0". The ends of standing seam metal panels are positive lapped with a lockbar securing the panels together.

Photo 2: The roof of the fire station is a structural standing seam metal roof. The roof panels are set on premanufactured roof purlins spaced 5'-0" on center and the slope of the roof is 1/4" per 1'-0". The ends of standing seam metal panels are positive lapped with a lockbar securing the panels together. This photograph shows three large exhaust fan penetrations within the metal roof.

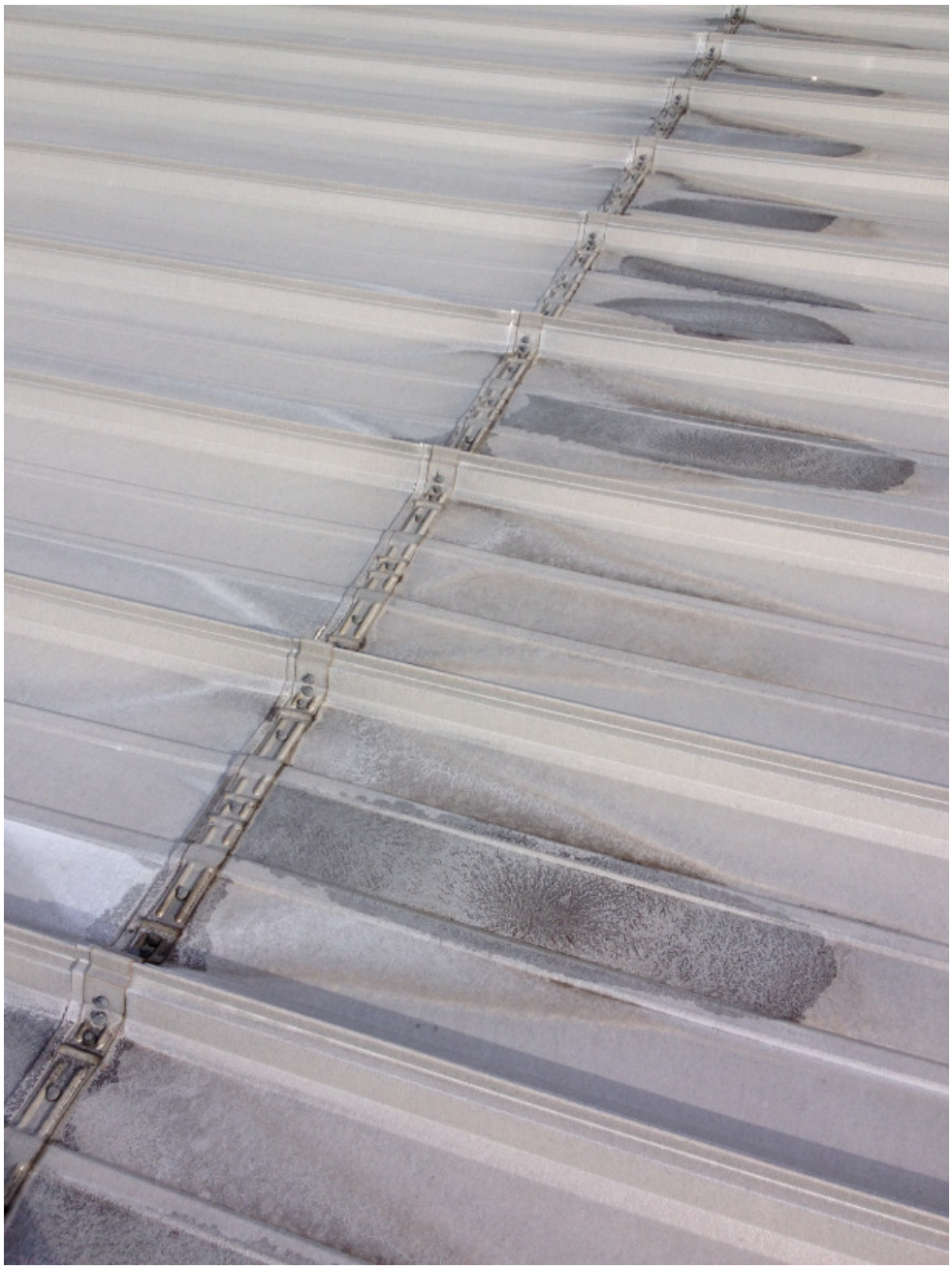


Photo 3: Closeup view of the positive lap of standing seam panels and the series of lockbars that connect the ends of the panels together. Note the evidence of standing water to the east side of the lockbars. The roof slopes 1/4" per foot from the east to the west. The pan adjacent to the lock-bars have deflected creating a dam that prevents all the water from running off the roof.

Photo 4: Closeup view of the positive lap of standing seam panels and the series of lockbars that connect the ends of the panels together. Note the evidence of standing water to the east side of the lockbars. The roof slopes 1/4" per foot from the east to the west. The pan adjacent to the lock-bars have deflected creating a dam that prevents all the water from running off the roof.

Photo 5: The joint between the panels of the metal pan roof has been coated with an elastomeric product. There is evidence on the inside of the building of leaking in this area. Also, there is evidence of water ponding on the high side of the joint

Photo 6: Elastomeric coating on another joint in the metal pan roof. There is evidence of water ponding in this area also.

Photo 7: Elastomeric coating on another joint in the metal pan roof. There is evidence of water ponding in this area also.

Photo 8: Metal flashing on the parapet wall above the building entry. The seams in the parapet flashing have been caulked. There is evidence that the caulk is failing and evidence in the outer wall below the parapet that water is entering behind the veneer on this wall.

Photo 9: This photograph shows the joint between two metal parapet cap flashings. There is an open joint between the top two metal caps that has anoher metal flashing directly under the joint. This connection solely relies on butyl tape to make the connection watertight. The butyl tape has failed in many locations. This metal coping has experienced damage.

Photo 10: Metal flashing on the parapet wall above the building entry. The seams in the parapet flashing have been caulked. There is evidence that the caulk is failing and evidence in the outer wall below the parapet that water is entering behind the veneer on this wall.

Photos 11: A number of the seams in the parapet wall flashing have been coated with an elastomeric product. Apparently the seams have been leaking at some point in the past.

Photos 12: A number of the seams in the parapet wall flashing have been coated with an elastomeric product. Apparently the seams have been leaking at some point in the past.

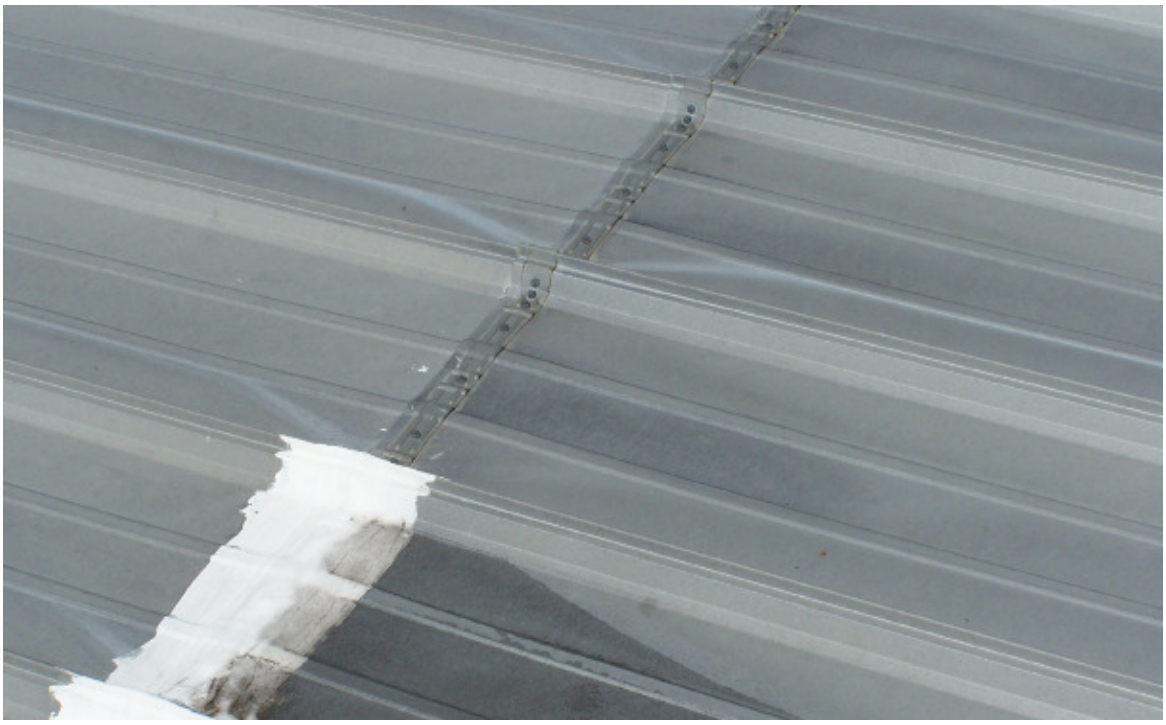


Photo 13: The metal pan roof has panels that are joined with an applied lockbar. The lockbar is face-fastened. It is evident that the roof has been leaking in a number of places at these joints. The deflection associated with the pan around these lockbars also retains water and creates ponding at the joints.

Photo 14: The metal pan roof has panels that are joined with an applied lockbar. The lockbar is face fastened. It is evident that the roof has been leaking in a number of places at these joints. The deflection associated with the pan around these lockbars also retains water and creates ponding at the joints.

Photo 15: The inside face of the North parapet wall at the East corner. The seams on the inside face of this parapet wall have been coated with an elastomeric product. The elastomeric coating also seals the bottom of the metal panels thus trapping any moisture that entered from the top and not allowing it to escape out onto the roof.

Photo 16: Closeup view of the parapet wall cladding and standing seam metal roof panel intersection. The parapet wall cladding panels are face-fastened to the parapet wall framing with sheet metal screws and rubber washers. The vertical metal cladding panels rest on a piece of 'L' shaped leader counterflashing which turns up behind the metal parapet cladding. The 'L' shaped piece of leader counterflashing flashes over the metal standing seam panels. There is eveidence that the seams between the vertical metal parapet wall cladding leaks as well as many of the face-fasteners. The 'L' shaped piece of leader counterflashing also leaks at the seams between individual segments of counterflashng.

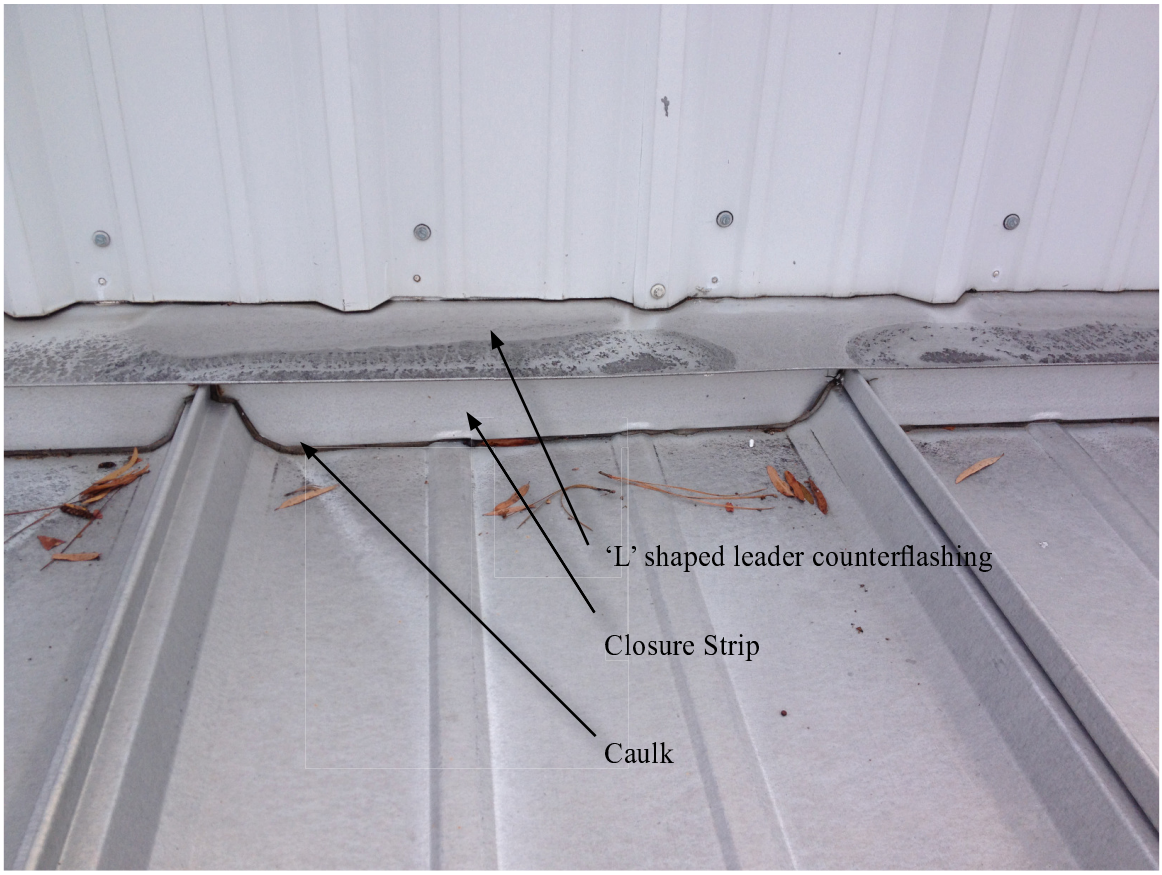


Photo 17: Closeup view of the parapet wall cladding and standing seam metal roof panel intersection. The parapet wall cladding panels are face-fastened to the parapet wall framing with sheet metal screws and rubber washers. The vertical metal cladding panels rest on a piece of 'L' shaped leader counterflashing which turns up behind the metal parapet cladding. The 'L' shaped piece of leader counterflashing flashes over the metal standing seam panels. There is eveidence that the seams between the vertical metal parapet wall cladding leaks as well as many of the face-fasteners. The 'L' shaped piece of leader counterflashing also leaks at the seams between individual segments of counterflashng. Also, note the caulking at the clsosure strip in the metal stading seam panel. The caulking is showing signs of failure which will allow water into the roof assembly.

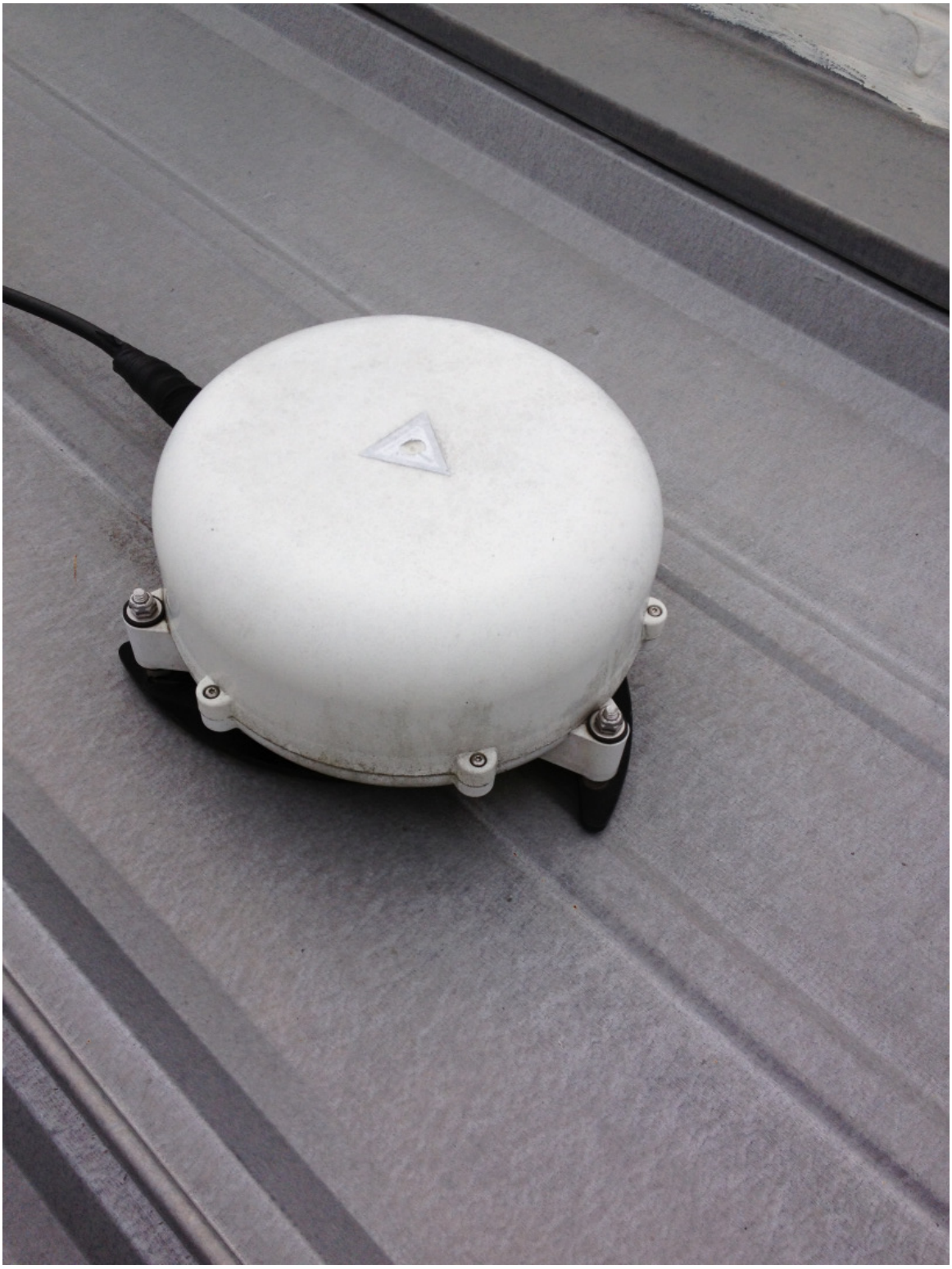


Photo 18: This photograph shows a component of the satelite dish that is fastened directly to the metal standing seam panel. This face-fastened connection provides a direct avenue for water to enter the facility. This component should be relocated and mounted to the face of the masonry wall or mounted so that it is elevated off the surface of the standing seam metal. The elevated metal support may be attached to the standing seam so that water can freely move under this component. Holes in panel should be patched with new metal panel which is attached with face-fastened gasketed screws and appropriate sealant.

Photo 19: This photograph shows the intersection of the metal standing seam roof and the gutter on the west side of the building. Note that the top edge of the gutter sits higher than the pan of the SSSMR panel and also note the evidence of standing water at the edge of the roof. At this location, many exposed fasteners have failed and also there is heavy efflorescence on the brick masonry wall directly below this gutter which indicates heavy amounts of moisture is getting into the msonry wall. This water intrusion is possibly coming from poor performing gutters and failed fasteners. The ends of the metal standing seam roof are not completely sealed so if water backs up in the gutter, it will run into the wall assembly.

Photo 20: This roof penetration is leaking. The calk on the ring has failed and the penetration is leaking between the ring and the metal pan roof. This condition is typical of all roof penetrations.

Photo 21: Water is ponding at the seams in the metal pan roof. The seams have been coated with an elastomeric product in an attempt to prevent the roof from leaking.

Photo 22: There is evidence that water ponds on the backside, i.e. the high side (east) of all of the roof ventilators. There is also evidence that the building leaks at these penetrations. There is a slight cricket behind each roof ventilator, but it appears not to be extensive enough to prevent ponding.

Photo 23:

Photo 24: There is evidence that water ponds on the backside (east side), i.e. the high side of all of the roof penetrations. There is also evidence that the building leaks at these penetrations.

Photo 25: The screws in the edge of the metal pan roof at the gutter on the West side have been coated with elastomeric or caulk. There is evidence that water ponds at the edge of the roof as it runs into the gutter, thus allowing any fasteners that are not secure to let water into the structure behind the brick veneer. There is evidence of ponding all along the edge of the roof at the gutter. This may indicate that the roof slopes slightly up at the edge or that in a very hard rain the gutter is insufficient to carry off the water and the water backs up onto the roof as it spills out of the gutter. In either circumstance, the fasteners, if not completely secure, would allow water into the structure behind the brick veneer.

Photo 26: Evidence of ponding at the edge of the roof at the gutter. The water stains in this area could be the result a slight upturn in the roof. The fact that the gutter, in a hard rain, may be unable to carry the water off means that the water backs up onto the roof as the gutter overflows.

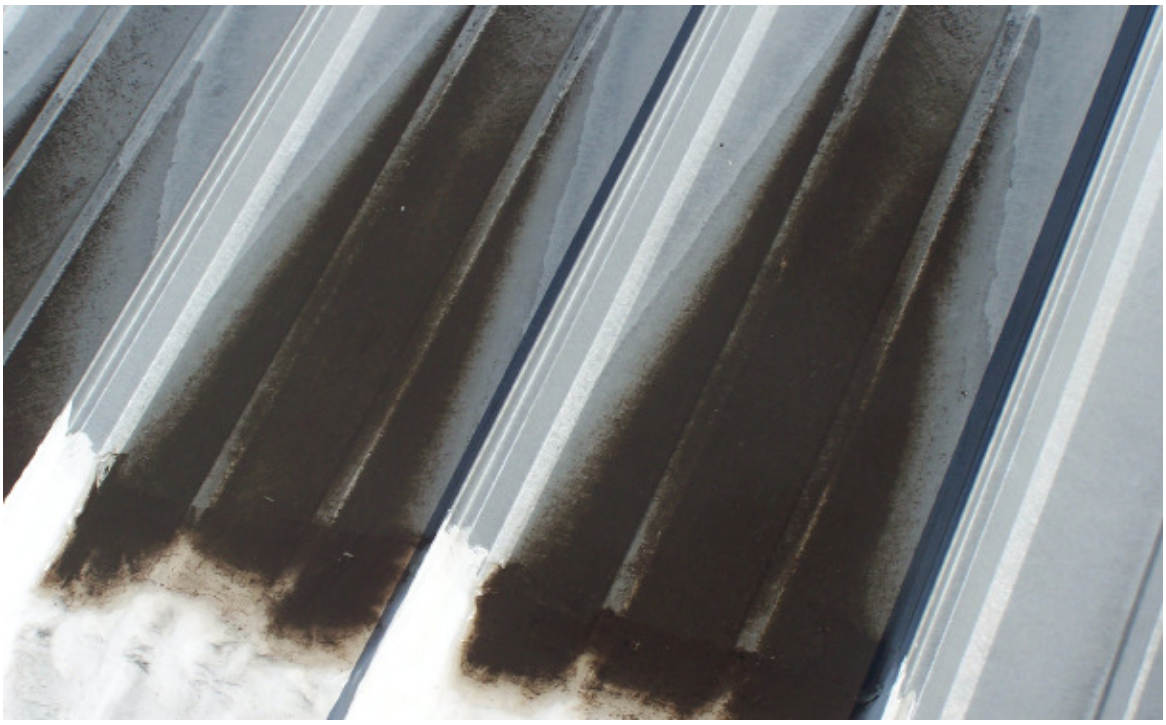


Photo 27: Ponding at the joints in the metal pan roof.

Photo 28: Elastomeric coating applied to the roof in the South West corner. There is evidence that water ponds in this area and the roof has leaked. The elastomeric coating is an attempt to prevent water intrusion in this area.

Photo 29: This photo shows the ends of the ridges in the metal roof panels at the edge of the roof at the gutter. The ends are open at the gutter. If water backs up onto the roof from a full gutter, that water could enter the open ends of the seams and four directly into the building and behind the brick veneer.

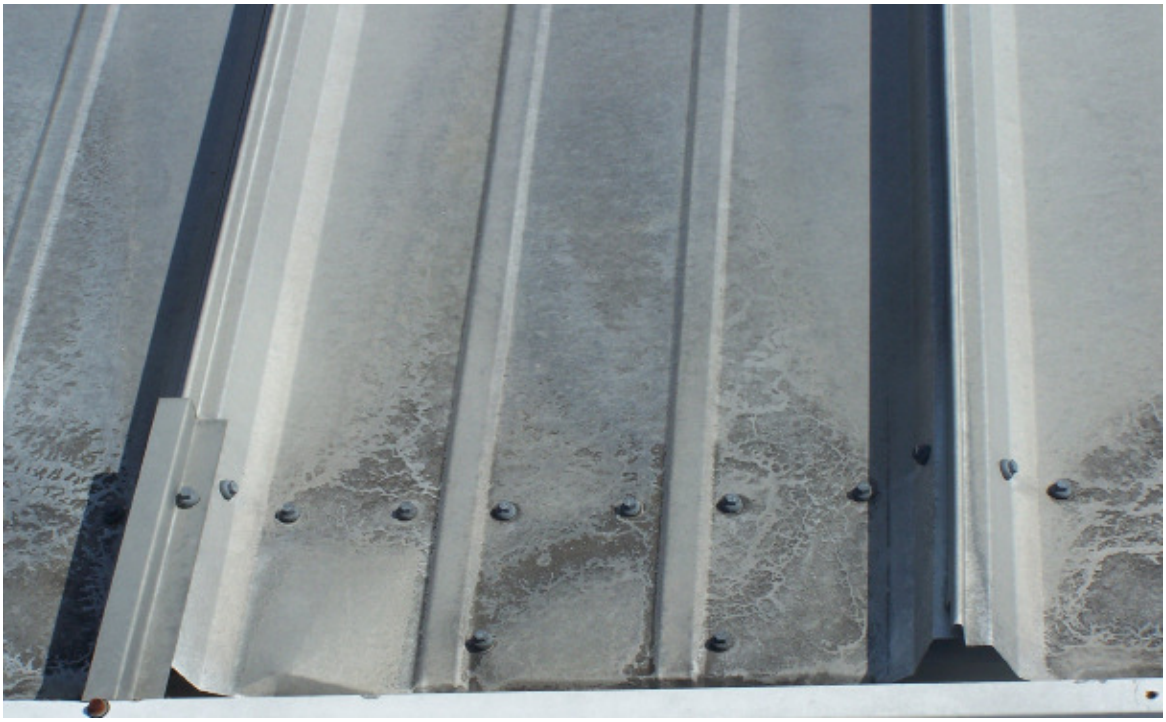


Photo 30: This is the edge of the roof at the gutter along the West wall on the portion of the building adjacent to the Fire Department garage bays. The condition in this area is the same as above the garage bays. There is evidence of water ponding and standing all along the edge of the roof. This can result in water intrusion into the structure at any unsecured fasteners or at the open panel edges. See also Photo 31 as example.

Photo 31: This photograph shows the condition of the fasteners at the edge of the metal standing seam roof panels where they meet the box gutter. Note the loosed fastener, which is a direct avenue for water to enter the roof system.

Photo 32: PVC roof above the Sheriffs Building. The roof requires cleaning.

Photo 33: The Parapet on the North side of the building where it abuts the Sheriffs Building. The parapet cap slopes towards the Sheriffs Building and has evidence that water is ponding on the parapet at the intersection of the two structures.

Photo 34: The Parapet on the North side of the building where it abuts the Sheriffs Building. The counterflashing has been inserted into a reglet cut into the mortar. However, the reglet has not been properly caulked and sealed. The reglet should be caulked with a flexible non-shrinking caulk the full length of the reglet.

Roof Assembly

Recommendations

Even with all of the existing roofs flaws, we do not at this time recommend wholesale removal of the roof assembly. Instead we propose and recommend the following options be considered.

Option A

This option consists of a structured topical coating to be applied to the entire roof assembly from the parapet cap, wall cladding, counterflashing, metal standing seam panels, and all roof penetrations. We also propose the lowering of the gutter to prevent backups from allowing water to sit on the roof. The topical coat is outlined in this section on roofing and the basis of design is the utilization of a Sealoflex system. In abbreviated form, the process includes the following:

1. the cleaning of the entire roof, wall panels, and coping by power washing and using a mixture of TSP (Tri-Sodium Phosphate).

2. All metal (except galvanized) shall then be primed with Sealoflex Metal Etch Primer at a coverage rate of 250 square feet per gallon.

3. A process of installing Sealoflex Pink base coat, Fabric, and Pink saturation coat should be followed. This process should be installed on all metal joints of parapet wall panels, coping cap panels, joints in metal counterflashing, joints between upper panel closures under the wall counterflashings, and roof penetrations. This product should not be installed on lockbar joints or vertical standing seam ribs. Coverage rate of the Pink base coat should be 35-40 square feet per gallon, which includes both the base and saturation coats.

4. If the flexible pipe boots are leaking, they should be replaced. Where these boots are bolted to the metal panel, they should be covered with the Pink base coat, Fabric, and Pink saturation coats.

5. Install Sealocaps on all exposed fasteners of the roof, wall, and coping panels (except on the end laps where the lockbars are located).

6. In all the identified ponding water areas and over the end laps with lockbars (extending 12" below the lockbar and 12" beyond the upper limit of the ponding area in the valley of the metal panel [approx. 60" above lockbar]) apply Enviroflex base coat, Fabric, and Enviroflex saturation coat. Coverage rate o fthe Enviroflex system should equate to 30-35 square feet per gallon, which includes both base and saturation coats.

7. Apply two coats of Sealoflex Finish Coat at a coverage rate of 100 square feet per gallon to the entire surface of roof, wall, and coping cap. Allow to dry between coats.

8. This process should be repeated every 10 years.

Metal Etch Primer™

Sealoflex® Waterproofing Systems

Corrosion Resistance Metal Primer

Description

Sealoflex Metal Etch Primer™ is a waterborne, acrylic primer for optimum corrosion protection of ferrous metal substrates.

Uses

Sealoflex Metal Etch Primer™ is used as a first coat on bare ferrous metal surfaces and as an adhesion coat over non-ferrous metals.

Advantages

Sealoflex Metal Etch Primer™ displays the following characteristics:

- Forms a tough, non chip film
- Good chemical and abrasion resistance
- Quick Drying
- Inhibits rust formation
- Waterborne for easy wash up
- No dangerous fumes from solvents
- Sealoflex Metal Etch Primer™ is used as a primer for all metal accessories, e.g. drip edge, trim pieces, etc.
- Excellent adhesion to Kynar® and silicone polyester based coatings.

Instructions for Use

Surface Preparation

Surface must be clean, oil and grease free and free of loosely adhering particles. All rusted areas must be sand blasted or wire brushed to remove any loose rust. Power washing of the general area to be coated is highly recommended for optimum bonding. Unless the metal is prepared to shop conditions it is required to first apply one coat of Rust X-2020™ to the prepared surface.

Application

Apply the Metal Etch Primer™ by brush, roller or spray. Allow to dry. Then coat with appropriate Sealoflex product and/or Sealoflex System within 48 hours.

Cleaning

Wash tools and equipment immediately after use with water. Cured Sealoflex Metal Etch Primer™ can be removed with Quickclean™ available from Sealoflex, Inc.

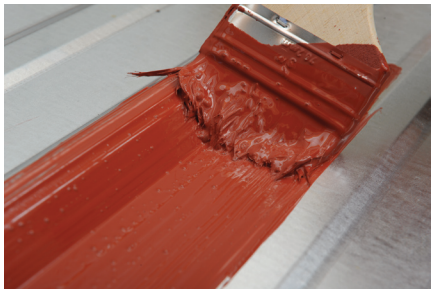
Coverage

Sealoflex Metal Etch Primer™ will cover approximately 250 sq.ft./gal.

Precautions

Do not apply Sealoflex Metal Etch Primer™ over existing asphalt, bituminous coatings or bituminous aluminum coatings.

For this and all related products: Please refer to individual product data sheets, product MSDS, System Application Guides, Primer Chart and Fabric Chart.



Technical Data

Application Temperature:	+40˚F to 90˚F
Shelf Life and Storage Conditions:	12 months if unopened & stored between +40˚F & 100˚F *Do Not Allow to Freeze*
Density:	10 lb./gall
Color:	Oxide Red
Packaging:	1 gal and 5 gal metal pails, 55 gal. drums

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Sealoflex®
Waterproofing Systems

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FEBRUARY 2010

IMPORTANT NOTE: Always check our website, www.sealoflex.com to determine if the printed literature you are reading is the most current version available.

Sealoflex Pink®

Highly Flexible Acrylic Base and Saturator for Sealoflex Waterbased Systems

Sealoflex® Waterproofing Systems

MIAMI-DADE COUNTY

FM APPROVED

Description

Sealoflex Pink® is a waterborne, single component acrylic coating. It cures to a tough rubber like material, which displays good adhesion and flexibility. Sealoflex Pink®, generally used along with Sealoflex polyester reinforcing fabric and Sealoflex Finish Coat™ to form a fully adhered single ply roofing membrane, is also used in conjunction with other Sealoflex products and systems to satisfy various waterproofing requirements.

Uses

Sealoflex Pink® is used:

- As the base and saturation component of fully reinforced Sealoflex roofing applications including flashing, parapet wall, roof penetration, and other application details
- As a liquid applied building wrap (Call the Sealoflex Tech Department)
- For temporary deck and low slope roof waterproofing over metal, concrete, and plywood

Advantages

Sealoflex Pink® displays the following advantages:

- Does not become brittle with age
- Fast curing and may be applied in temperatures above 45˚F
- Good low temperature flexibility
- Adheres to almost any roof or wall substrate including stucco, concrete, metal, brick, wood, asphalt, PVC, etc.
- VOC Compliant and environmentally friendly
- Tools and equipment wash up easily with water
- Breathable

Color

Pink

Instructions for Use

Surface Preparation

Surfaces must be dry, clean and free of dust, loosely adhering particles, oil or grease.

Priming

Unpainted wooden surfaces, Asphalt, Weathered galvanized steel, Non-ferrous metal and PVC:
No priming is necessary.

Unprotected iron, Rusted metal, steel:
must first be treated with Rust-X 2020™ and then primed with Sealoflex Metal Etch Primer™.

Chalky surfaces:
must be primed first with Sealobond Primer™.

EPDM rubber, TPO, Hypalon®:
must be primed first with Sealoflex EPDM Primer™.

Concrete, Masonry:

Above grade:
Prime with a coat of Sealobond Primer™ and/or Dampseal 101™.

Below Grade, On grade and Cellular Lightweight Concrete:
Prime with Sealoment Plus™ and/or Dampseal 101™.

Application

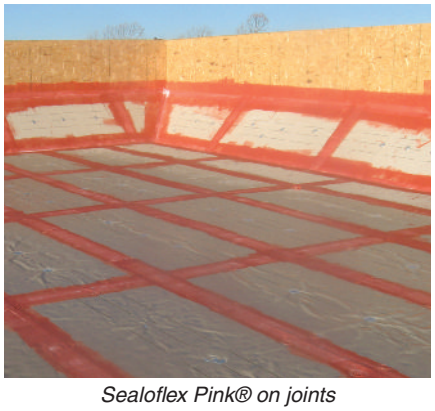
Sealoflex Pink® can be applied with a brush, roller or airless spray equipment.

Please refer to specific Sealoflex® System application guides for proper application requirements.

Coverage

As "base" and "saturation" coats:
40 sq.ft./gal.

As a Building Wrap (WRB):
40 sq.ft./gal. at joints using Sealoflex Jointing Fabric™
80 sq. ft./gal. over entire wall surface



Sealoflex Pink® on joints

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Sealoflex®
Waterproofing Systems

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FEBRUARY 2010

Cleaning

Uncured Sealoflex Pink® can be rinsed with water. Cured Sealoflex Pink® can be dissolved with Sealoflex Quickclean™ and rinsed with water.

Precautions

Do not apply Sealoflex Pink® if rain is imminent. Sealoflex Pink® will not cure when the ambient humidity is 100% e.g. during periods of dew or fog. Curing will commence again once the humidity drops below 100%.

Check adhesion to previously painted surfaces as some surfaces may require special treatment or priming. Contact our technical department for specific methods of testing.

Do not use Sealoflex Pink® over Cellular Lightweight Concrete.

Sealoflex Pink® as flashing around vent pipe

Technical Data

Type:	**Acrylic Copolymer**
Shelf Life and Storage Conditions:	12 months if unopened between +40˚F & 90˚F *Do Not Allow To Freeze*
Application Temperature:	+45˚F to 105˚F (Ambient) +40˚F to 130˚F (Surface)
Total System Thickness:	45 mils dft
Drying TIme (Touch Dry):	2 hours at 77˚F and 50% RH
Elongation (ASTM D2370):	61% (reinforced) 257% (unreinforced)
Tensile Strength (ASTM D412):	3109 psi (reinforced)
Water Vapor Transmission Rate (E96):	3.2 grains/ft²/hr(4.52 perms)
Packaging:	1, 5 and 55 gallon containers

Sealoflex Pink® stage prior to application of Coraflex™ on condominium in Florida

For this and/or related products, please refer to individual product data sheets, System Application Guides, Products MSDS, Primer Chart, Fabric Chart.

IMPORTANT NOTE: Always check our website, www.sealoflex.com to determine if the printed literature you are reading is the most current version available.

Sealoflex Finish Coat™

Highly Flexible Waterbased Waterproof & Protective Coating

Sealoflex® Waterproofing Systems

Description

Sealoflex Finish Coat™ is a waterborne, single component roof coating. It is a tough, flexible material, which displays good UV and Ozone resistance. Sealoflex Finish Coat™ is generally used in conjunction with Sealoflex Pink® and polyester reinforcing fabric to form a fully adhered single ply roofing membrane. Sealoflex Finish Coat™ is also used extensively as a protective coating to existing and new roofing materials such as single ply, modified asphalt membranes, and metal roofs.

Uses

Sealoflex Finish Coat™ is used:

- As the final coating to the Sealoflex Roofing System™
- To provide a hightly reflective (white) coating over roof surfaces of most types
- For coating of metal roofs of most types
- To provide protection and add life expectancy to existing roof surfaces

Advantages

Sealoflex Finish Coat™ displays the following advantages:

- Ultra Violet and Ozone resistant
- Excellent solar reflectance in white
- Fast curing
- Excellent low temperature flexibility
- Adheres to almost any roof or wall substrate including stucco, concrete, metal, brick, wood, asphalt, PVC, etc.
- Dade County, Florida approved
- Energy Star approved
- Factory Mutual approved

Colors

White, Pearl Gray, Beige, Slate Gray, Brown, Charcoal, Terra Cotta, Charleston Green and Tinners Red

Other colors are available.

Instructions for Use

Surface Preparation

Surfaces must be dry, clean and free of dust, loosely adhering particles, oil or grease.

Priming

Unpainted wooden surfaces, Asphalt, Weathered galvanized steel, Non-ferrous metal and PVC:
No priming is necessary.

Unprotected iron, Rusted metal, steel:
must first be treated with Rust-X 2020™ and then primed with Sealoflex Metal Etch Primer™.

Chalky surfaces:
must be primed first with Sealobond Primer™.

EPDM rubber, TPO, Hypalon®:
must be primed first with Sealoflex EPDM Primer™.

Concrete, Masonry:

Above grade:
Prime with a coat of Sealobond Primer™ and/or Dampseal 101™.

Below Grade, On grade and Cellular Lightweight Concrete:
Prime with Sealoment Plus™ and/or Dampseal 101™.

Application

Apply 2 coats of Sealoflex Finish Coat™ by airless sprayer, roller or brush.

Coverage

As a Finish Coat for the Sealoflex Waterbased System:
70 sq.ft./gal. (includes both coats)

As a "Stand Alone" Coating or Over Metal Surfaces:
50 sq.ft./gal. (Includes both coats)

Cleaning

Uncured Sealoflex Finish Coat™ may be rinsed with water. Cured Sealoflex Finish Coat™ can be dissolved with Sealoflex Quickclean™ and rinsed with water.

Precautions

Do not apply Sealoflex Finish Coat™ if rain is imminent. Sealoflex Finish Coat™ will not cure when the ambient humidity is 100% e.g. during the periods of dew or fog. Curing will commence again once the humidity drops below 100%.

Check adhesion to previously painted surfaces as some surfaces may require special treatment or priming. Contact our technical department for specific methods of testing.

The surface which Sealoflex Finish Coat™ is applied must have positive drainage.

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FEBRUARY 2010

Technical Data

PROPERTIES	TEST METHOD	SEALOFLEX Finish Coat™ White
Liquid Applied Acrylic Coating	ASTM D6083	100% Acrylic Resin
Weight/Gallon	ANSI/NCSL Z540-1	11.6 lbs./gal.
Specific Gravity		1.39
Solids by weight	ASTM D1644	66%
Solids by volume	ASTM D2697	54%
pH		9.0-9.5
Brookfield Viscosity	ASTM D2196	10,000-15,000 cps
Flash point	ASTM D56 Tag Closed Cap	>200°F
Initial Elongation (unreinforced)	ASTM D2370	300%
Initial Elongation (reinforced)	ASTM D412	61%
Final Elongation at Break (3000 hrs)	ASTM D412	161%
Recovery	ASTM D2370	98%
Initial Tensile Strength	ASTM D2370	294 psi
Impact Resistance		1.6 joules
Flex (5°F) 1/8 Mandrel	ASTM D734	Pass
Flexural Fatigue		2600 cycles
Cold Temperature Flex	ASTM D522	1/2 inch Mandrel -15°F
Accelerated Weathering	ASTM D4798/G28	No effects after 3,600 hours
Fire Resistance (UL 790)	ASTM E108	Pass UL Class A
Dimensional Stability	ASTM D1204	Less than 0.44% change
Water Vapor Transmission Rate	ASTM E96	3.2 grains/ft/hour (4.5 perms)
Permeance	ASTM D1653	28.8 perms
Solar Reflectance Initial	ASTM D903/D&S	86%
Solar Reflectance Aged 3 Years	ASTM D903/D&S	66%
Infrared Emittance	ASTM D903/D&S	0.94
Application Temperature	Ambient Surface	+45°F to 105°F +40°F to 130 °F
Dry time at 77°F and 50% Relative Humidity	Set to touch Between coats	1 hour 1 hour minimum (dry to touch)
Total Thickness at 2 gals./100 ft.^{2}		System: 45 mils dft Coating: 18 mils dft
Shelf Life and Storage Conditions		12 months, Unopened & stored between +40°F & 90°F. *Do Not Allow To Freeze*
Packaging		1 gal, 5 gal and 55 gal

For this and/or related products, please refer to individual product data sheets, System Application Guides, Products MSDS, Primer Chart, Fabric Chart.

IMPORTANT NOTE: Always check our website, www.sealoflex.com to determine if the printed literature you are reading is the most current version available

Sealocap Roof Seals™

Self-Adhesive Fastener Seals

Sealoflex®
Waterproofing Systems

Description

Butyl based, self adhesive flexible polyester fabric backed seals for use with the SEALOFLEX® METAL ROOF SYSTEM.

Uses

For covering fasteners which are used to secure metal panels.

Advantages

- Economical
- Easy to apply
- Labor saving
- Permanent waterproof seal over fasteners
- Prevents fastener movement
- Adheres to cold surfaces

Instructions for Use

- Tighten or replace loose or missing fasteners.
- Clean the surface per Sealoflex® specification before applying.
- Remove Sealocap™ from polyethylene backing and place over fastener or screwhead
- Place the Sealocap™ tool over the Sealocap™, push down and twist.

Sealocaps™ on roll

Remove Sealocap™ from roll; Apply over top of all fasteners

Use Sealocap™ Tool to adhere Sealocaps over fasteners

Sealocap™ installation over fasteners complete

Important Information

- Sealocaps™ should not be applied over fasteners covered in tar, caulking or other sealant material. These will need to be treated with a 6" square of Sealoflex Pink®, fabric and Pink or Sealoflex Seam Tape™.
- Store in a cool, dry place.
- Sealocap™ must always be coated with Sealoflex Finish Coat™ to protect from ultra violet attack.

Precautions

Overcoat with Sealoflex Finish Coat™ within 7 days of application as prolonged exposure to ultra violet light will deteriorate the fabric backing.

Do not stretch during application.

DO NOT USE SEALOCAPS™ WITH SEALOFLEX CT™ PRODUCTS

For this and/or related products, please refer to individual product data sheets, System Application Guides, Products MSDS, Primer Chart, Fabric Chart.

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FEBRUARY 2010

Technical Data

Type:	Butyl based self adhesive polyester backed sealing disc
Shelf Life and Storage Conditions:	18 months if stored in cool, dry conditions
Application Temperature:	+45°F to 90°F (Ambient) +40°F to 130°F (Surface)
Bonding Time:	Immediate watertight bond
Full Bond:	24 hours
Total Thickness:	45 mils (including coating)
System Weight:	0.32 lb./sq.ft.
Elongation (ASTM D638):	60%
Tensile Strength (ASTM D638):	475 psi (adhesive sealant)
Peel Strength:	10 lb./linear inch
Packaging:	300/Roll

IMPORTANT NOTE: Always check our website, www.sealoflex.com to determine if the printed literature you are reading is the most current version available.

Enviroflex™

Sealoflex® Waterproofing Systems

Highly Elastic Liquid Applied 100% Solids Moisture Cure Waterproofing System

Description

Sealoflex Enviroflex™ is a solvent free, no VOC's,100% solids, single component, moisture cure waterproofing system. It is a tough, flexible material which displays good UV, ozone and ponding water resistance. Enviroflex™ is used in conjunction with Sealoflex™ Fabric to form a fully adhered monolithic roofing membrane.

Uses

Enviroflex™ is used:

- As a flat and low slope roof waterproofer
- For flashings and parapet walls
- As a below grade waterproofer
- As a waterproof liner for box gutters

Advantages

Enviroflex™ displays the following advantages:

- Complete system installs in a single operation.
- May be applied to damp surfaces
- Ultraviolet and Ozone resistant
- Excellent resistance to ponding water
- Fast curing
- Excellent low temperature flexibility
- Completely solvent and isocyanurate free
- Adheres to many roof or wall substrates
- Once cured, Enviroflex™ is resistant to animal fats as well as many other aggressive chemicals
- No VOC's
- CRRC Cool Roof rated
- Title 24 compliant

Color

White & Gray (Not tintable)

Note: Slight color variations between batch numbers can occur. Blend materials to ensure color consistency.

Instructions for Use

Surface Preparation

Surfaces must be free of dust, loosely adhering particles, oil, grease, algae, mildew or fungal growth.

Prior to installing the Enviroflex™ System over Single Ply membranes, surfaces must be washed with a mild detergent then rinsed with clean water. Allow to dry before priming.

Thoroughly stir the product before use. When using a mechanical mixer, do not over agitate. Over agitating will add air into the product, creating bubbles.

Priming

Unpainted Metal, Concrete, Masonry, Cellular Lightweight Concrete, Glass Ceramic Tile and Hypalon®:

No priming is necessary.

Treated or Untreated Wood;

Prime with EP1 Primer™ only to prevent tannin staining.

Smooth Modified, EPDM Black, EPDM White, and Aged PVC:

Prime with EP1 Primer™.

Granular Modified:

Prime with Sealoflex Waterbased Pink®.

Apply the Enviroflex™ System within 48 hours after priming.

Application

Apply 2" Sealoflex Aluminum Tape™ over all board joints such as plywood and polyiso insulation boards.

Apply a base coat of Enviroflex™, 6" or 12" Sealoflex Fabric™, and a saturation coat of Enviroflex™ to all flashings and penetrations. Allow to dry.

Apply a moderate base coat of Enviroflex™ to the surface with brush, foam roller or sprayer. Embed the 40" Sealoflex Fabric™ directly into the wet coating using a foam roller or brush. Make sure no bubbles or wrinkles occur in the fabric. Overlap of adjacent runs of fabric must be 3". Immediately follow with a generous saturation coat of Enviroflex™ to fully saturate the fabric from above.

Allow to cure. The total application rate of Enviroflex™ should be approximately 30-35 sq. ft./gal., depending on porosity and texture of substrate. (Refer to "Coverage Rates")

For optimal ease of application, the Enviroflex™ product should be above 55°F.

Do not apply over frozen matter.

Note: In conditions of relative humidity less than 25%, mist clean water onto the installed Enviroflex™ System to enable curing.

SEALOFLEX INC.

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SALES OFFICE
CHARLESTON, SC
HAMBURG, GERMANY
CANTERBURY, KENT, U.K.

Sealoflex®
Waterproofing Systems

LIMITED WARRANTY

Sealoflex warrants its products to be free of manufacturing defects and that they will meet Sealoflex's current published physical propertiess when applied in accordance with Sealoflex's directions. There are no other warranties by Sealoflex of any nature whatsoever, expressed or implied, including any warranty of merchantability of fitness for a particular purpose in connection with this product. Sealoflex Inc. shall not be liable for damages of any sort, including remote or consequential damages, resulting from any claimed breach of any warranty whether expressed or implied, including any warranty of merchantability of fitness for a particular purpose or from any other cause whatsoever.

DECEMBER 2012

Coverage Rates (Approximate)

Full System reinforced:

Smooth Surfaces:
35 sq. ft./gal.
(Total for base and saturation coats)
Porous or Irregular Surfaces:
30 sq. ft./gal.
(Total for base and saturation coats)

4" Fabric:

Smooth Surfaces:
105 lin. ft./gal.
(Total for base and saturation coats)
Porous or Irregular Surfaces:
90 lin. ft./gal.
(Total for base and saturation coats)

6" Fabric:

Smooth Surfaces:
70 lin. ft./gal.
(Total for base and saturation coats)
Porous or Irregular Surfaces:
60 lin. ft./gal.
(Total for base and saturation coats)

12" Fabric:

Smooth Surfaces:
35 lin. ft./gal.
(Total for base and saturation coats)
Porous or Irregular Surfaces:
30 lin. ft./gal.
(Total for base and saturation coats)

Chemical Resistance:

14 days after the Enviroflex™ System has been installed, the system will tolerate contact with the following chemicals for up to 30 days:

- Diesel Fuel
- Acetone
- MEK (Methyl Ethyl Ketone)
- Shellsol D80™ at 176ºF
- Mineral Spirits
- Sulphuric Acid 5%
- Sodium Hydroxide 5%

Animal Fats Resistance:

48 hours after the Enviroflex™ System has been installed, the system is resistant to animal fats.

Technical Data

Type:	Reinforced Synthetic Polymer
Shelf Life and Storage Conditions:	12 months if unopened between +40˚F & 90˚F
Application Temperature:	+32˚F to 105˚F (Ambient) +32˚F to 130˚F (Surface)
Total SystemThickness: (Smooth Surface)	45 mils@35 sq. ft./gal. 53 mils@30 sq. ft./gal.
System Weight:	0.36 lb./ ft. @ 35 sq. ft./gal. 0.42 lb./ ft. @ 30 sq. ft./gal.
Trafficable	After 3 hours
Drying TIme (Touch Dry):	2 hours at 70˚F and 50% RH
Full Cure:	14 days
Solar Reflectance (ASTM C1549):	0.83
Thermal Emmittance (ASTM C1371):	0.91
SRI-Solar Reflectance Index (ASTM E1980)	104
Packaging:	1 gallon and 4 gallon containers

Cleaning

Uncured Enviroflex™ can be dissolved with mineral spirits. Cured Enviroflex™ can only be removed mechanically.

Storage

Unused material: To extend potlife of opened pails, pour 1/32" to 1/16" film of mineral spirits on top of the unused product before closing the lid for storage. When re-opening to use, if a skin has formed, simply remove the skin and stir before use, being sure not to over agitate. Over agitating will add air into the product, creating bubbles.

Precautions

Read the MSDS sheet on Enviroflex™ carefully before application. Avoid contact with eyes and skin. If eyes become contaminated flush with water for at least 15 minutes. If ingested do not induce vomiting and seek medical attention immediately.

IMPORTANT NOTE: Always check our website, www.sealoflex.com to determine if the printed literature you are reading is the most current version available.

For this and/or related products, please refer to individual product data sheets, System Application Guides, Products MSDS, Primer Chart, Fabric Chart.

Sealoflex Fabric™

Sealoflex Fabric™ (Sometimes referred to as "Flashing Fabric")

Sealoflex Fabric™ is a 3.3 oz. per square yard polyester, non-woven, stitch-bonded and heat set fabric.

Click above for larger image

Uses

-Roof Panel Joints
-Detail work such as flashings, copings, gutters, etc.
-Interiors of parapet walls
-Flat, smooth roofs

Advantages

-Conforms readily to uneven surfaces
-Easy to apply
-Comes in a variety of sizes

Instructions

When using Sealoflex Fabric, always lay the fabric into a generous coat of Sealoflex Pink, allowing the wet product to saturate the fabric from below. Another coat of Sealoflex Pink is then applied to ensure saturation from above.

Important Notes

When applying Sealoflex Fabric, to achieve an aesthetically pleasing finish, always apply with the "fluffy" side down.

Color

White

Packaging

Sealoflex Fabric™ comes in rolls in the following sizes:
4 inches x 300 ft.
6 inches x 300 ft.
12 inches x 300 ft.
20 inches x 300 ft.
40 inches x 100 ft.
40 inches x 324 ft.

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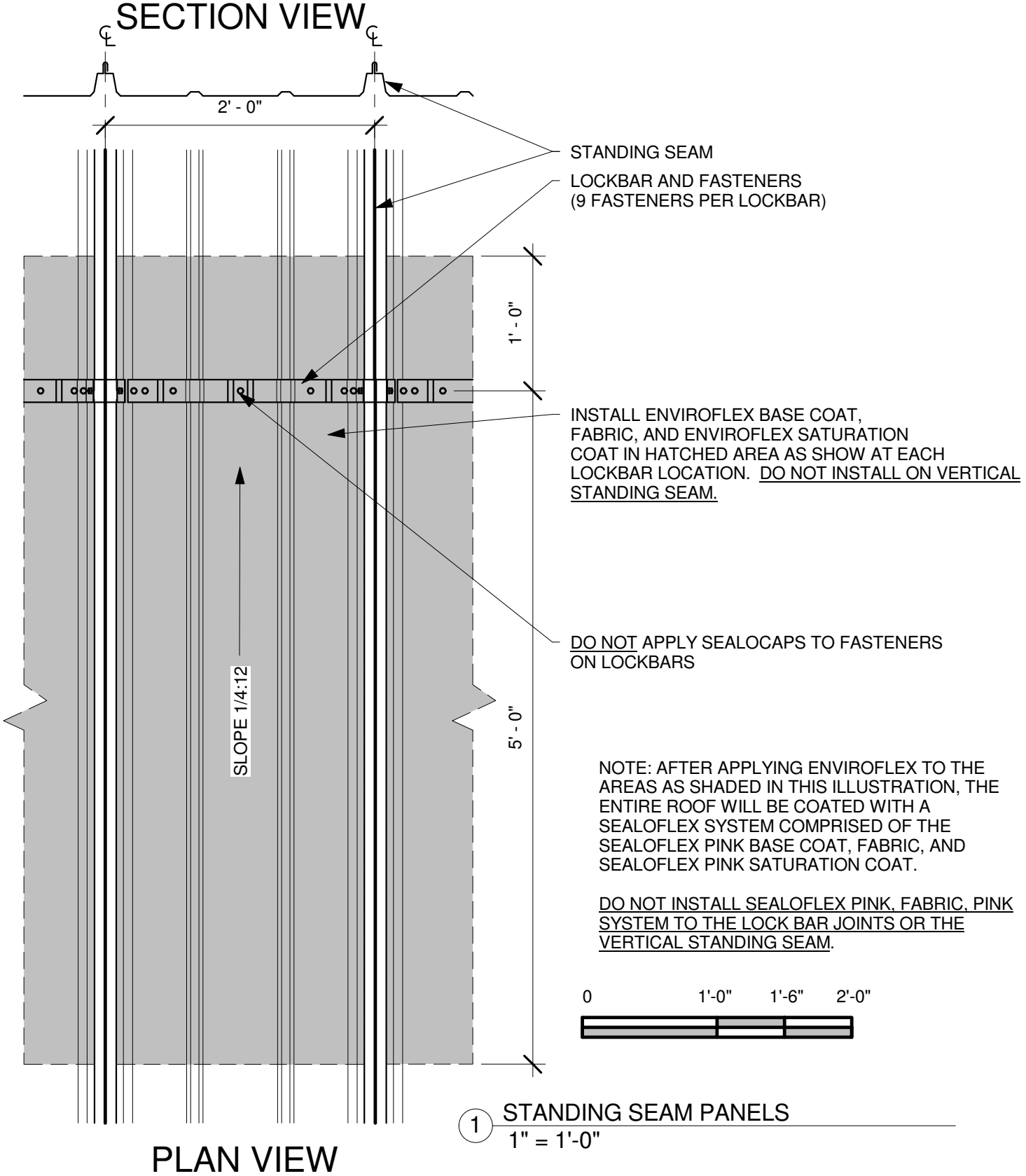

1 STANDING SEAM PANELS
1" = 1'-0"

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FIRE STATION ASSESSMENT
CLARENDON COUNTY, SC

PANEL
SHEET NO.
A1

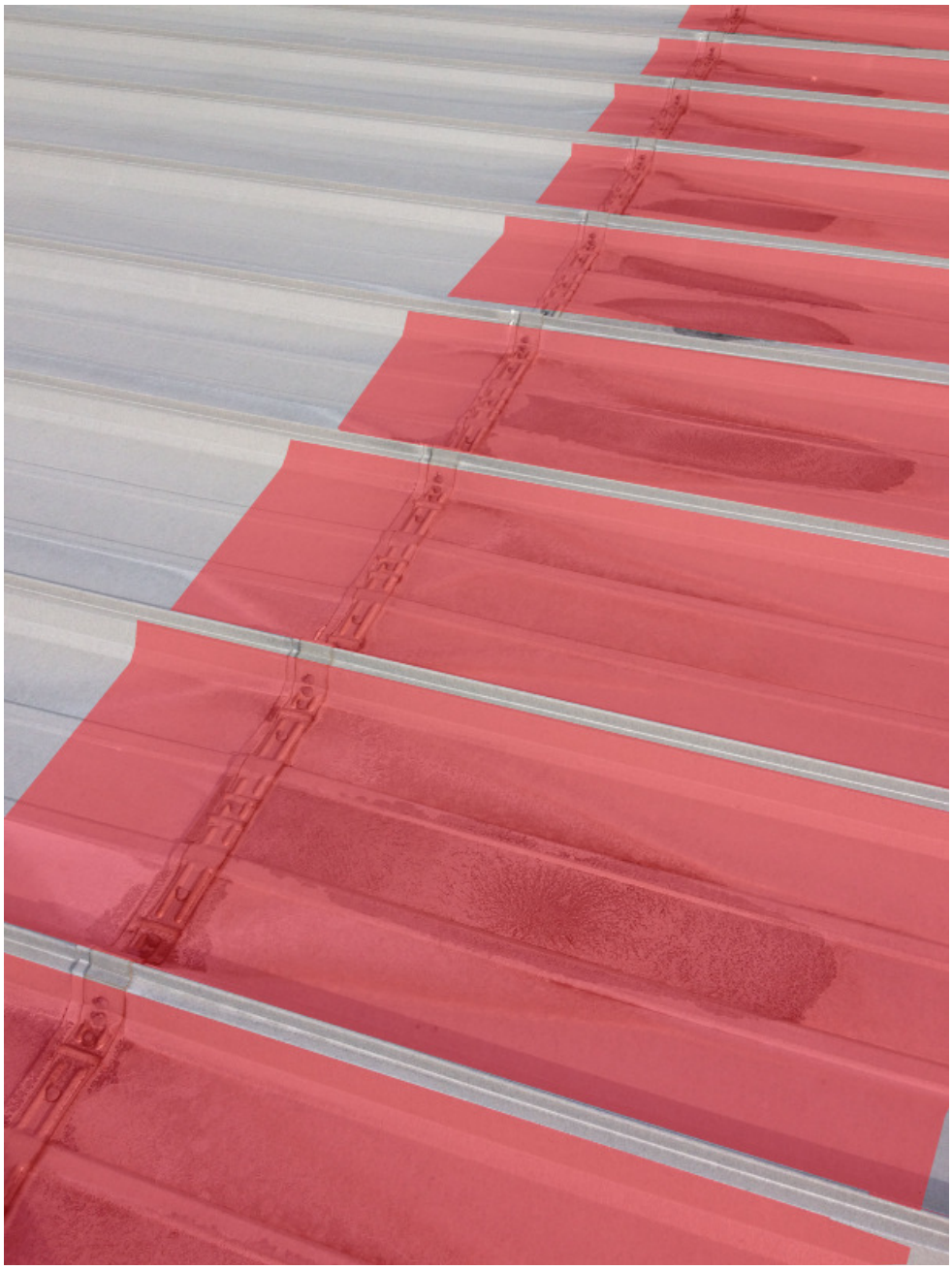


Photo 35: Illustration of the extent of the Enviroflex patch.

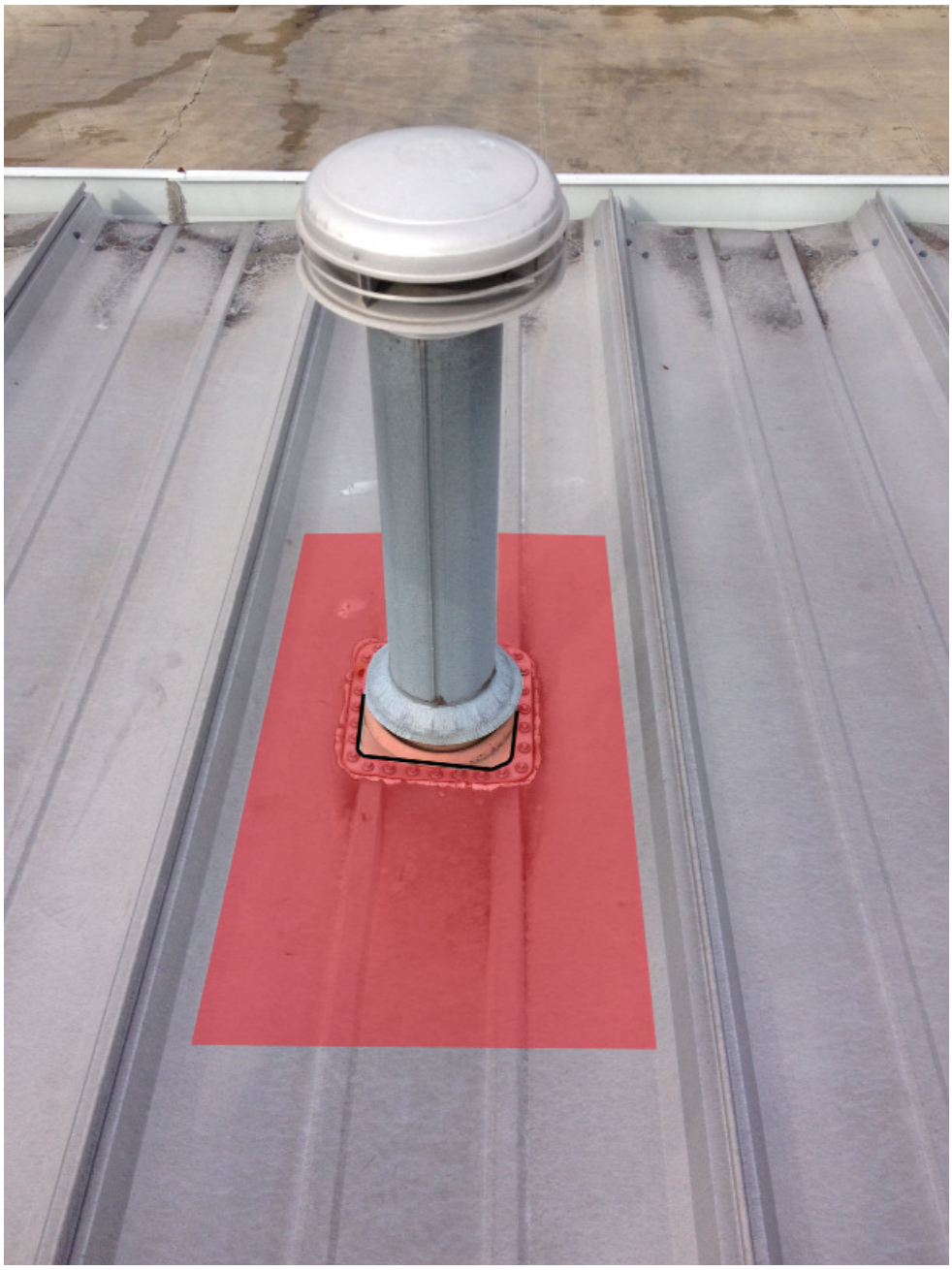


Photo 36: Illustration of the extent of the Sealoflex pink base, fabric, and pink saturation coat system in regards to a gas heater exhaust vent. Do not apply sealoflex to the rubber boot or up on the metal of the gas heater exhaust vents. Only apply the Sealoflex system to the metal standing seam panels and the metal trim ring of the boot. If the boot apperas to be leaking, replace boot with new one first and then apply the Sealoflex system.

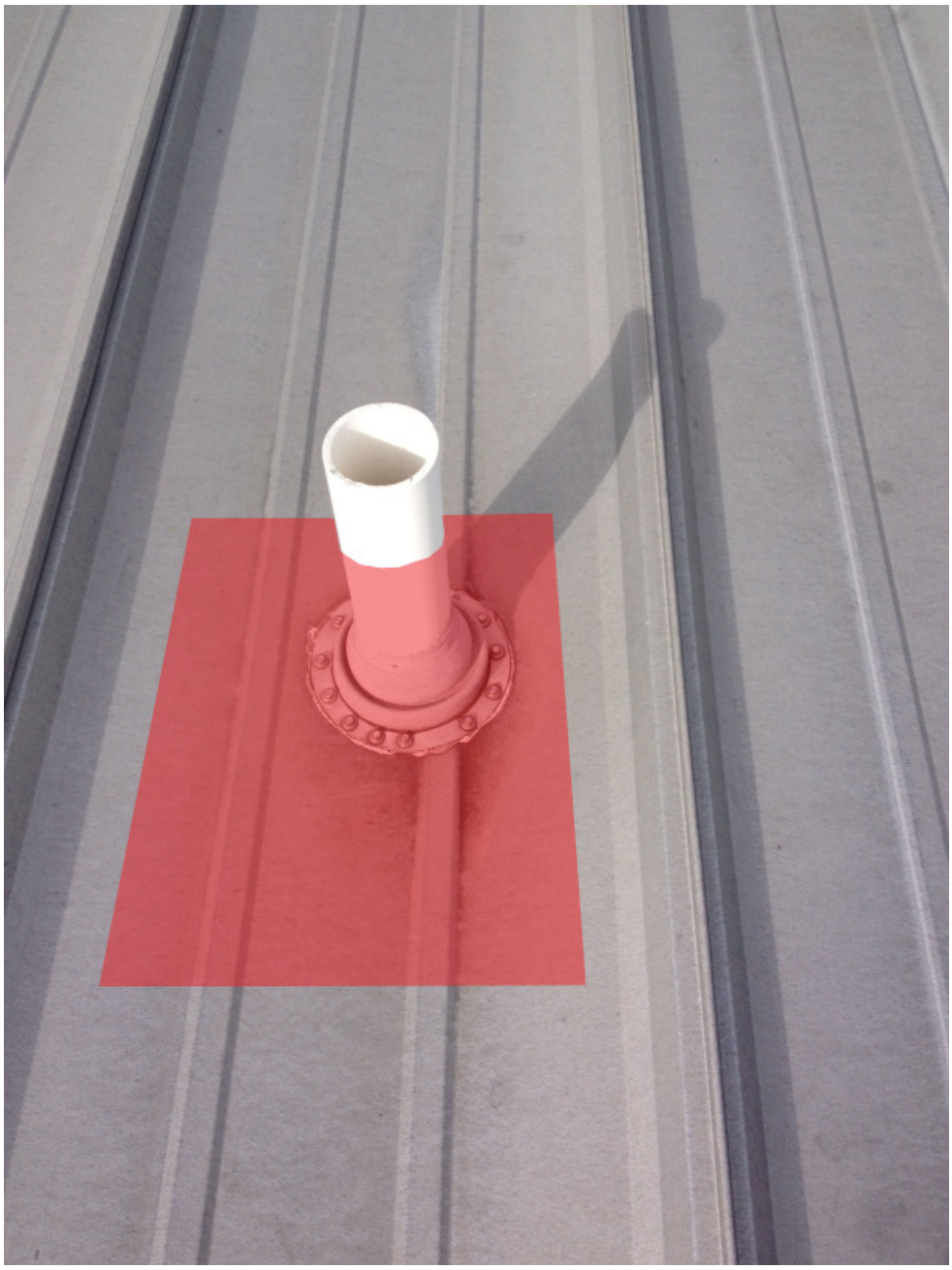


Photo 37: Illustration of the extent of the Sealoflex pink base, fabric, and pink saturation coat system in regards to a plumbing vent pipe. Apply the Sealoflex system to the metal standing seam panels, metal trim ring of the boot, boot, and up on the PVC pipe. If the boot apperas to be leaking, replace boot with new one first and then apply the Sealoflex system.

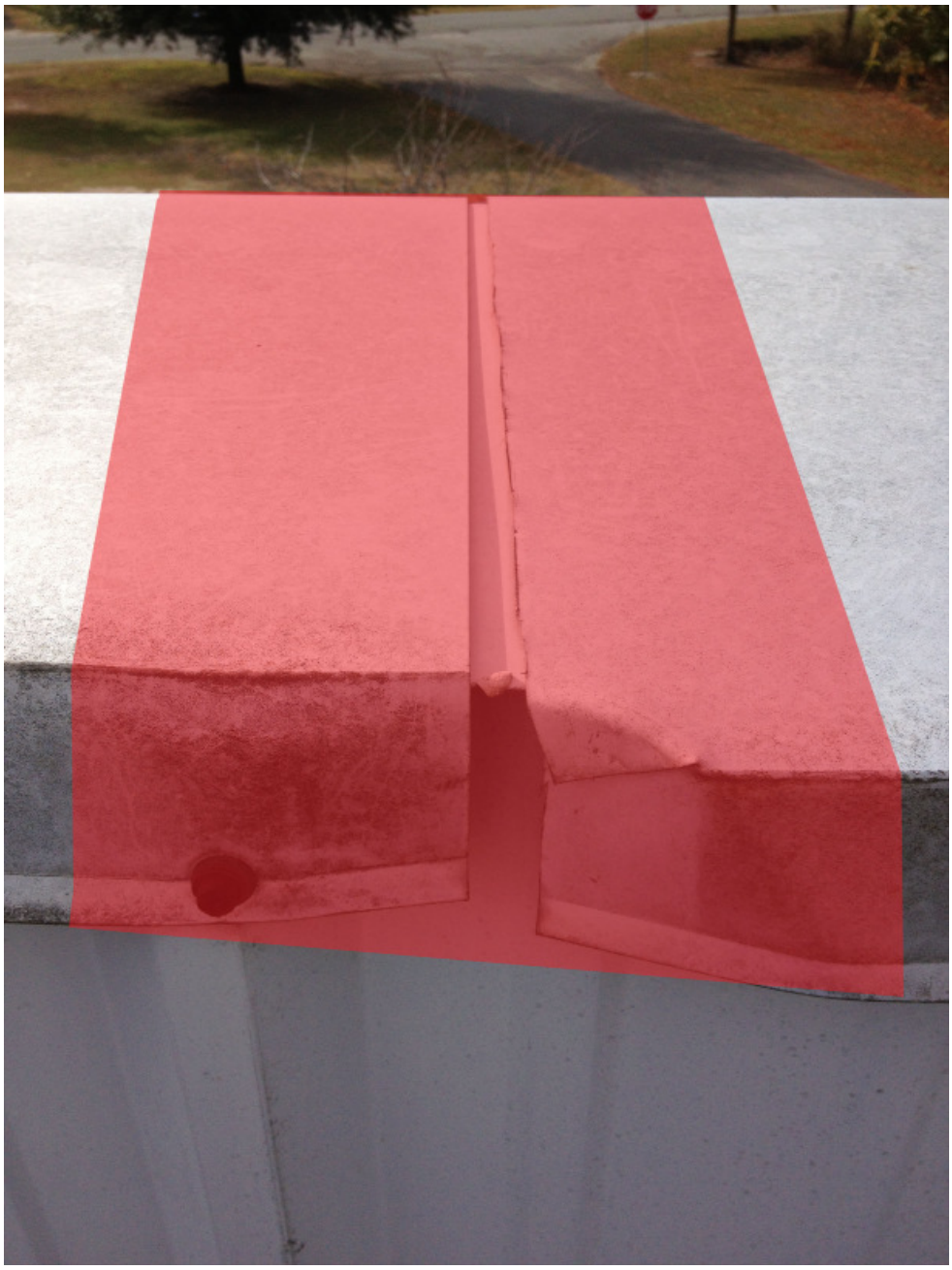


Photo 38: Illustration of the extent of the Sealoflex pink base, fabric, and pink saturation coat system in regards to a joint in the parapet cap flashing. Apply the Sealoflex system to the metal standing seam parapet cap flasing to span the joint by atleast 6" either side of the joint. Some metal work may be necessary to ensure a proper base for the appliation of the Sealoflex system. Install new metal patch to repair this are before application of Sealoflex.

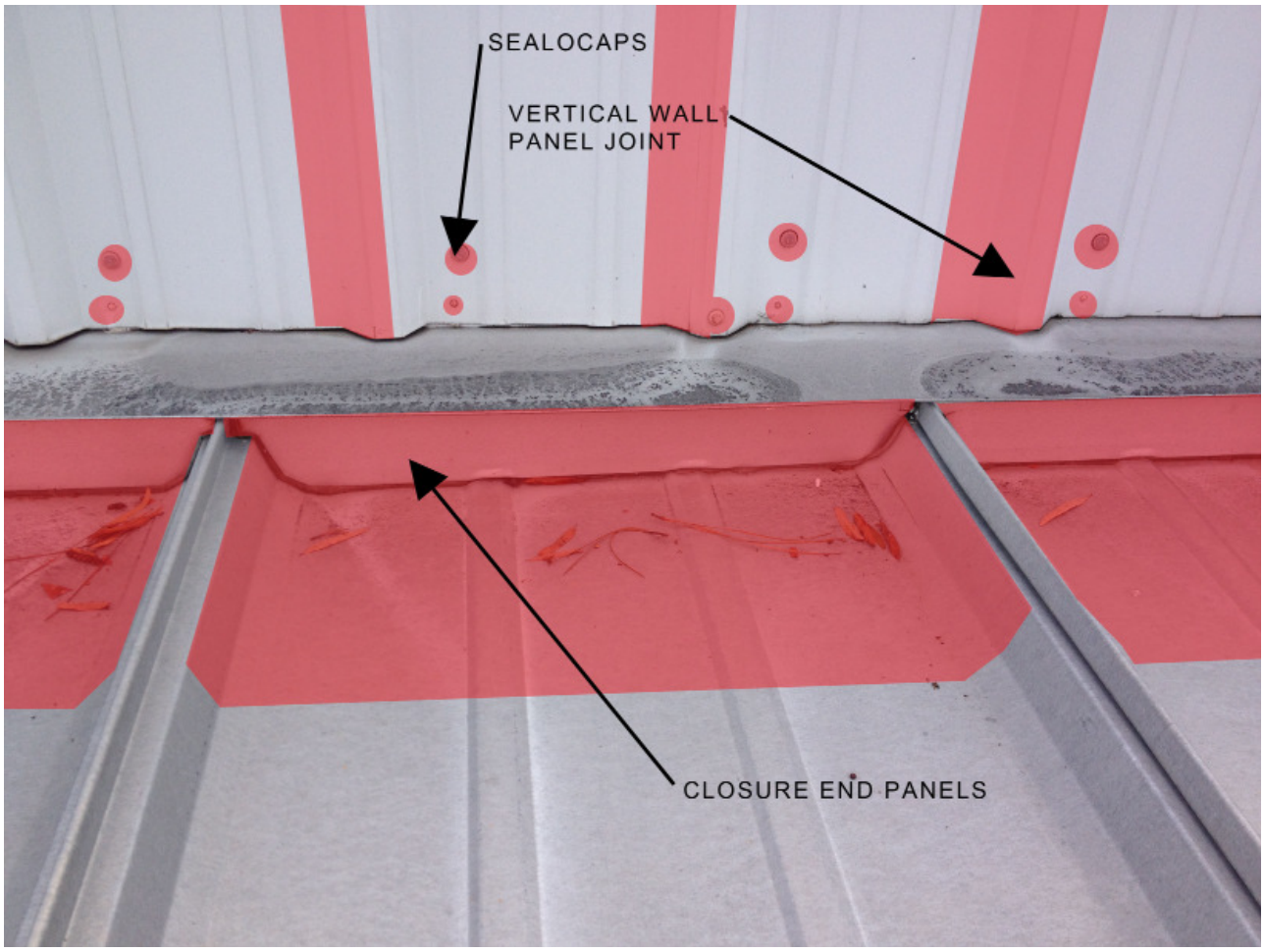


Photo 39: Illustration of the extent of the Sealoflex pink base, fabric, and pink saturation coat system in regards to parapet wall to roof intersection at the east wall. Apply the Sealoflex system to the metal closures under the wall counter flashing, vertical wall panel joint, any joints in the horizontal counter flashing at base of parapet wall, and apply Sealocaps to all fasteners. (Do not install Sealoflex on the vertical standing seam).

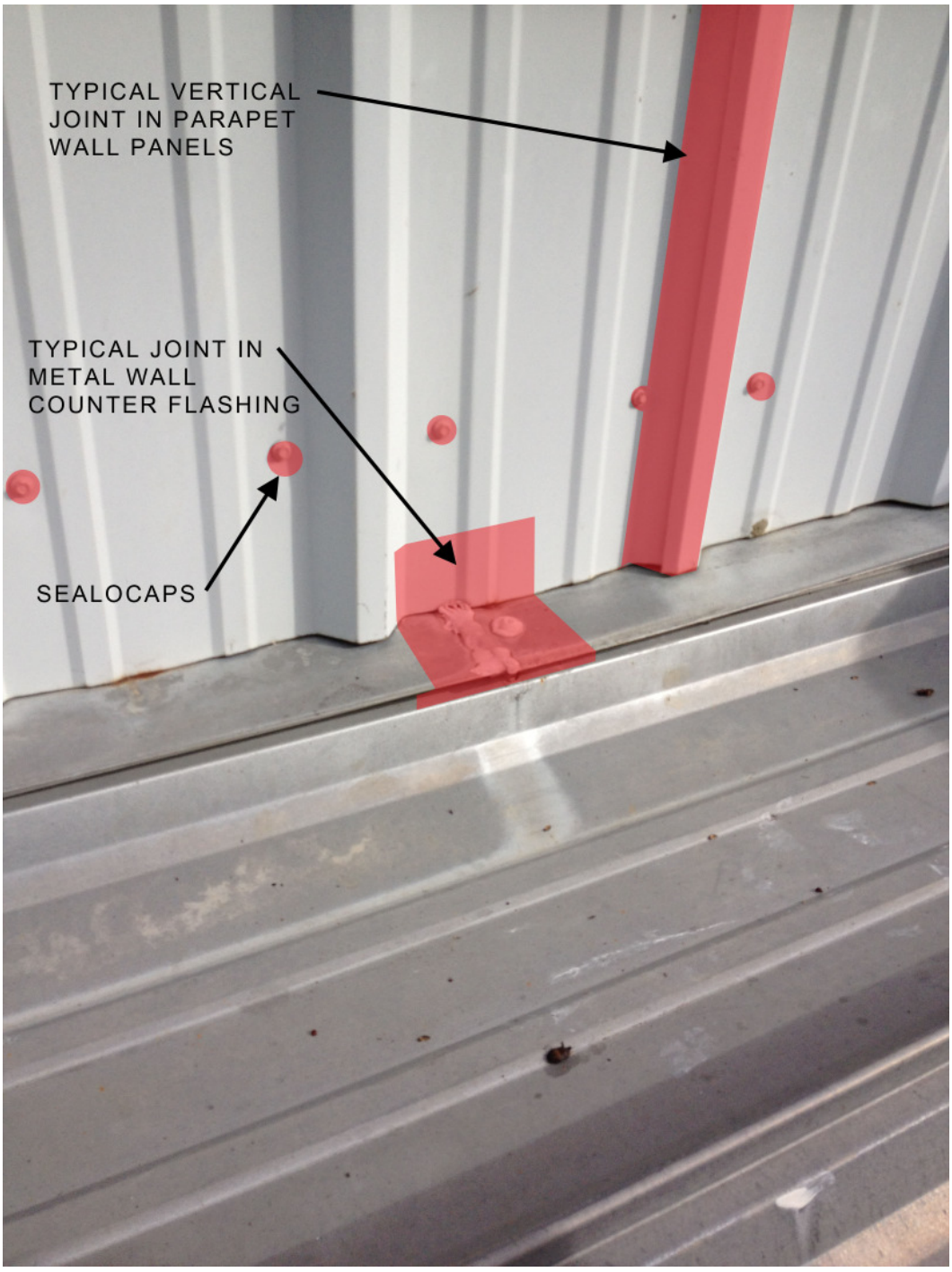


Photo 40: Illustration of the extent of the Sealoflex pink base, fabric, and pink saturation coat system in regards to parapet wall to roof intersection at the north and south wall. Apply the Sealoflex system to the joint in the vertical wall panel, joint in the horizontal wall counter flashing at parapet wall base, and apply Sealocaps to all fasteners. (Do not install Sealoflex on the vertical standing seam).

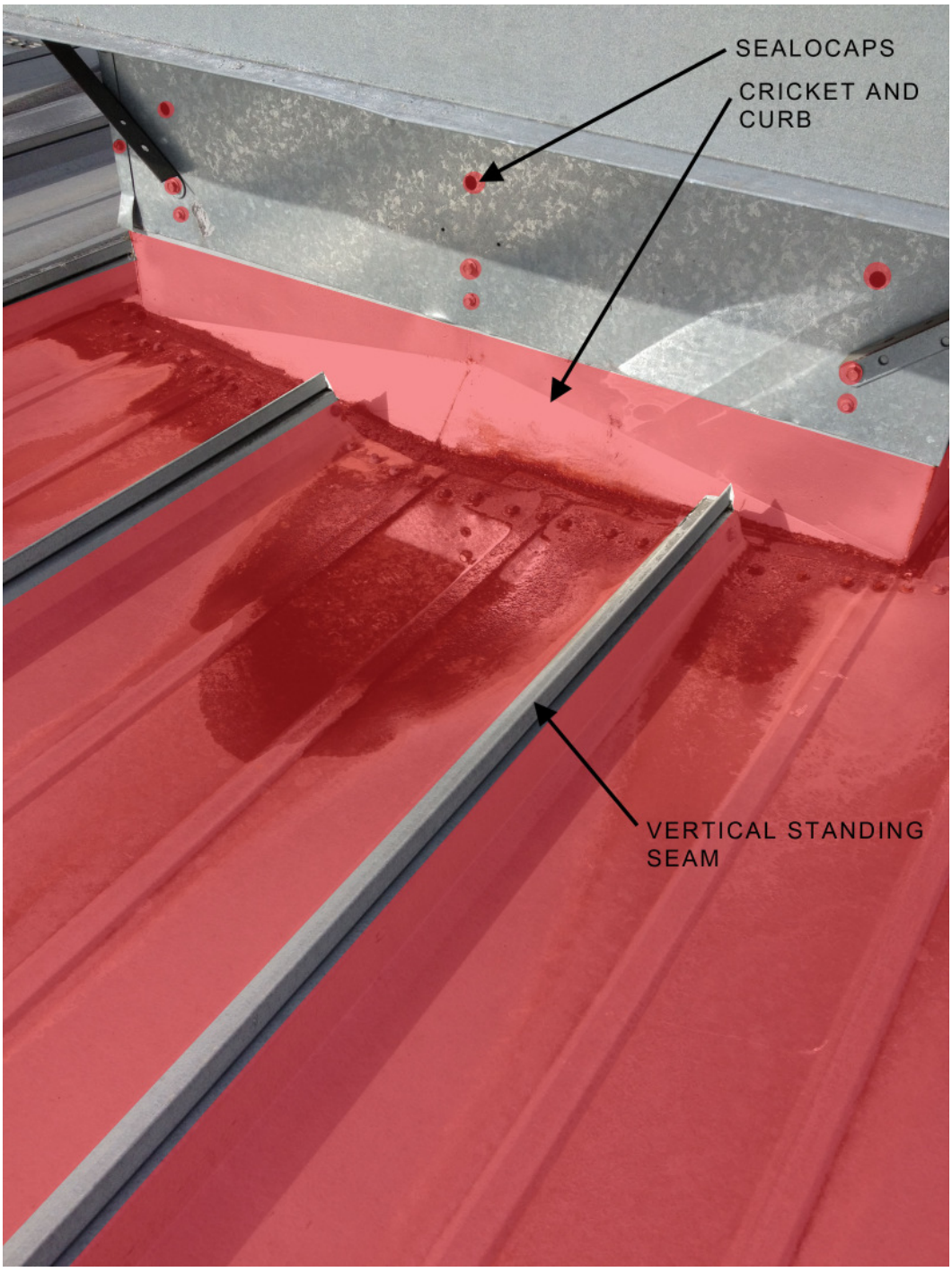
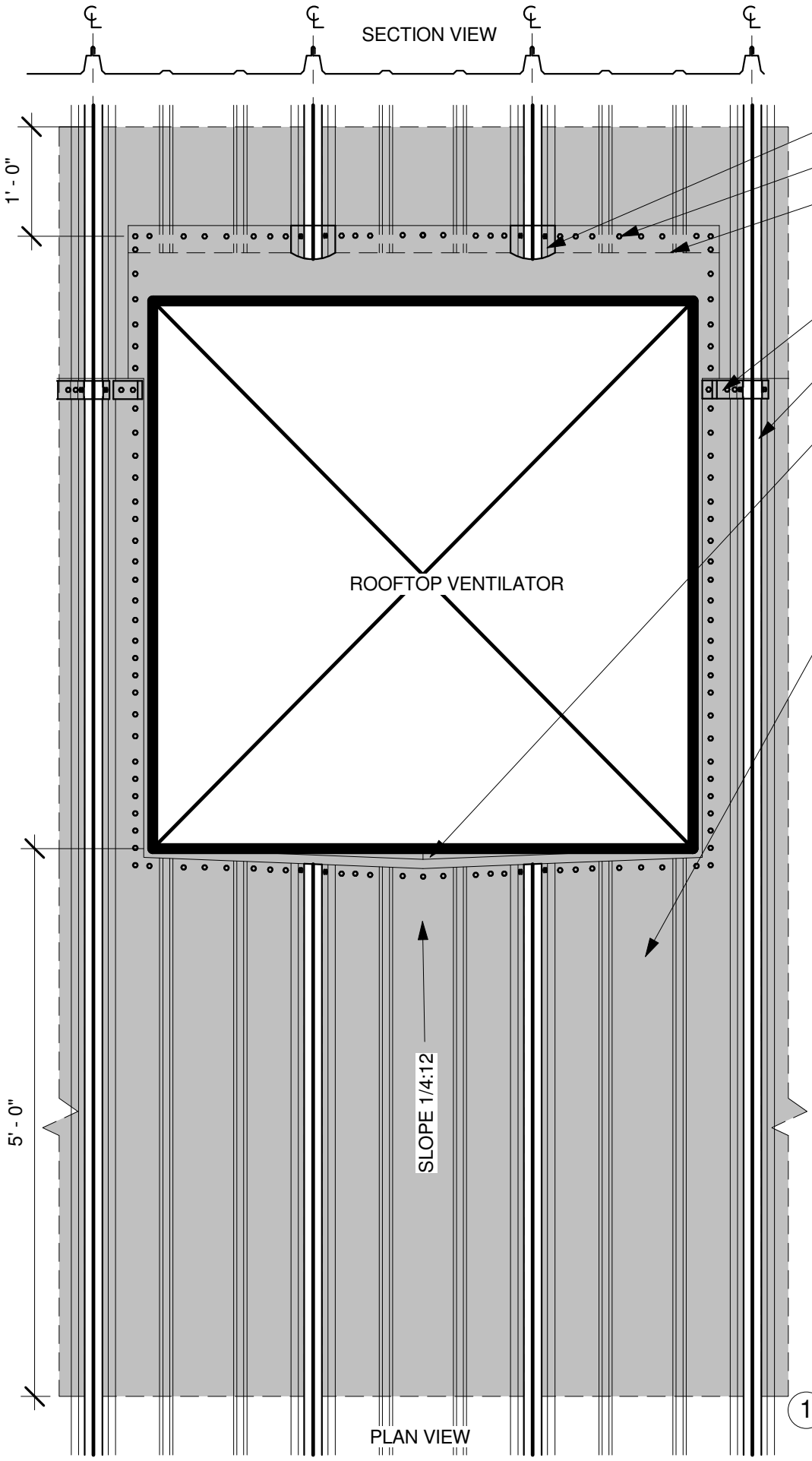


Photo 41: Illustration of the extent of the Enviroflex base, fabric, and Enviroflex saturation coat system in regards to the rooftop ventilator penetrations. Apply the Enviroflex system to all fasteners around the ventilator, on the metal roof panels (see drawing A2), and up on the cricket and curb (all sides) as shown in this photograph. Apply Sealocaps to the fastners on the vertical face of the ventialtor counterflashing and hood. (Do not install Enviroflex on the vertical standing seam).



STANDING SEAM ENDCAP

FASTENERS

STANDING SEAM PANEL BELOW VENTILATOR BASE FLASHING

LOCKBAR

VERTICAL STANDING SEAM

VENTILATOR CRICKET
APPLY ENVIROFLEX SYSTEM TO THE CRICKET AND UP
ON THE VERTICAL SIDES OF THE VENTILATOR UP TO THE COUNTER FLASHING.

INSTALL ENVIROFLEX BASE COAT, FABRIC, AND ENVIROFLEX SATURATION COAT IN HATCHED AREA AS SHOW AROUND EACH ROOFTOP VENTILATOR PENETRATION LOCATION AND LOCKBARS. BE SURE TO COVER ALL FASTENERS AND ALL THE ENVIROFLEX SYSTEM ON THE VERTICAL WALL OF THE VENTILATOR UP TO THE LEVEL OF THE CUNTERFLASHING AS SHOWN IN PHOTO 41.
DO NOT INSTALL ON VERTICAL STANDING SEAM.

NOTE: AFTER APPLYING ENVIROFLEX TO THE AREAS AS SHADED IN THIS ILLUSTRATION, THE ENTIRE ROOF WILL BE COATED WITH A SEALOFLEX SYSTEM COMPRISED OF THE SEALOFLEX PINK BASE COAT, FABRIC, AND SEALOFLEX PINK SATURATION COAT.

DO NOT INSTALL SEALOFLEX PINK, FABRIC, PINK SYSTEM TO THE LOCK BAR JOINTS OR THE VERTICAL STANDING SEAM.

0 1'-0" 1'-6" 2'-0"

1 HVAC ROOF PENETRATION
3/4" = 1'-0"

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HVAC
SHEET NO.
A2

Photo 42: Illustration of the extent of the Sealoflex pink base, fabric, and pink saturation coat system in regards to parapet wall to roof intersection at the north wall. Apply the Sealoflex system to the vertical wall panel joint, any joints in the horizontal counter flashing at base of parapet wall, and apply Sealocaps to all fasteners. Apply NP1 caulking in the reglet created by the insertion of the counterflashing into the brick vener wall. (Do not install Sealoflex on the vertical standing seam).

Roof Assembly

Recommendations

Option B

This option is for the installation of the TPO Metal Retrofit Roofing System, designed for retrofitting existing standing seam roofs. Meadors recommends this roofing option as the most preferred option and it will provide a 20 year warranty.

The basis of design shall be as follows:

1. Install Insulfoam FL Expanded Polystyrene (EPS) Rigid Closed-Cell Flute Filler laid into SSSMR flutes and set with approved adhesive.

2. Install water-resistant and silicone treated 1/2" layer of GP Gypsum Dens-Deck board with embedded fiberglass facer on both sides over Insulfaom FL (EPS) Flute Filler. Dens-Deck to be attached by HPV or HPVX fasteners.

3. Install Versico 60 mil white VersiWeld Thermoplastic Polyolefin (TPO) membrane to Dens-Deck.

4. Follow manufacturer's instructions to suit the existing job conditions with respect to corners, curbs, edges, espansion joints, penetration pockets, pipes, seams, wall terminations, etc.

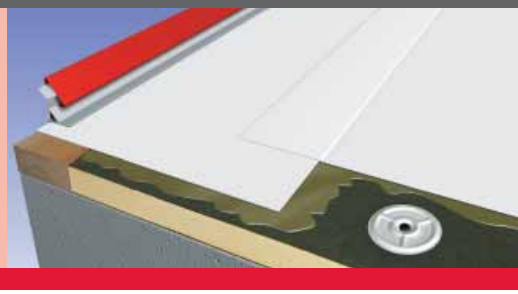
5. The gutter along the western edge of the roof should be incorporated within this roofing system application. Height of gutter shall be properly set to comply with roof manufacturer's installation instructions. The gutter shall be 7" wide by 5 1/4" high minimum to meet the most severe rain event conditions.

6. The existing downspout locations are adequate. Downspouts should measure 3 3/4" by 4 3/4" to sufficiently carry water from roof to ground. The size of downspouts take into account the most severe rain event conditions.

7. Install 1/2" CDX plywood fastened on top of the existing metal parapet wall panel system. Install TPO base flashing onto plywood and cover plywood with TPO to the top of parapet wall.

8. Remove existing parapet cap and replace with Versico metal standing seam parapet coping. Color to be approved by Owner's Representative.

VERSIWELD



TPO METAL RETROFIT SYSTEM

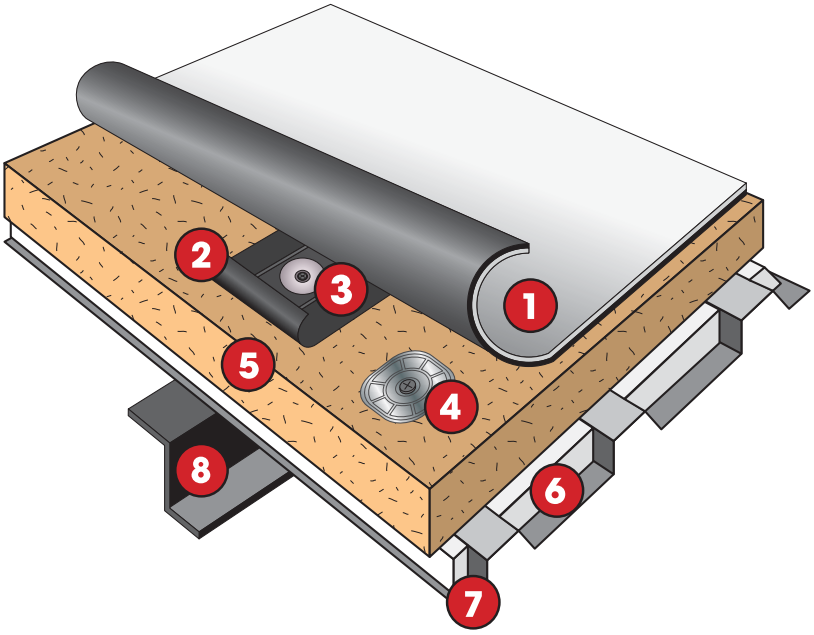
The VersiWeld TPO Metal Retrofit Roofing System is designed for retrofitting existing standing seam, flat seam or corrugated metal roofs.

FEATURES AND BENEFITS

- 45-, 60-, 72- & 80-mil membrane thicknesses
- White, Gray & Tan colors available
- Heat weldable seams
- ENERGY STAR®, CRRC and LEED approved roofing membrane
- High wind uplift performance
- Industry's highest top ply membrane thickness adds improved weatherability, durability and long-term rooftop performance

METAL RETROFIT SYSTEMS ARE AVAILABLE IN THE FOLLOWING:

- Standard Gauges: 45-, 60-, 72-, and 80-mil
- Colors: White, Gray, Tan
- Standard Widths: 12'
- Standard Lengths: 100'



1. VersiWeld 45-mil Membrane

2. 10" wide RUSS™ (Reinforced Universal Securement Strip)

3. Versico Purlin Fasteners

4. HPV or HPVX Fasteners

5. Acceptable Insulation

6. Flute Filler

7. Existing Metal Roof

8. Structural Purlin

	SYSTEM OPTIONS	
	MECHANICALLY ATTACHED	FULLY ADHERED
	FLUTES OF EXISTING METAL ROOF ARE FILLED WITH AN ACCEPTABLE INSULATION	
FLUTE FILLER ATTACHED BY	INSULATION IS LOOSE-LAID INTO FLUTES	INSULATION IS LOOSE-LAID INTO FLUTES OR SET WITH APPROVED ADHESIVE
APPROVED VERSICO INSULATION IS THEN LAID OVER EXISTING ROOF		
INSULATION ATTACHED BY	INSULATION IS MECHANICALLY FASTENED INTO EXISTING METAL WITH INSULTITE, HPV OR HPVX FASTENERS	HPV OR HPVX FASTENERS SECURE INSULATION TO EXISTING METAL, OR FAST ADHESIVE
MEMBRANE ATTACHED BY	PURLIN FASTENERS USED TO ATTACH 10" TPO PRESSURE-SENSITIVE RUSS STRIP INTO EXISTING TPO PURLINS	BONDING ADHESIVE IS UTILIZED TO ADHERE MEMBRANE TO THE INSULATION

VERSICO

A SINGLE SOURCE FOR SINGLE-PLY ROOFING

Versico, LLC PO Box 1289, Carlisle, PA 17013
Tel: **800.992.7663** Fax: 717.960.4036 Web: **www.versico.com**

SECTION 07545

THERMOPLASTIC POLYOLEFIN (TPO) MEMBRANE ROOFING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Thermoplastic Polyolefin Membrane Roofing.

B. Membrane Flashings.

C. Metal Flashings.

D. Roof Insulation.

1.2 RELATED SECTIONS

A. Section 06100 - Rough Carpentry: Roof blocking installation and requirements.

B. Section 07620 - Sheet Metal Flashing and Trim: Metal flashing and counter flashing installation and requirements.

1.3 REFERENCES

A. American Society of Civil Engineers (ASCE) - ASCE 7 - Minimum Design Loads for Buildings and Other Structures, Current Revision.

B. ASTM International (ASTM):
   1. ASTM C 578 - Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation.
   2. ASTM D 6878 - Standard Specification for Thermoplastic Polyolefin Based Sheet Roofing.
   3. ASTM C 1177 – Standard Specification for Glass Mat Gypsum Sheathing.

C. Sheet Metal and Air Conditioning Contractors National Association, Inc. (SMACNA) - Architectural Sheet Metal Manual.

D. Underwriters Laboratories (UL):
   1. UL-790 - Standard Test Method for Fire Tests of Roof Coverings.

1.4 DESIGN CRITERIA

A. Wind Uplift Performance:
   1. Roof system is designed to withstand wind uplift forces as calculated using the current revision of ASCE-7.

B. Fire Resistance Performance:
   1. Roof system will achieve a UL Class A rating when tested in accordance with UL-790.

C. Building Codes:
   1. Roof system will meet the requirements of all federal, state and local code bodies having jurisdiction.

1.5 SUBMITTALS

A. Submit under provisions of Section 01300.

B. Product Data: Manufacturer's data sheets on each product to be used, including:
   1. Preparation instructions and recommendations.
   2. Storage and handling requirements and recommendations.
   3. Installation methods.

C. Detail Drawings:
   1. Submit approved plan, section, elevation or isometric drawings which detail the appropriate methods for all flashing conditions found on the project.
   2. Coordinate approved drawings with locations found on the Contract Drawings.

1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications: All primary products specified in this section will be supplied by a single manufacturer with a minimum of fifteen (15) years experience.

B. Installer Qualifications:
   1. All products listed in this section are to be installed by a single installer with a minimum of five (5) years demonstrated experience in installing products of the same type and scope as specified.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Store products in manufacturer's unopened packaging until ready for installation.

B. Store and dispose of hazardous materials, and materials contaminated by hazardous materials, in accordance with requirements of local authorities having jurisdiction.

1.8 PROJECT CONDITIONS

A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

1.9 WARRANTY

A. At project closeout, provide to Owner or Owners Representative an executed copy of the manufacturer's Total System, 90 MPH wind speed warranty, outlining its terms, conditions, and exclusions from coverage.
   1. Duration: Twenty (20) Years.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. **BASIS OF DESIGN:** Versico Roofing Systems, which is located at: P. O. Box 1289; Carlisle, PA 17013; Toll Free Tel: 800-992-7663;

B. Substitutions: Requests for substitution must be made 15 days prior to bid date.

C. Requests for substitutions will be considered in accordance with provisions of Section 01600.

2.2 SCOPE / APPLICATION

A. Roof System: Provide a waterproof roof system, capable of withstanding uplift forces as specified in this section.
   1. Membrane Attachment: RhinoBond

B. Base Flashing: Provide a waterproof, fully adhered base flashing system at all penetrations, plane transitions and terminations.

C. Insulation: Provide a roof insulation system beneath the finish membrane.

2.3 INSULATION

A. Insulfoam FL: Expanded Polystyrene (EPS): Rigid, closed cell foam insulation meeting ÅSTM C 578.
   1. Compressive Strength: Type I - 10 psi (0.7 kg/sq.cm.) min.

B. Water-resistant and silicone treated gypsum panel with embedded fiberglass facer on both sides. GP Gypsum Dens-Deck, distributed by Versico.
   1. Board Thickness: 1/2 inch (13mm).

2.4 THERMOPLASTIC POLYOLEFIN (TPO) MEMBRANE

A. VersiWeld Membrane:
   1. Color: White.
   2. Membrane Thickness: 60 mil nominal.
      a. Thickness over Scrim: 0.0120 inches (0.508mm).
      b. Breaking Strength (ASTM D 751): 250 lbf/in (1.1 kN/m) minimum.
      c. Tear Resistance (ÅSTM D 751): 55 lbf/in (245 N/m) minimum.
      d. Elongation (ÅSTM D 751): 25 percent.

2.5 FLASHING ACCESSORIES

A. Inside Corners: Pre-molded corner flashing for inside corners. 60 mil thickness. Color to match membrane.

B. Outside Corners: Pre-molded corner flashing for outside corners. 60 mil thickness. Color to match membrane.

C. TPO T-Joint Covers: 60 mil thick non-reinforced TPO flashing cut into a 4.5 inch (114mm) diameter circle used to seal step-offs at splice intersections. Color to match membrane.

D. Pipe Flashings: A pre-molded flashing and clamping ring used for pipe penetrations. Available for 1 inch to 6 inch (25 - 152mm) diameter pipes.

E. Split Pipe Seals: Pre-fabricated flashing consisting of 45 mil thick reinforced VersiWeld Membrane for pipes 1 inch to 6 inch (25 - 152mm) in diameter. Split (cut) and overlapped tabs are incorporated to allow the pipe seal to be opened and wrapped around the pipe when it is not possible to pull a standard pipe flashing over a round penetration.

F. Molded TPO Sealant Pockets:

1. Pre-fabricated, interlocking, 2-piece, injection molded, flexible pocket with a rigid polypropylene vertical wall and pre-formed deck flanges. Color - White
2. Used with Thermoplastic One-Part Pourable Sealer as specified in this section for waterproofing pipe clusters or other odd shaped penetrations. Forms a 7 1/2 inch by 6 inch (191 x 152mm) oval when completed. Color - White.

G. Sealant Pocket Extension Legs: Designed for use with the TPO Molded Sealant Pocket and the Pre-Fabricated Sealant Pocket to extend the length in increments of 10 inches (254mm). Fabricated from 45 mil thick reinforced TPO membrane and TPO coated metal. Can be used full length, cut to size for customized lengths or welded to each other for extra long applications. Color - White.

H. Pressure-Sensitive (PS) Cover Strip: A nominal 6 inch (152mm) by 40 mil thick non-reinforced TPO membrane laminated to nominal 35 mil thick cured synthetic rubber pressure-sensitive adhesive used in conjunction with TPO Primer to strip in flat metal flanges (i.e., drip edges or rows of fasteners and plates). Color to match membrane.

I. TPO Pressure-Sensitive (PS) RUSS: A nominal 6 inch (152mm) and 10 inch (254mm) wide, 45 mil thick reinforced TPO membrane with nominal 3 inch (76mm) wide 35mil thick cured synthetic rubber pressure-sensitive adhesive laminated along one end on 6 inch (152mm) width and both ends on 10 inch (254mm) width.

J. TPO Non-Reinforced Flashing: Non-reinforced thermoplastic polyolefin based membrane used for field fabricated pipe flashings, sealant pockets and scuppers when the use of a pre-molded accessory is not feasible.

K. Heat Weldable Walkway Rolls: Recycled VersiWeld Membrane offering superior tear, puncture and weather resistance and designed to protect VersiWeld membrane in those areas exposed to repetitive foot traffic or other hazards. Walkway material may be heat welded to VersiWeld membrane using an automated heat welder or hand held heat welder. Walkway Rolls are 34 inches (762mm) wide by 50 feet (15.2 M) long and are nominal 120 mils thick. Color - White.

2.6 CLEANERS, PRIMERS, ADHESIVES AND SEALANTS

A. VersiWeld Bonding Adhesive: Solvent-based contact adhesive that allows bonding of VersiWeld membrane to various porous and non-porous substrates.
1. Base: Synthetic Rubber.
2. Color: Yellow.
3. Solids: 20.0 percent.
4. VOC: 670 grams/liter.

B. Cut Edge Sealant: A medium solids contact, free flowing polymeric material designed for sealing cut edges (exposed fabric) of VersiWeld reinforced membrane.

C. Water Cut-Off Mastic: A one-component, low viscosity, self wetting, Butyl blend mastic used as a compression sealing agent between membrane and applicable substrates.

D. TPO Primer: Solvent-based product designed for priming TPO surfaces prior to the application of pressure-sensitive products.

E. Universal Single-Ply Sealant: A 100 percent solids, solvent free, one-part polyether sealant that is used as a termination bar sealant. Available in white only.

F. Thermoplastic One-Part Sealant: Single component, moisture curing, elastomeric polyether sealant that is compatible with Versico's Thermoplastic membranes. Provides a flexible, durable and long lasting seal around hard-to-flash penetrations in Thermoplastic Roofing Systems.

G. Versico Weathered Membrane Cleaner: Clear, solvent-based cleaner used to loosen and remove contaminants from the surface of exposed membrane.

2.7 FASTENERS

A. HPVX Fasteners: Heavy-duty #15 threaded fastener with a Phillips head used with HPVX seam plates.

B. HP Fastener: Threaded, coated (E-Coat) fastener for use with steel, wood plank, minimum 15/32" thick plywood, or minimum 7/16" thick oriented strand board (OSB).

C. Versico Rhinobond Plates: For use with Versico Rhinobond roof system.

D. Versico Purlin Fanstners: For use witih Versico Rhinobond metal retrofit roof system.

E. Term Bar Nail-In: A 1 1/4 inch (32mm) long expansion anchor with threaded drive pin used for fastening VersaGard Termination Bar or Seam Fastening Plates to concrete, brick or block walls.

F. HPVX Plates: A 2-3/8 inch (60mm) diameter metal barbed fastening plate used with Versico Fasteners for membrane securement. This plate can be used for insulation securement.

G. Insulation Fastening Plates: a nominal 3 inch (76mm) diameter plastic or metal plate used for insulation attachment.

2.8 EDGINGS AND TERMINATIONS

A. VersiTrim 3000: Anchor bar roof edge fascia system consisting of 0.100 inch (2.5 mm) thick extruded aluminum bar, corrosion resistant stainless steel fasteners and snap-on fascia cover.

B. Versico Termination Bar: 1 inch (13 mm) wide, 98-mil thick extruded aluminum bar pre-punched 6 inches (152 mm) on center with sealant ledge.

C. VersiWeld TPO Coated Metal: A 24 gauge galvanized steel sheet coated with a layer of 40-mil non-reinforced VersiWeld Flashing.

PART 3 EXECUTION

3.1 EXAMINATION

A. Do not begin installation until substrates have been properly prepared.

B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2 PREPARATION

A. Clean surfaces thoroughly prior to installation.

B. Prepare surfaces using the methods recommended by the manufacturer for

achieving the best result for the substrate under the project conditions.

3.3 INSULATION - SYSTEM DESIGN

A. Base Layer:
   1. Type: Expanded Polystyrene: Insulfoam FL.
   2. Thickness: Match height and configuration of existing metal roof system.
   3. Attachment Method: Loose laid.

B. Top Layer:
   1. Type: DensDeck.
   2. Thickness: 0.5 inches
   3. Attachment Method: Mechanically Fastened.

3.4 INSULATION PLACEMENT INSULFOAM FL

A. Install insulation substrate with boards butted tightly together with no joints or gaps greater than 1/4 inch (6 mm).

B. Do not install wet, damaged or warped insulation boards.

C. Do not install any more insulation than will be completely waterproofed each day.

3.5 INSULLATION PLACEMENT DENS DECK

A. Install insulation substrate with boards butted tightly together with no joints or gaps greater than 1/4 inch (6 mm).

B. Secure insulation to the substrate with the required mechanical fasteners or insulation adhesive in accordance with the manufacturer's current application guidelines.

C. Do not install wet, damaged or warped insulation boards.

D. Stagger joints in one direction unless joints are to be taped. Install insulation boards snug. Gaps between board joints shall not exceed 1/4 inch (6 mm). Fill all gaps in excess of 1/4 inch (6 mm) with same insulation material.

E. Do not install any more insulation than will be completely waterproofed each day.

3.6 INSULATION ATTACHMENT

A. Securely attach insulation to the existing metal roof system. Attachment must have been successfully tested to meet or exceed the calculated uplift pressure required by the International Building Codes (ASCE-7)

3.7 MEMBRANE PLACEMENT AND ATTACHMENT

A. Fasten RhinoBond Plate to substrate using Versico Purlin Fasteners per manufacturer’s recommendations.

B. Position VersiWeld membrane over the appropriate RhinoBond Plates allowing membrane to relax

C. Place RhinoBond Induction Tool centered over the RhinoBond Welding plate (+/- 1”) under the roofing membrane.

D. Elevate the temperature of plate from ambient to 400-500 degrees F using induction tool.

E. Immediately place Cooling clamp on the membrane over the plate and leave in place for at least 60 seconds.

F. Resume process ensuring membrane is attached to all plates.

3.8 SEAM WELDING

A. Hot-air weld membrane using an Automatic Hot Air Welding Machine or Hot Air Hand Welder in accordance with the manufacturer's current guidelines. At all splice intersections, roll the seam with a silicone roller to ensure a continuous hot air welded seam.

B. Overlay all splice intersections with T-Joint Covers.

C. Probe all seams once the hot air welds have thoroughly cooled (approximately 30 minutes).

D. Repair all seam deficiencies the same day they are discovered.

E. Apply Cut Edge Sealant on all cut edges of reinforced membrane (where the scrim reinforcement is exposed) after seam probing is complete. Cut Edge Sealant is not required on vertical splices.

3.9 FLASHING

A. Flashing of parapets, curbs, expansion joints and other parts of the roof must be performed using VersiWeld reinforced membrane or prefabricated accessories. VersiWeld non-reinforced membrane may be used for flashing pipe penetrations, Sealant Pockets, and scuppers, as well as inside and outside corners, when the use of pre-molded or prefabricated accessories is not feasible.

B. Follow manufacturer's typical flashing procedures for all wall, curb, and penetration flashing including metal edging/coping and roof drain applications.

3.10 WALKWAYS

A. Install walkways at all traffic concentration points (such as roof hatches, access doors, rooftop ladders, etc.) and all locations as identified on the Contract Drawings.

B. Hot-air weld walkway pads to the membrane in accordance with the manufacturer's current application guidelines.

C. Loose lay concrete pavers over an approved protection sheet in accordance with the manufacturer's current application guidelines.

3.11 DAILY SEALS

A. On phased roofing, when the completion of flashings and terminations is not achieved by the end of the work day, a daily seal must be performed to temporarily close the membrane to prevent water infiltration.

B. Complete an acceptable membrane seal in accordance with the manufacturer's requirements.

3.12 CLEAN UP

A. Perform daily clean-up to collect all wrappings, empty containers, paper, and other debris from the project site. Upon completion, all debris must be disposed of in a legally acceptable manner.

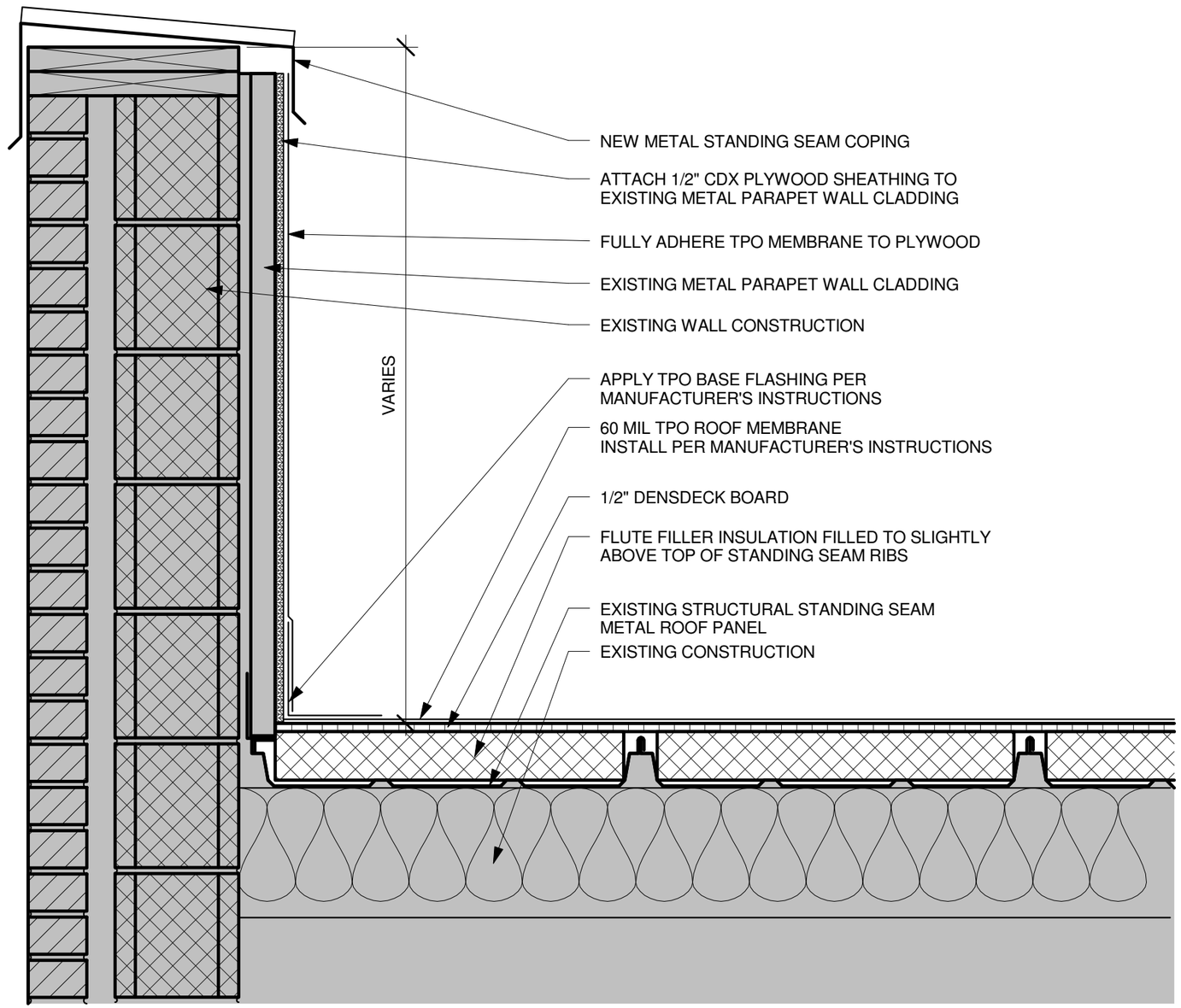
B. Prior to the manufacturer's inspection for warranty, the applicator must perform a pre-inspection to review all work and to verify all flashing has been completed as well as the application of all caulking.

3.13 PROTECTION

A. Protect installed products until completion of project.

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

END OF SECTION



1 PARAPET CAP
1 1/2" = 1'-0"

MEADORS, INC.
843.723.8585 ■ CHARLESTON, SC ■ 2811 AZALEA DRIVE

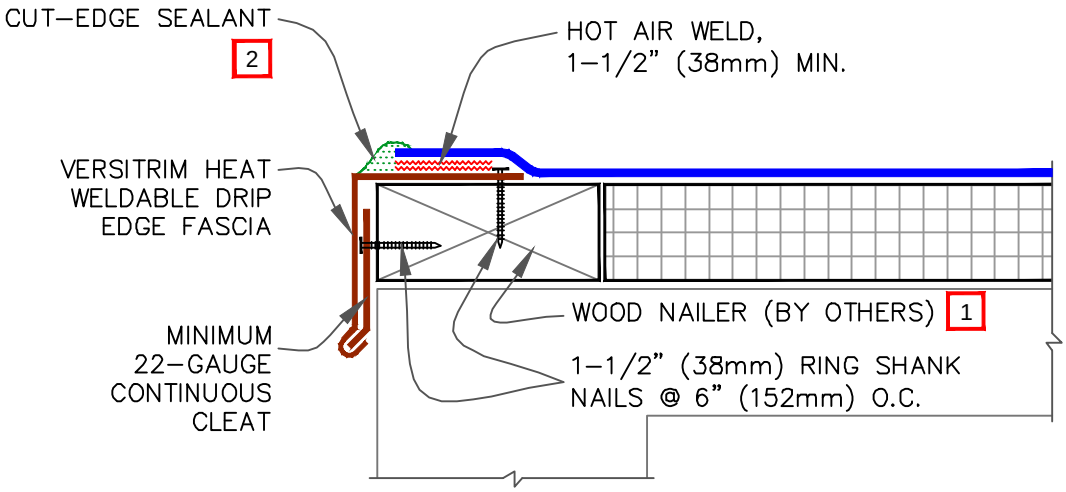
FIRE STATION ASSESSMENT

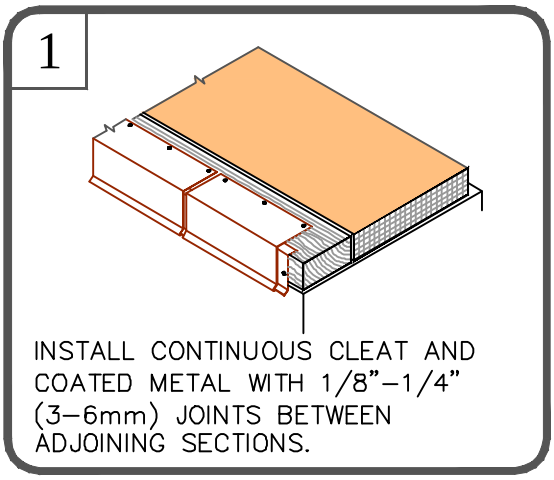
CLARENDON COUNTY, SC

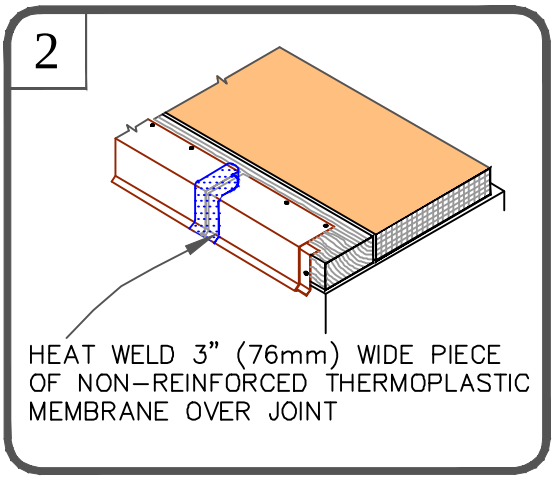
TPO ROOF RETROFIT

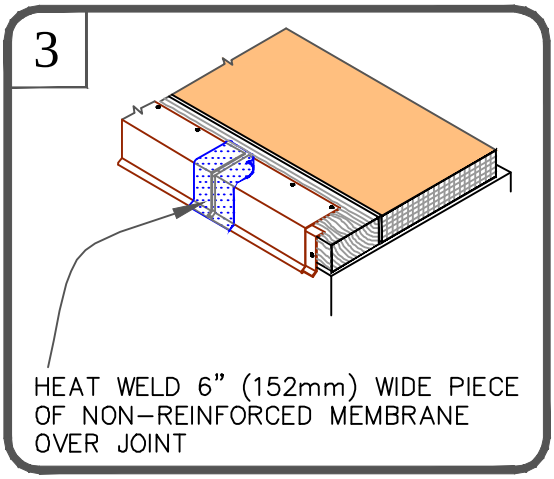
SHEET NO.
A3

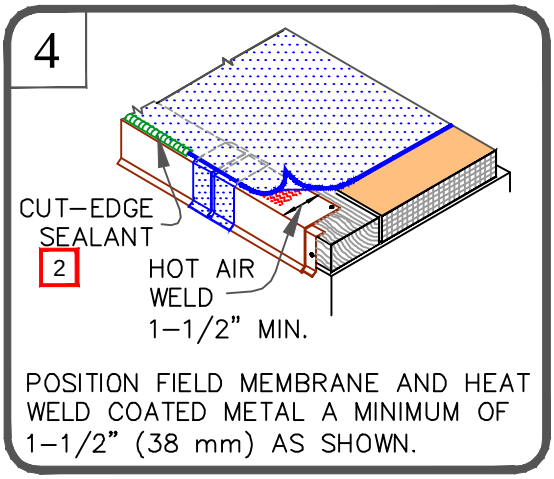
VERSICO ROOFING SYSTEMS
TPO DETAIL DRAWINGS







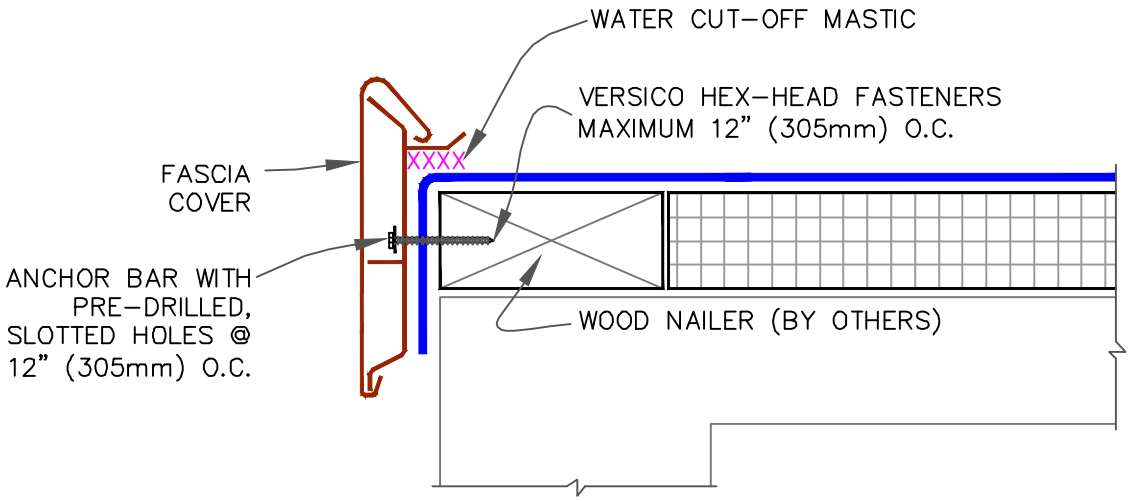




NOTES:

1. WOOD NAILER MUST EXTEND PAST TOTAL WIDTH OF METAL FASCIA DECK FLANGE.

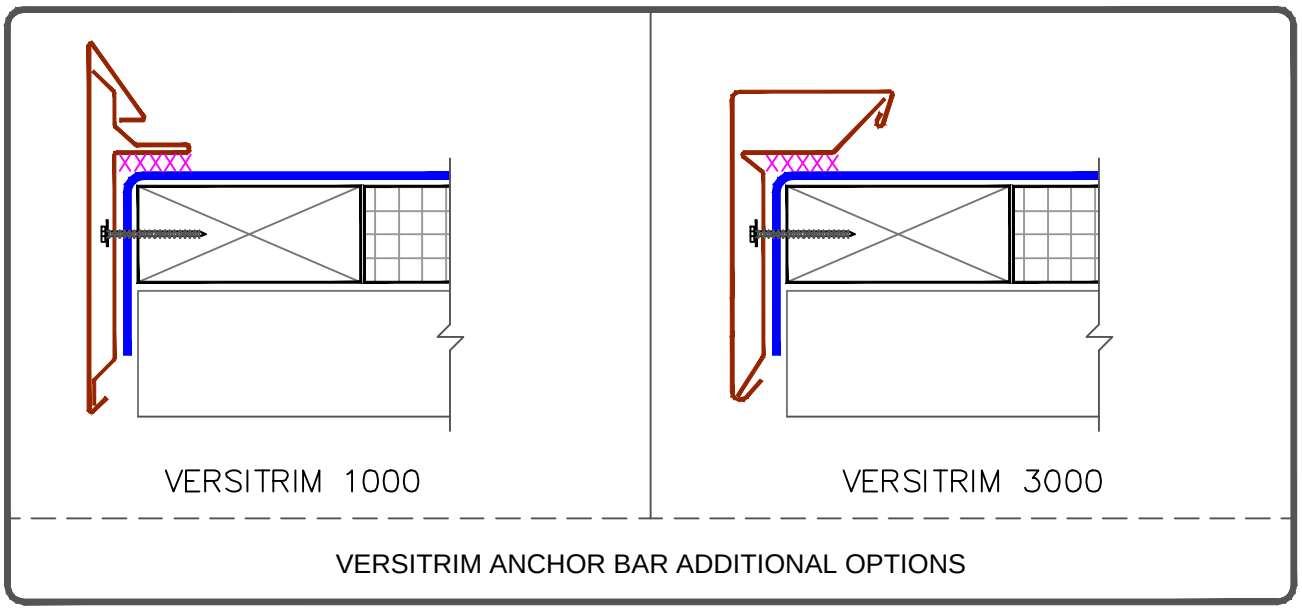
2. APPROXIMATELY 1/8" (3mm) DIAMETER BEAD OF CUT–EDGE SEALANT IS REQUIRED ON CUT EDGES OF REINFORCED TPO MEMBRANE AND RECOMMENDED ON CUT EDGES OF VERSIFLEX PVC MEMBRANE.



VERSITRIM 2000

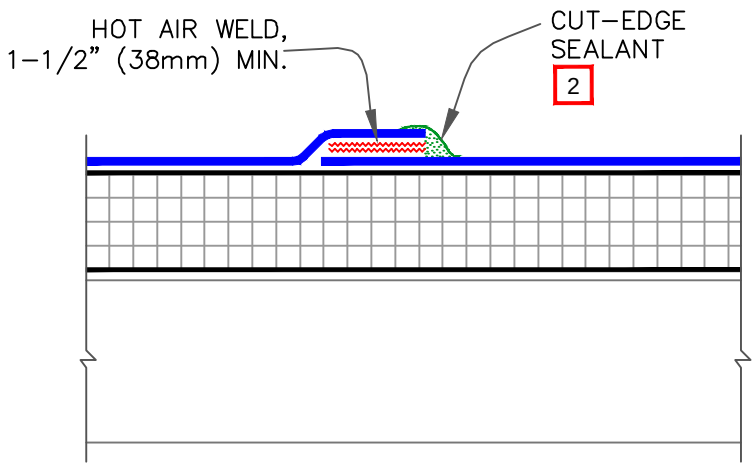
NOTES:

1. REFER TO VERSITRIM INSTALLATION INSTRUCTION MANUAL FOR THE STEP BY STEP INSTALLATION PROCEDURES AND FOR THE VARIOUS PRODUCT FEATURES AVAILABLE.
2. IF INCIDENTAL/TEMPORARY PONDED WATER IS EXPECTED, THE VERSITRIM MUST BE ELEVATED AND SCUPPERS PROVIDED FOR DRAINAGE.
3. ENSURE ROOF SLOPES AWAY FROM VERSITRIM.



VERSITRIM 1000 VERSITRIM 3000

VERSITRIM ANCHOR BAR ADDITIONAL OPTIONS

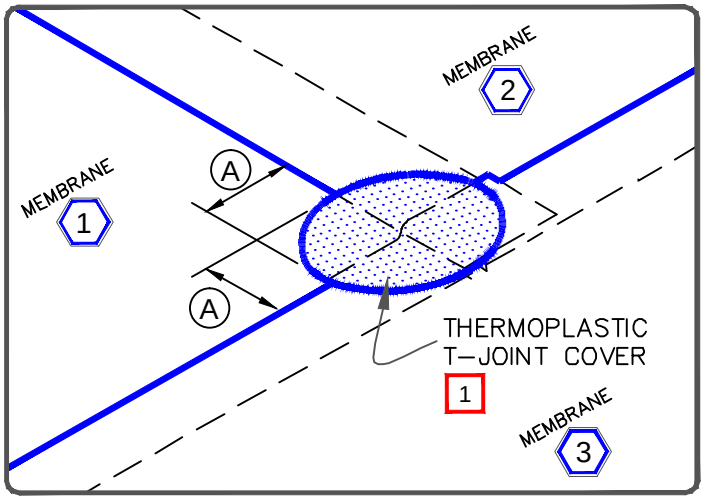


DIMENSIONS		mm	
A	2–1/4"	57	MIN.

NOTE:

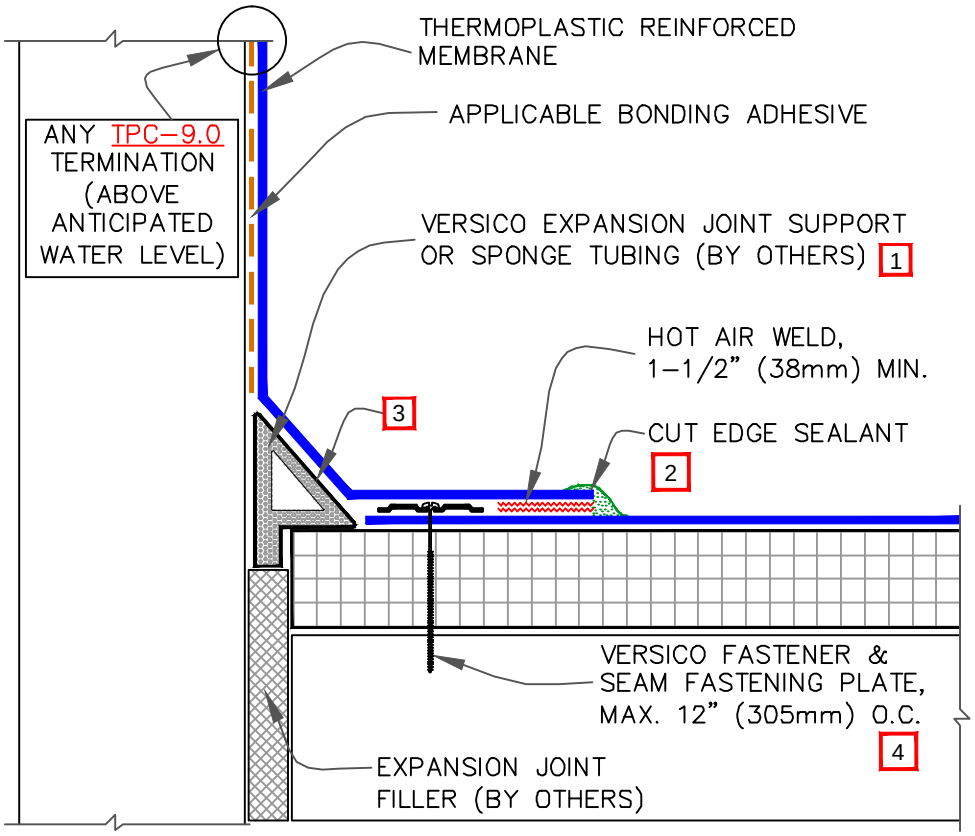
1. WHEN USING 60 OR 80–MIL MEMBRANE, APPLY A 4–1/2" (114mm) DIAMETER "T–JOINT" COVER AT ALL FIELD SPLICE INTERSECTIONS.

2. APPROXIMATELY 1/8" (3mm) DIAMETER BEAD OF CUT–EDGE SEALANT IS REQUIRED ON CUT EDGES OF REINFORCED TPO MEMBRANE AND RECOMMENDED ON CUT EDGES OF VERSIFLEX PVC MEMBRANE.



CAUTION

WHEN A WARRANTY WIND SPEED GREATER THAN 90MPH IS SPECIFIED, VERSICO FASTENERS AND SEAM FASTENING PLATES SHALL NOT EXCEED 6" (152mm) ON CENTER FOR ADHERED MEMBRANE ASSEMBLIES.



NOTES:

1. WHEN VERSICO EXPANSION JOINT SUPPORT IS USED, WIDTH OF JOINT SHALL BE A MINIMUM OF 3/4" (19mm) AND SHALL NOT EXCEED 2" (51mm).
2. APPROXIMATELY 1/8" (3mm) DIAMETER BEAD OF CUT-EDGE SEALANT IS REQUIRED ON CUT EDGES OF REINFORCED TPO MEMBRANE AND RECOMMENDED ON CUT EDGES OF VERSIFLEX PVC MEMBRANE.
3. MEMBRANE FLASHING SHALL NOT BE ADHERED OVER THE EXPANSION JOINT SUPPORT OR SPONGE TUBING.
4. ON MECHANICALLY ATTACHED SYSTEMS, HPVX FASTENERS AND PLATES OR HPV-XL FASTENERS AND PLATES ARE REQUIRED OVER STEEL AND WOOD DECKS. ON CONCRETE DECKS, CD-10 OR MP 14-10 FASTENERS ARE USED WITH HPVX PLATES.

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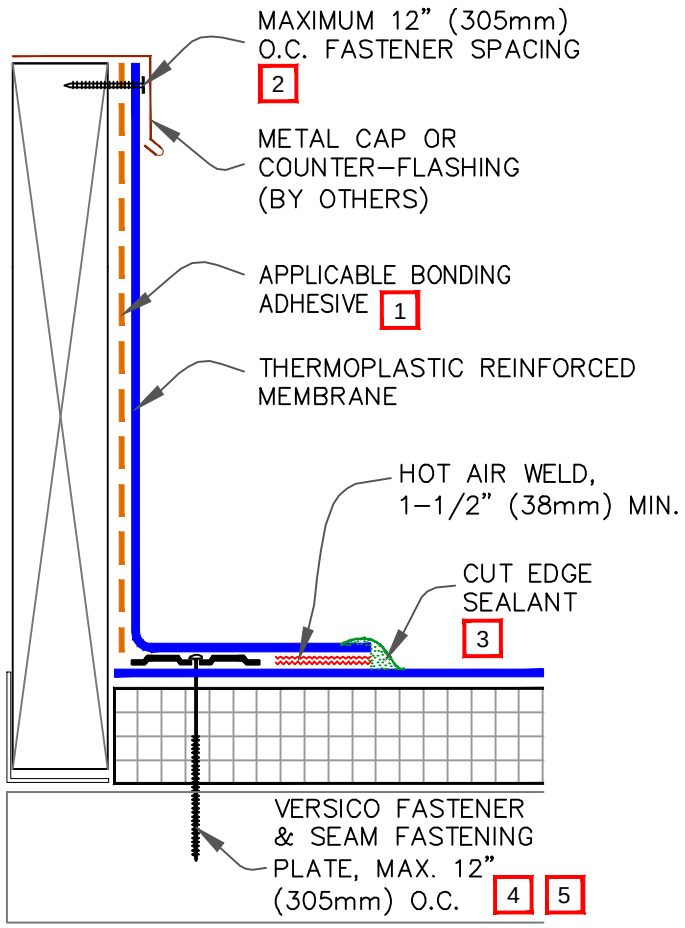
DECK-TO-WALL EXPANSION DETAIL

THERMOPLASTIC REINFORCED MEMBRANE
APPROVED SUBSTRATE
0 SEE NOTE(S)

THERMOPLASTIC ROOFING SYSTEM

TPC-3.2

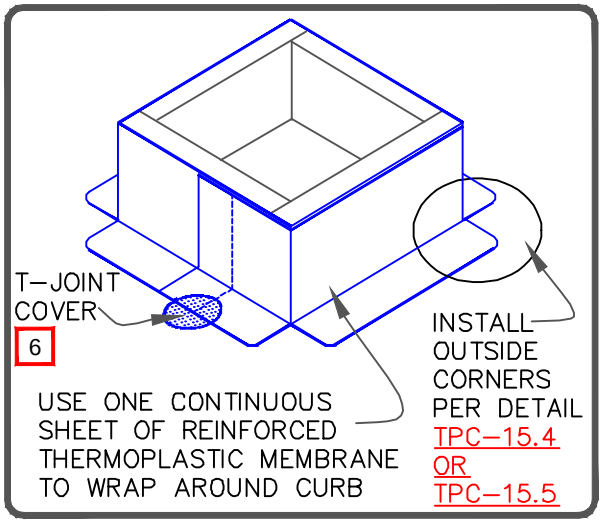


NOTES:

1. WHEN USING TPO MEMBRANE, BONDING ADHESIVE IS NOT REQUIRED WHEN THE FLASHING HEIGHT IS 12" (305mm) OR LESS AND THE MEMBRANE IS FASTENED "AS SHOWN" ON TOP OF THE CURB. WHEN VERSICO TERMINATION BAR IS USED BENEATH THE COUNTER-FLASHING, BONDING ADHESIVE CAN BE ELIMINATED WHEN THE MEMBRANE HEIGHT IS 18" (457mm) OR LESS.

2. WHEN MECHANICAL FASTENERS ARE USED TO PENETRATE THE METAL COUNTER-FLASHING, USE EPDM WASHERS, APPLY WATER CUT-OFF MASTIC UNDER THE COUNTER-FLASHING OR CAULK THE FASTENER HEADS.

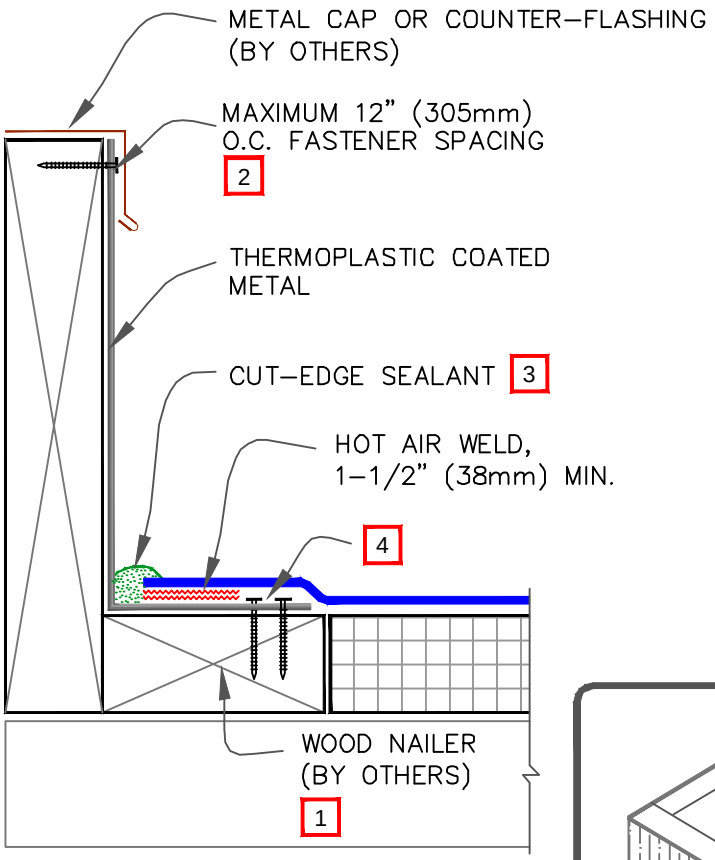
3. APPROXIMATELY 1/8" (3mm) DIAMETER BEAD OF CUT-EDGE SEALANT IS REQUIRED ON CUT EDGES OF REINFORCED TPO MEMBRANE AND RECOMMENDED ON CUT EDGES OF VERSIFLEX PVC MEMBRANE.

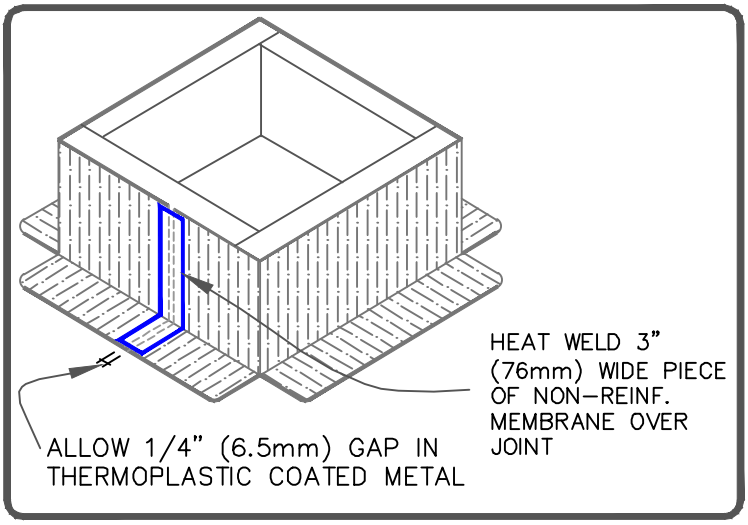


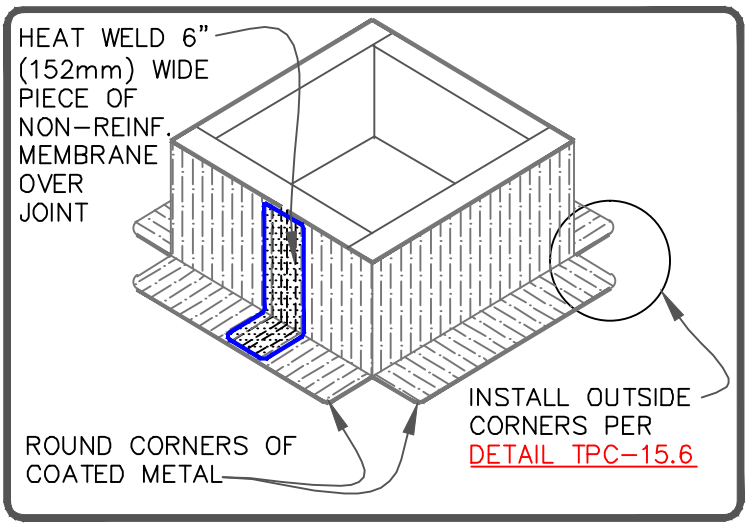
4. REFER TO VERSICO SPECIFICATIONS FOR ACCEPTABLE VERSICO FASTENER AND PLATE.

5. MECHANICAL SECUREMENT MAY BE INSTALLED INTO THE VERTICAL SUBSTRATE.

6. WHEN USING 60 OR 80 MIL THICK CURB FLASHING, THE INTERSECTIONS BETWEEN SPLICES MUST BE OVERLAID WITH A THERMOPLASTIC "T-JOINT" COVER.

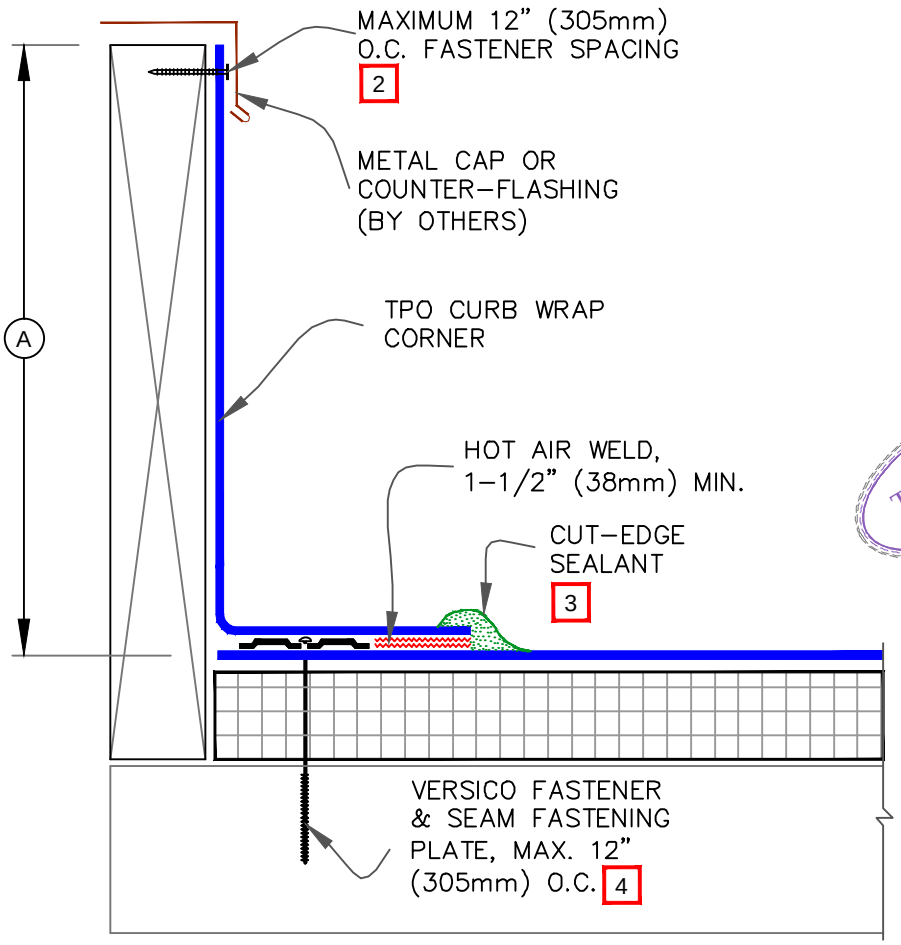






NOTES:

1. WOOD NAILER MUST EXTEND PAST TOTAL WIDTH OF COATED METAL DECK FLANGE.
2. WHEN MECHANICAL FASTENERS ARE USED TO PENETRATE THE METAL COUNTER–FLASHING, USE EPDM WASHERS, APPLY WATER CUT–OFF MASTIC UNDER THE COUNTER–FLASHING OR CAULK THE FASTENER HEADS.
3. APPROXIMATELY 1/8" (3mm) DIAMETER BEAD OF CUT–EDGE SEALANT IS REQUIRED ON CUT EDGES OF REINFORCED TPO MEMBRANE AND RECOMMENDED ON CUT EDGES OF VERSIFLEX PVC MEMBRANE.
4. FASTEN COATED METAL USING 1–1/2" (38mm) MIN. RING SHANK NAILS AT 6" (152mm) STAGGERED APPROX. 1/2" (13mm).

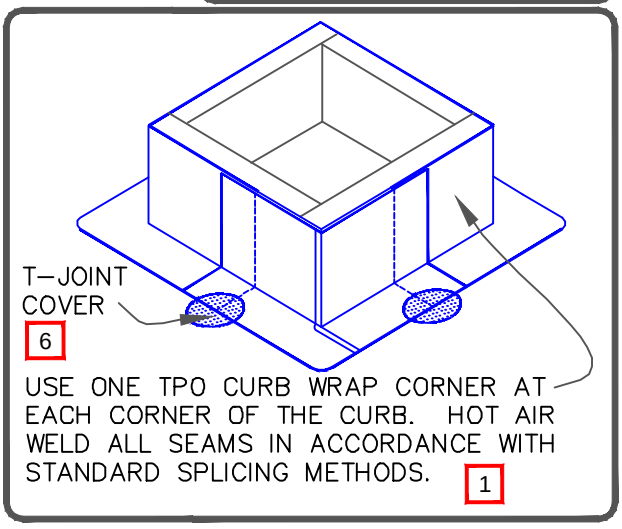


TPO ONLY (NOT FOR PVC)

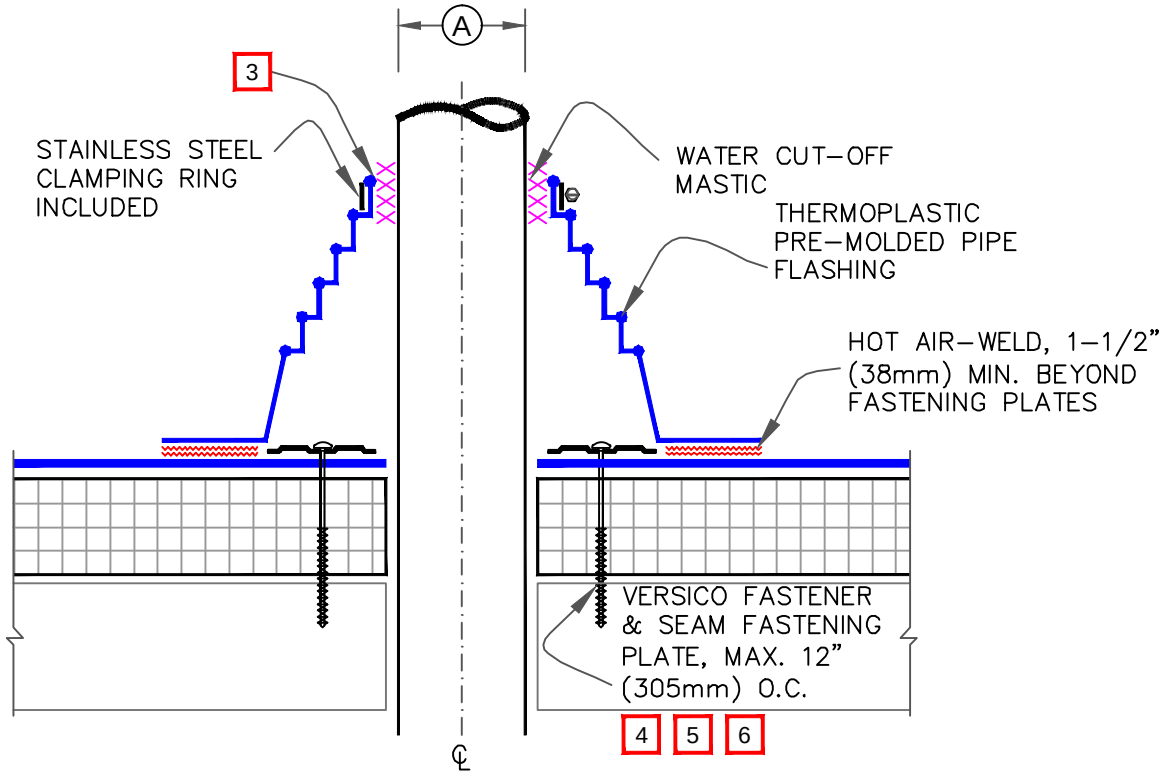
NOTES:

1. FOUR (4) CURB WRAP CORNERS WILL COMPLETELY FLASH A MAXIMUM CURB SIZE OF 3'X3' (914mm X 914mm). FOR LARGER CURBS USE THE TPO CURB WRAP CORNERS IN CONJUNCTION WITH ADDITIONAL SECTIONS OF VERSIWELD TPO MEMBRANE.
2. WHEN MECHANICAL FASTENERS ARE USED TO PENETRATE THE METAL COUNTER-FLASHING, USE EPDM WASHERS, APPLY WATER CUT-OFF MASTIC UNDER THE COUNTER-FLASHING OR CAULK THE FASTENER HEADS.
3. APPROXIMATELY 1/8" (3mm) BEAD OF CUT-EDGE SEALANT IS REQUIRED ON THE CUT EDGES OF THE TPO FIELD WRAP CORNER.
4. REFER TO VERSICO SPECIFICATIONS FOR ACCEPTABLE VERSICO FASTENERS AND PLATES.
5. CUSTOM SIZES ARE AVAILABLE FOR CURB FLASHING HEIGHTS GREATER THAN 12" (305mm).

DIMENSIONS	mm	
A	12"	305



6. REGARDLESS OF THE FIELD MEMBRANE THICKNESS, THE INTERSECTIONS BETWEEN SPLICES MUST BE OVERLAID WITH A THERMOPLASTIC "T-JOINT" COVER.



DIMENSIONS		mm	
A	3/4"	19	TO
	8"	203	

NOTES:

1. REMOVE ALL EXISTING LEAD AND FLASHING MATERIAL BEFORE INSTALLING PRE-MOLDED PIPE FLASHING.
2. TEMPERATURE OF THE PIPE PENETRATION MUST NOT EXCEED 140°F (60°C) WHEN USING PVC AND 160°F (71°C) WHEN USING TPO FLASHING.
3. PIPE SEAL MUST HAVE INTACT RIB AT TOP EDGE, REGARDLESS OF PIPE DIAMETER.
4. INSTALL A MINIMUM OF 4 FASTENERS AND PLATES AROUND THE PIPE, EQUALLY SPACED. IF FASTENERS AND PLATES CANNOT BE INSTALLED AS SHOWN, THEY MAY ALSO BE POSITIONED OUTSIDE THE PIPE MAXIMUM 12" (305mm) O.C. AND FLASHED WITH THERMOPLASTIC REINFORCED MEMBRANE/CUT-EDGE SEALANT. REFER TO DETAIL TPC-8.2.
5. FASTENERS AND PLATES ARE NOT REQUIRED ON ADHERED SYSTEMS UNLESS PIPE DIAMETER EXCEEDS 18" (457mm).
6. ON MECHANICALLY ATTACHED SYSTEMS, HPVX FASTENERS AND PLATES OR HPV-XL FASTENERS AND PLATES ARE REQUIRED OVER STEEL AND WOOD DECKS. ON CONCRETE DECKS, CD-10 OR MP 14-10 FASTENERS ARE USED WITH HPVX PLATES.

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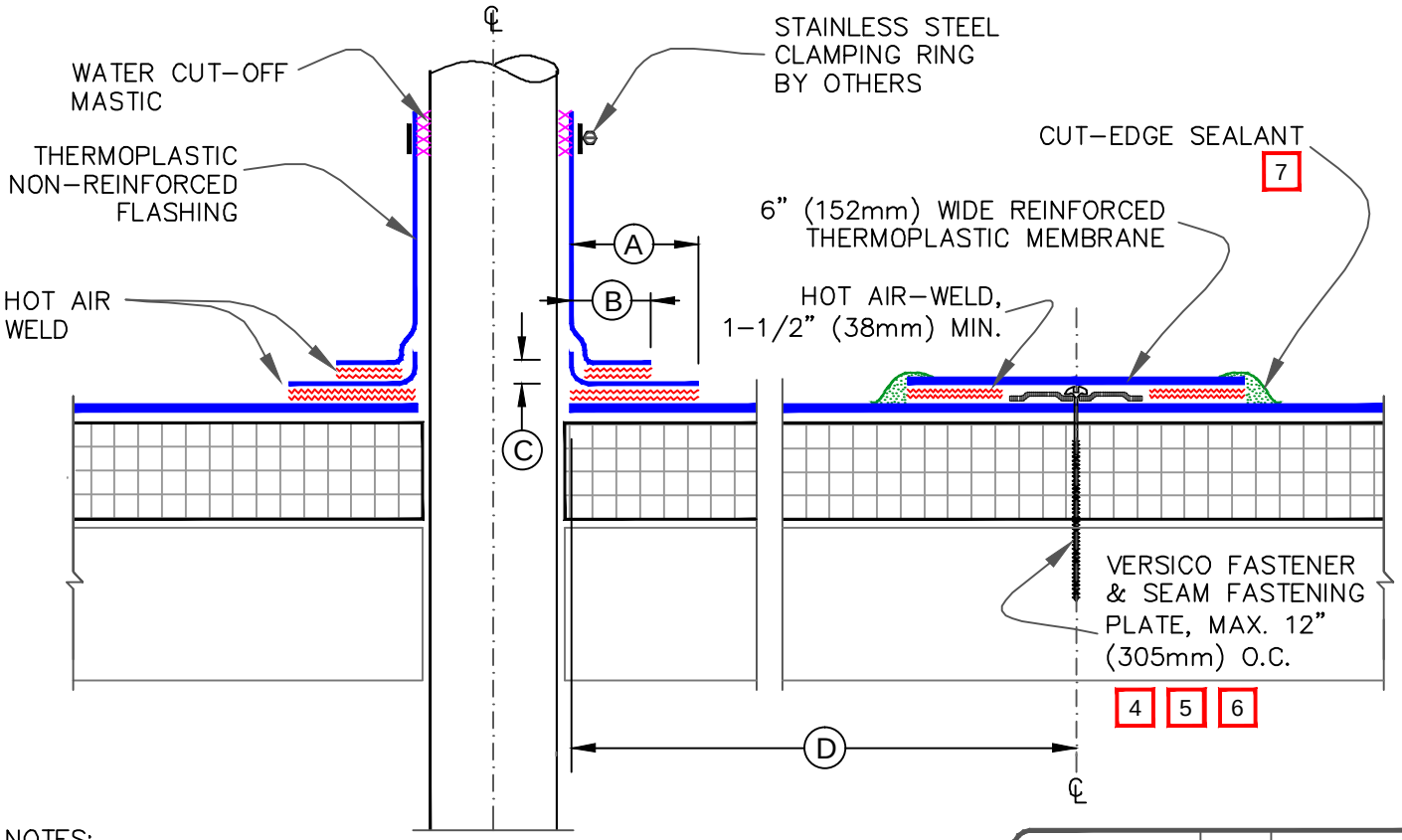
CAUTION DETAIL NOT FOR USE ON 25 OR 30-YEAR WARRANTY PROJECTS, PRE-FABRICATED/PRE-MOLDED ACCESSORIES MUST BE UTILIZED. ACCEPTABLE PIPE FLASHINGS SHALL CONFORM WITH THERMOPLASTIC COMMON DETAILS TPC-8.1, 8.3 OR 8.4.



NOTES:

DIMENSIONS		mm	
A	1-1/2"	38	TO
	2"	51	
B	1"	25	MIN.
C	1/2"	13	MIN.
D	12"	305	APPROX.

1. REMOVE ALL EXISTING LEAD AND FLASHING MATERIAL BEFORE INSTALLING FIELD FABRICATED PIPE FLASHING.
2. TEMPERATURE OF THE PIPE PENETRATION MUST NOT EXCEED 140°F (60°C) WHEN USING PVC AND 160°F (71°C) WHEN USING TPO FLASHING.
3. THERMOPLASTIC NON-REINFORCED FLASHING WRAPPED AROUND PIPE SHALL HAVE MINIMUM 1-1/2" (38mm) VERTICAL HOT AIR WELD.
4. INSTALL A MINIMUM OF 4 SEAM FASTENING PLATES FOR PIPES WITH A DIAMETER UP TO 6" (152mm). ADDITIONAL SEAM FASTENING PLATES WILL BE REQUIRED FOR PIPES GREATER THAN 6" (152mm) IN DIAMETER AND SHALL BE SPACED 12" (305mm) ON CENTER MAXIMUM.
5. FASTENERS/PLATES ARE NOT REQUIRED ON ADHERED SYSTEMS UNLESS PIPE DIAMETER EXCEEDS 18" (500mm).
6. ON MECHANICALLY ATTACHED SYSTEMS, HPVX FASTENERS AND PLATES OR HPV-XL FASTENERS AND PLATES ARE REQUIRED OVER STEEL AND WOOD DECKS. ON CONCRETE DECKS, CD-10 OR MP 14-10 FASTENERS ARE USED WITH HPVX PLATES.
7. APPROXIMATELY 1/8" (3mm) DIAMETER BEAD OF CUT-EDGE SEALANT IS REQUIRED ON CUT EDGES OF REINFORCED TPO MEMBRANE AND RECOMMENDED ON CUT EDGES OF VERSIFLEX PVC MEMBRANE.

VERSICO ROOFING SYSTEMS
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FIELD FABRICATED PIPE FLASHING

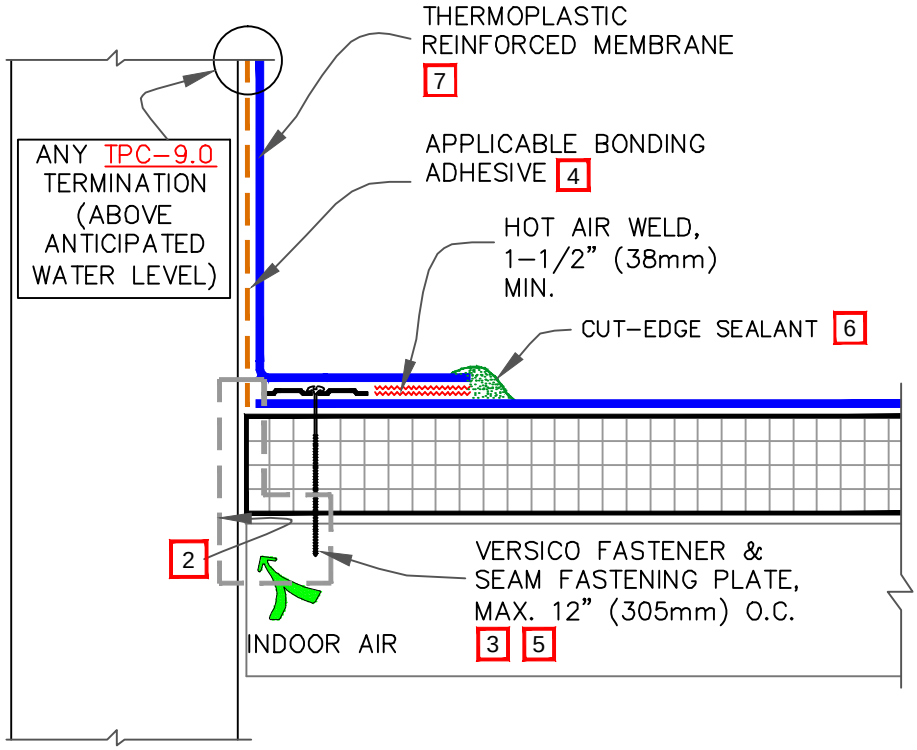
THERMOPLASTIC REINFORCED MEMBRANE
APPROVED SUBSTRATE
0 → SEE NOTE(S)

THERMOPLASTIC ROOFING SYSTEM

TPC-8.2

CAUTION

WHEN A WARRANTY WIND SPEED GREATER THAN 90MPH IS SPECIFIED, VERSICO FASTENERS AND SEAM FASTENING PLATES SHALL NOT EXCEED 6" (152mm) ON CENTER FOR ADHERED MEMBRANE ASSEMBLIES.

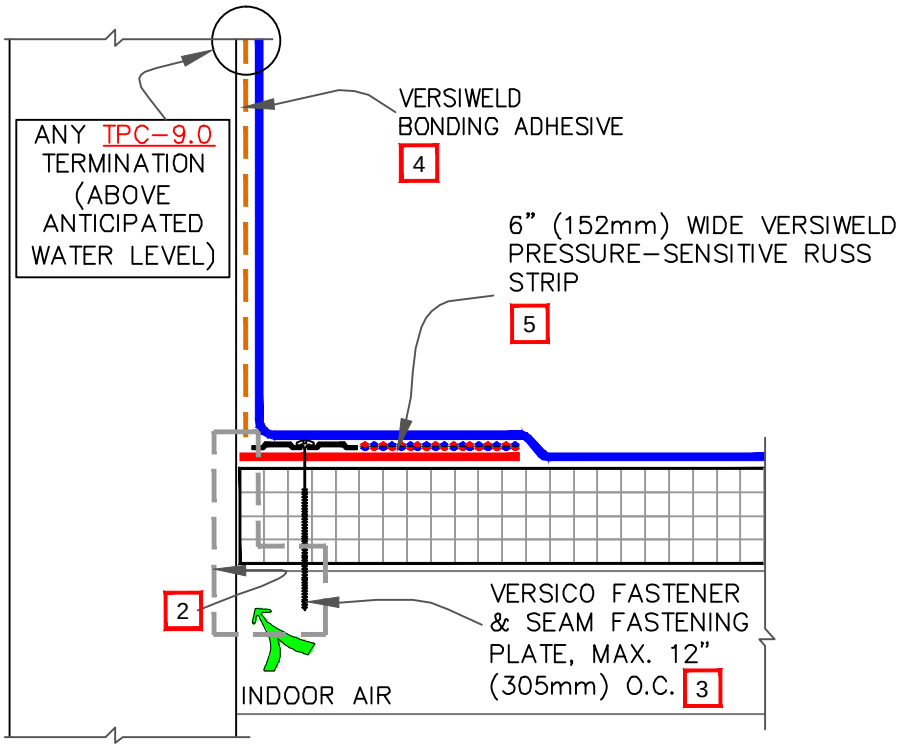


NOTES:

1. POSITION FASTENING PLATES 1/2" (13mm) TO 1" (25mm) FROM EDGE OF DECK MEMBRANE.
2. REFER TO SPECIAL CONDITION SPEC. SUPPLEMENTS G-01-11 OR G-07-11:
   2.1. TO BLOCK INDOOR AIR INFILTRATION AND HUMIDITY AT THE JUNCTION (G-01-11).
   2.2. WHERE ROOF SYSTEM IS DESIGNED WITH A VAPOR RETARDER (G-07-11).
3. ON MECHANICALLY ATTACHED SYSTEMS, HPVX FASTENERS AND PLATES OR HPV-XL FASTENERS AND PLATES ARE REQUIRED OVER STEEL AND WOOD DECKS. ON CONCRETE DECKS, CD-10 OR MP 14-10 FASTENERS ARE USED WITH HPVX PLATES.
4. WHEN USING TPO MEMBRANE, BONDING ADHESIVE IS NOT REQUIRED WHEN THE FLASHING HEIGHT IS 12" (305mm) AND COUNTERFLASHING IS USED FOR TERMINATION. WHEN COPING OR VERSICO TERMINATION BAR IS USED, BONDING ADHESIVE MAY BE ELIMINATED WHEN THE FLASHING HEIGHT IS 18" (457mm) OR LESS.
5. IN A CASE WHERE FASTENERS MUST BE FASTENED INTO THE VERTICAL SURFACE, CARE MUST BE TAKEN TO CREASE THE MEMBRANE TIGHTLY INTO THE ANGLE CHANGE. PLACING THE PLATES TIGHT INTO THE ANGLE CHANGE WILL HELP HOLD THE MEMBRANE IN THE PROPER POSITION.
6. APPROXIMATELY 1/8" (3mm) DIAMETER BEAD OF CUT-EDGE SEALANT IS REQUIRED ON CUT EDGES OF REINFORCED TPO MEMBRANE AND RECOMMENDED ON CUT EDGES OF VERSIFLEX PVC MEMBRANE.
7. WHEN PARAPET WALL HEIGHT EXCEEDS 48" (1219mm), REFER TO DETAILS TPC-12.4 OR TPC-12.5 FOR ADDITIONAL REQUIREMENTS WHEN USING PVC MEMBRANE ONLY.

CAUTION

WHEN A WARRANTY WIND SPEED GREATER THAN 90MPH IS SPECIFIED, VERSICO FASTENERS AND SEAM FASTENING PLATES SHALL NOT EXCEED 6" (152mm) ON CENTER FOR ADHERED MEMBRANE ASSEMBLIES.



TPO ONLY (NOT FOR PVC)

NOTES:

1. FOR INSIDE CORNER AND RUSS APPLICATION SEE TPC-12.2B.

2. REFER TO SPECIAL CONDITION SPEC. SUPPLEMENTS G-01-11 OR G-07-11:
   2.1. TO BLOCK INDOOR AIR INFILTRATION AND HUMIDITY AT THE JUNCTION (G-01-11).
   2.2. WHERE ROOF SYSTEM IS DESIGNED WITH A VAPOR RETARDER (G-07-11).

3. ON MECHANICALLY ATTACHED SYSTEMS, HPVX FASTENERS AND PLATES OR HPV-XL FASTENERS AND PLATES ARE REQUIRED OVER STEEL AND WOOD DECKS. ON CONCRETE DECKS, CD-10 OR MP 14-10 FASTENERS ARE USED WITH HPVX PLATES.

4. WHEN COUNTERFLASHING IS USED FOR TERMINATION, BONDING ADHESIVE IS NOT REQUIRED WHEN FLASHING HEIGHT IS 12" (305 mm) OR LESS. WHEN COPING OR TERMINATION BAR IS USED, ADHESIVE MAY BE ELIMINATED WHEN FLASHING HEIGHT IS 18" (457mm) OR LESS.

5. TPO PRIMER MUST BE APPLIED TO BACK SIDE OF THE VERSIWELD MEMBRANE PRIOR TO COMPLETING SPLICE TO PRESSURE-SENSITIVE RUSS.

6. IN A CASE WHERE FASTENERS MUST BE FASTENED INTO THE VERTICAL SURFACE, CARE MUST BE TAKEN TO CREASE THE RUSS AS WELL AS THE MEMBRANE TIGHTLY INTO THE ANGLE CHANGE TO MAXIMIZE CONTACT BETWEEN THE TAPE AND MEMBRANE. MEMBRANE MUST BE ADHERED TO THE FULL WIDTH OF THE TAPE. PLACING THE PLATES TIGHT INTO THE ANGLE CHANGE WILL HELP HOLD THE RUSS IN THE PROPER POSITION.

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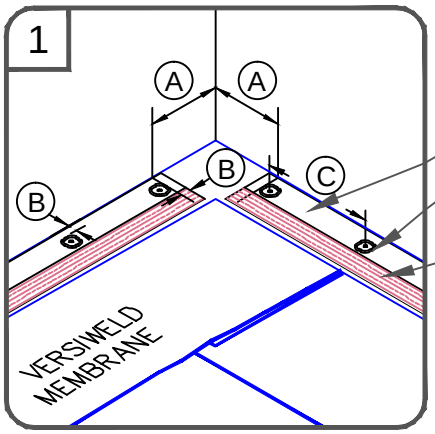
PARAPET FLASHING WITH PRESSURE-SENSITIVE RUSS, PAGE 1 OF 2

TPO MEMBRANE
APPROVED SUBSTRATE
0 SEE NOTE(S)

THERMOPLASTIC ROOFING SYSTEM

TPC-12.2A



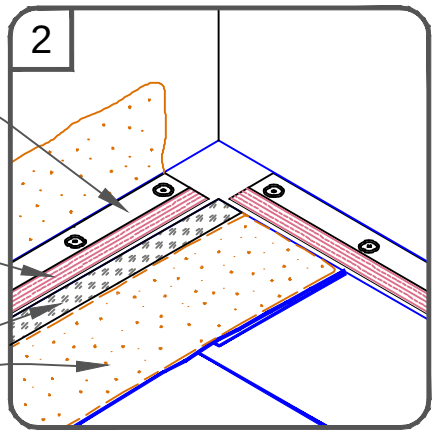
6" (152mm) WIDE PRESSURE-SENSITIVE RUSS

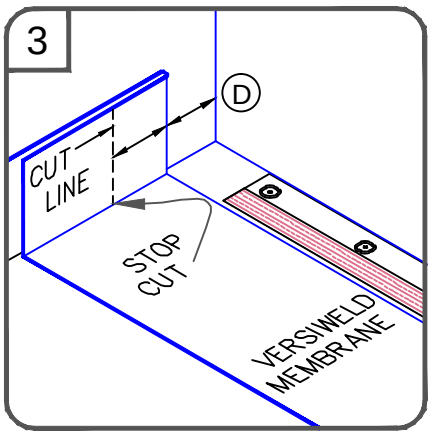
VERSICO FASTENER & SEAM FASTENING PLATE, MAX. 12" (305mm) O.C.

PRE-APPLIED QUICK APPLIED TAPE

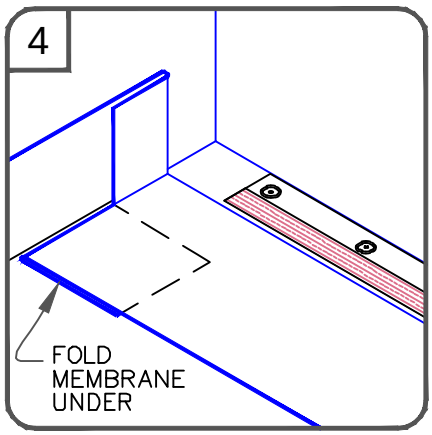
TPO PRIMER

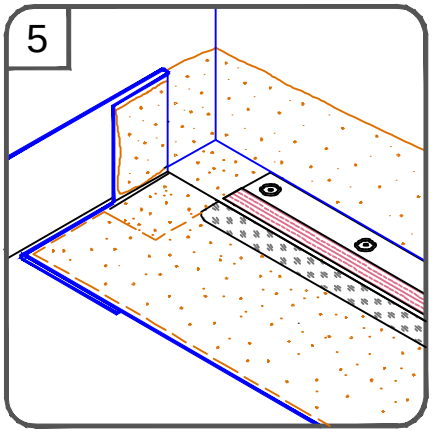
VERSIWELD BONDING ADHESIVE





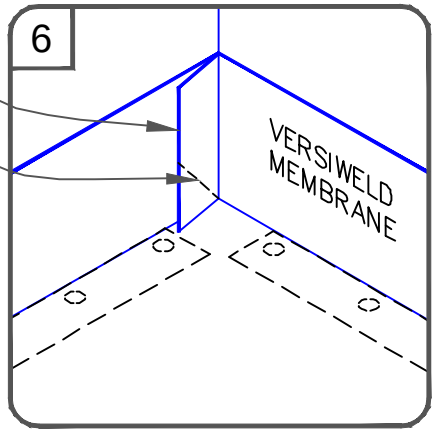
DIMENSIONS		mm	
A	6"	152	TO
	9"	229	
B	1/8"	3	MIN.
	1"	25	MAX.
C	12"	305	MIN.
D	6"	152	MIN.
E	1-1/2"	38	MIN.





HOT AIR WELD FLAP IN STEP 7

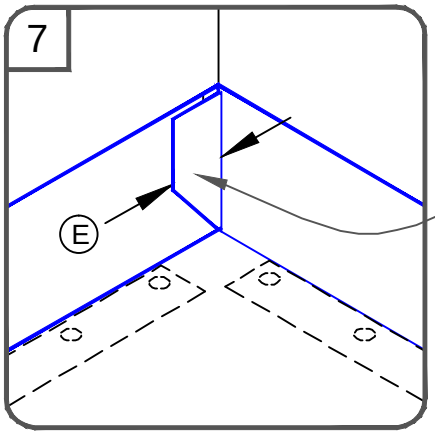
CUT AT 45°



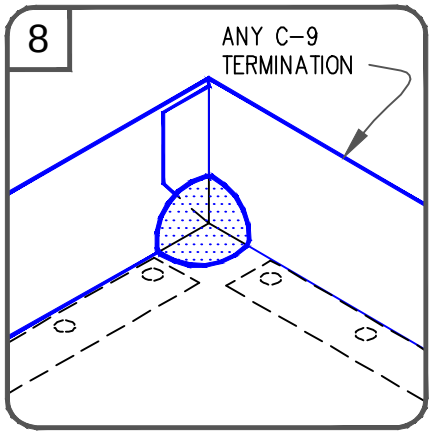
NOTES:

1. THE CUT SECTION OF VERTICAL MEMBRANE WILL BE FOLDED UNDER THE FIELD MEMBRANE AS SHOWN IN STEP 4.

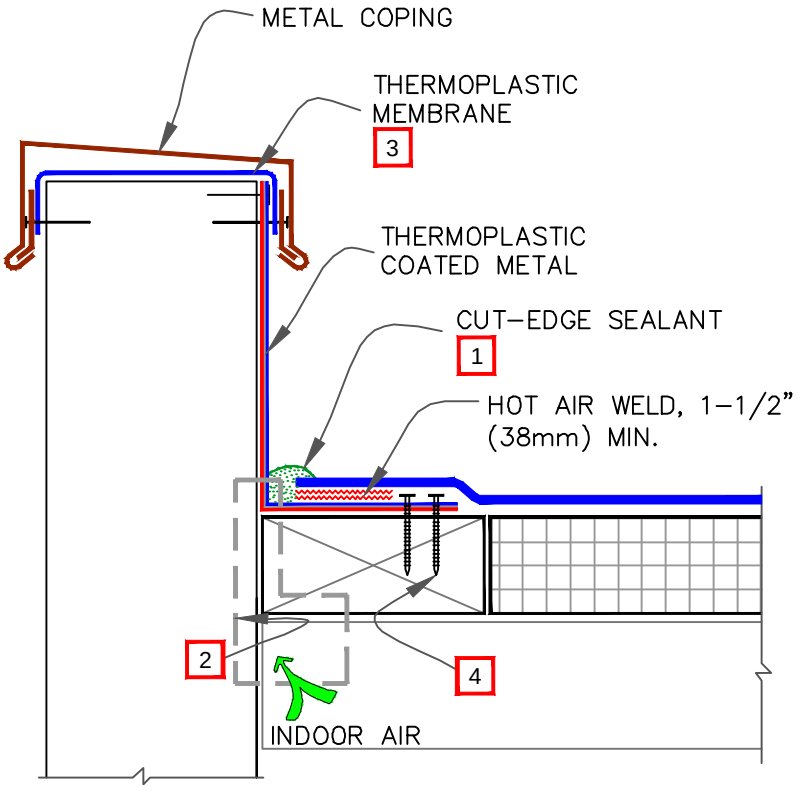
2. APPLY INSIDE CORNER IN ACCORDANCE WITH VERSICO DETAILS TPC-15.1 OR TPC-15.2.

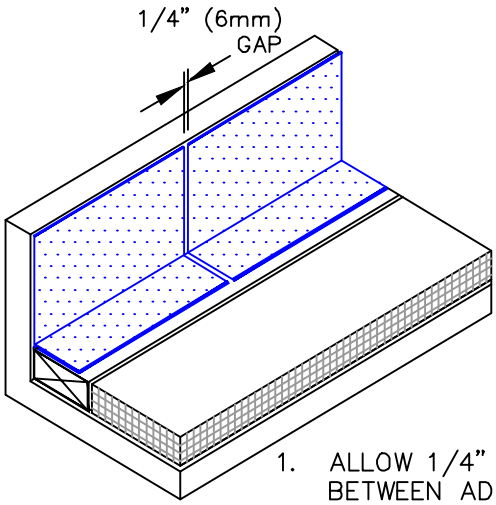


HOT AIR WELD

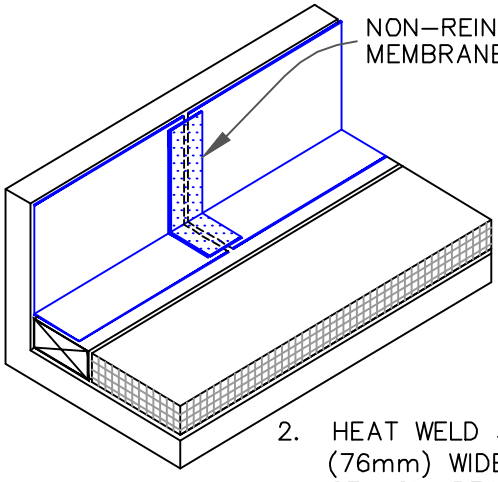


TPO ONLY (NOT FOR PVC)

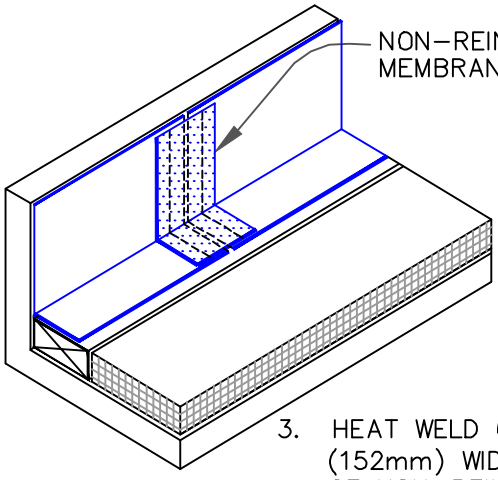




1. ALLOW 1/4" GAP BETWEEN ADJOINING SECTIONS OF COATED METAL.



2. HEAT WELD 3" (76mm) WIDE PIECE OF NON-REINF. MEMBRANE OVER JOINT.



3. HEAT WELD 6" (152mm) WIDE PIECE OF NON-REINF. MEMBRANE OVER JOINT.

NOTES:

1. APPROXIMATELY 1/8" (3mm) DIAMETER BEAD OF CUT-EDGE SEALANT IS REQUIRED ON CUT EDGES OF REINFORCED TPO MEMBRANE AND RECOMMENDED ON CUT EDGES OF VERSIFLEX PVC MEMBRANE.

2. REFER TO SPECIAL CONDITION SPEC. SUPPLEMENTS G-01-11 OR G-07-11:
   - 2.1. TO BLOCK INDOOR AIR INFILTRATION AND HUMIDITY AT THE JUNCTION (G-01-11).
   - 2.2. WHERE ROOF SYSTEM IS DESIGNED WITH A VAPOR RETARDER (G-07-11).

3. PLACE A LAYER OF THERMOPLASTIC MEMBRANE UNDER THE METAL CAP TO PROTECT AGAINST MOISTURE INFILTRATION AT JOINTS.

4. FASTEN COATED METAL FLASHING TO WOOD NAILERS USING 1-1/2" (38mm) MIN. RING SHANK NAILS SPACED 6" (152mm) ON CENTER AND STAGGERED APPROX. 1/2" (13mm).

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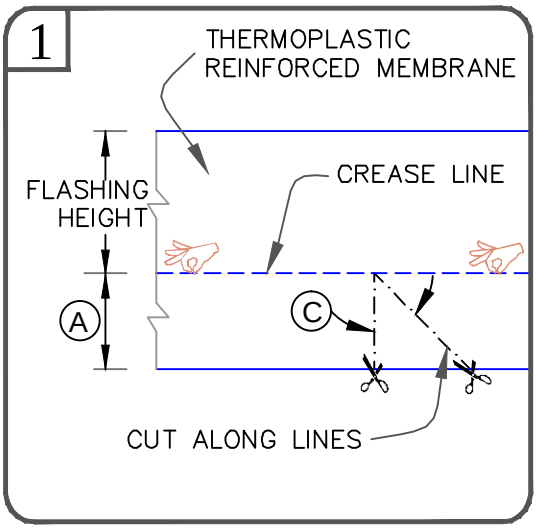
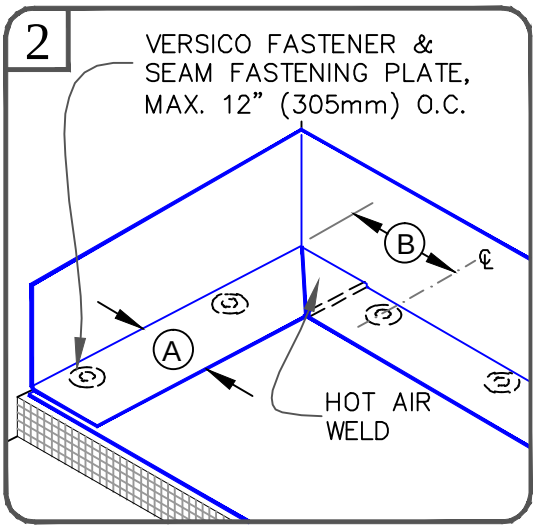
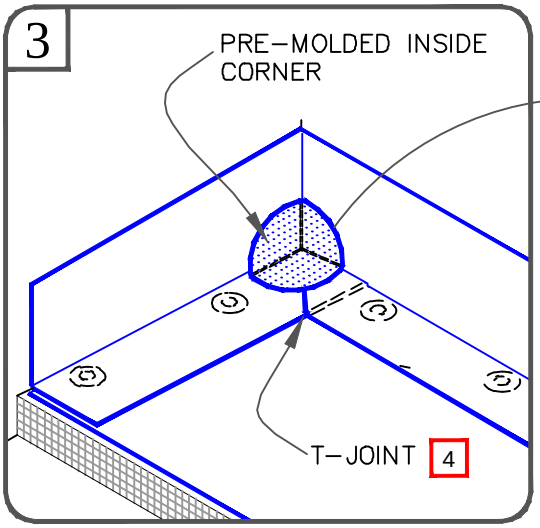
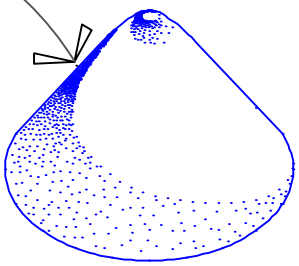
COATED METAL WALL FLASHING

THERMOPLASTIC REINFORCED MEMBRANE
APPROVED SUBSTRATE
0 SEE NOTE(S)









PRE-MOLDED INSIDE CORNER BEFORE INSTALLATION

NOTES:

1. POSITION FASTENING PLATES 6" TO 9" (152 TO 229mm) FROM THE CORNER AND 1/2" TO 1" (13 TO 25mm) FROM EDGE OF MEMBRANE.

2. APPROXIMATELY 1/8" (3mm) DIAMETER BEAD OF CUT-EDGE SEALANT IS REQUIRED ON CUT EDGES OF REINFORCED TPO MEMBRANE AND RECOMMENDED ON CUT EDGES OF VERSIFLEX PVC MEMBRANE.

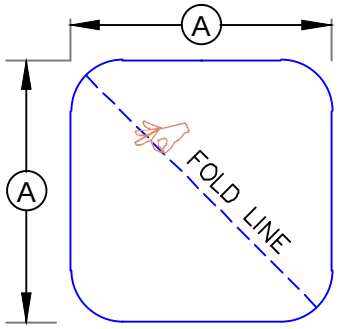
3. REFER TO VERSICO SPECIFICATIONS FOR ACCEPTABLE VERSICO FASTENERS AND PLATES.

4. WHEN USING 60 OR 80-MIL MEMBRANE, APPLY A 4-1/2" (114mm) DIAMETER "T-JOINT" COVER AT ALL FIELD SPLICE INTERSECTIONS.

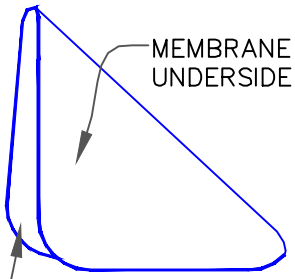
DIMENSIONS		mm	
A	6"	152	APPROX.
B	6"-9"	152-229	
C	45-DEGREES APPROX.		

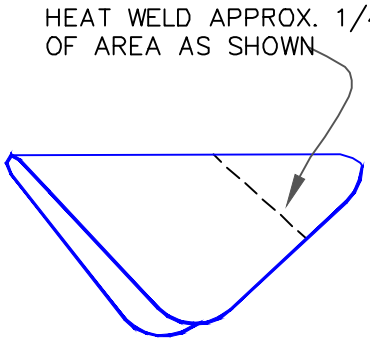
CAUTION

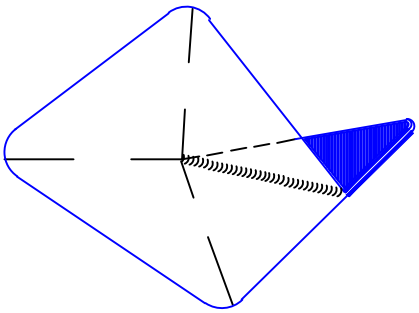
DETAIL NOT FOR USE ON 25 OR 30-YEAR WARRANTY PROJECTS, PRE-FABRICATED/PRE-MOLDED ACCESSORIES MUST BE UTILIZED. ACCEPTABLE FLASHING SHALL CONFORM WITH THERMOPLASTIC COMMON DETAIL TPC-15.1.



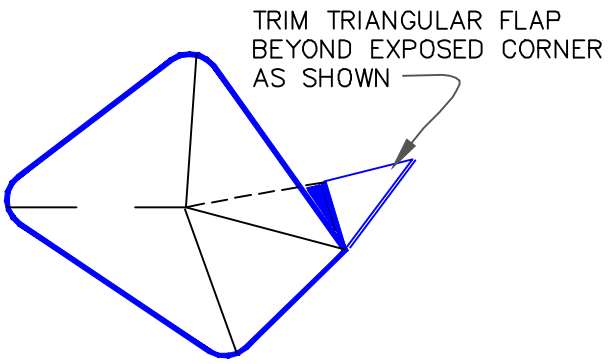
CUT A SECTION OF THERMOPLASTIC NON-REINFORCED MEMBRANE WITH ROUNDED CORNERS

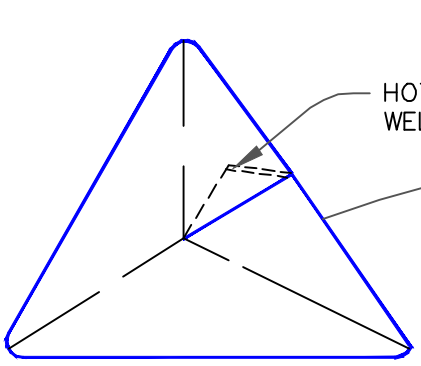


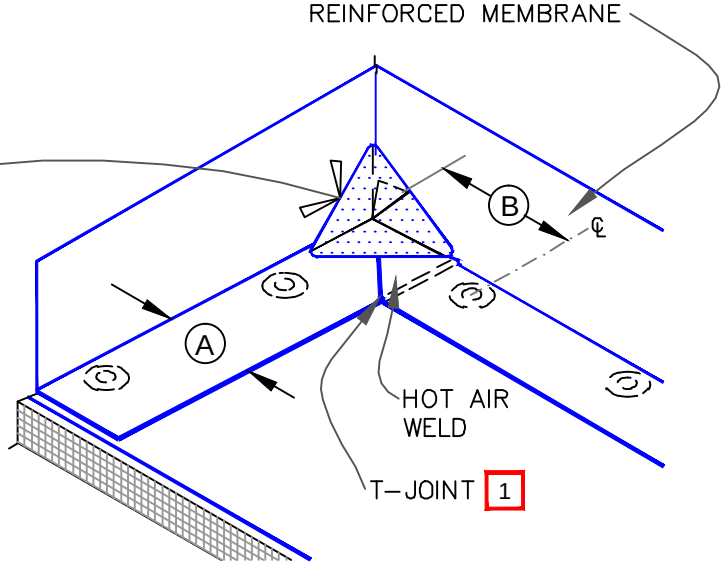




POSITION AND HEAT WELD CORNER IN PLACE AS SHOWN







DIMENSIONS		mm	
(A)	6"	152	APPROX.
(B)	6"-9"	152-229	

NOTES:

1. WHEN USING 60 OR 80-MIL MEMBRANE, APPLY A 4-1/2" (114mm) DIAMETER "T-JOINT" COVER AT ALL FIELD SPLICE INTERSECTIONS.

VERSICO ROOFING SYSTEMS
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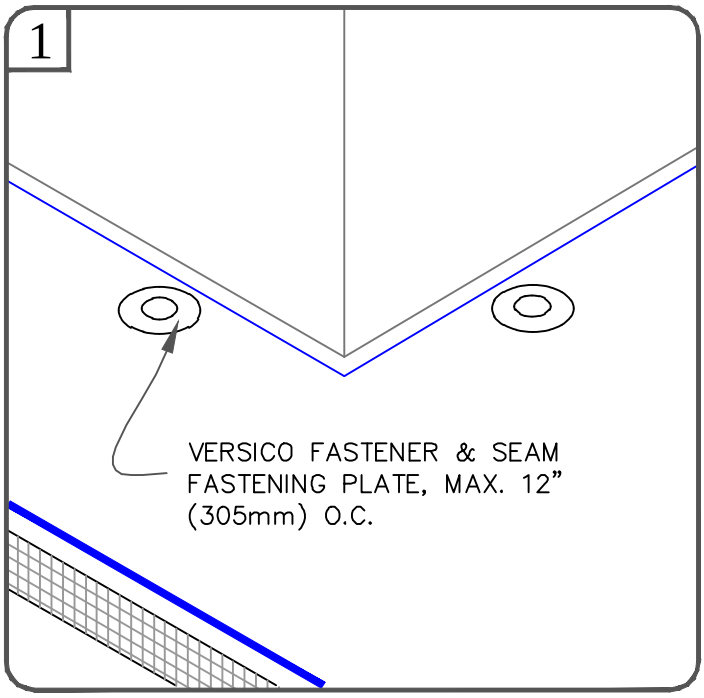
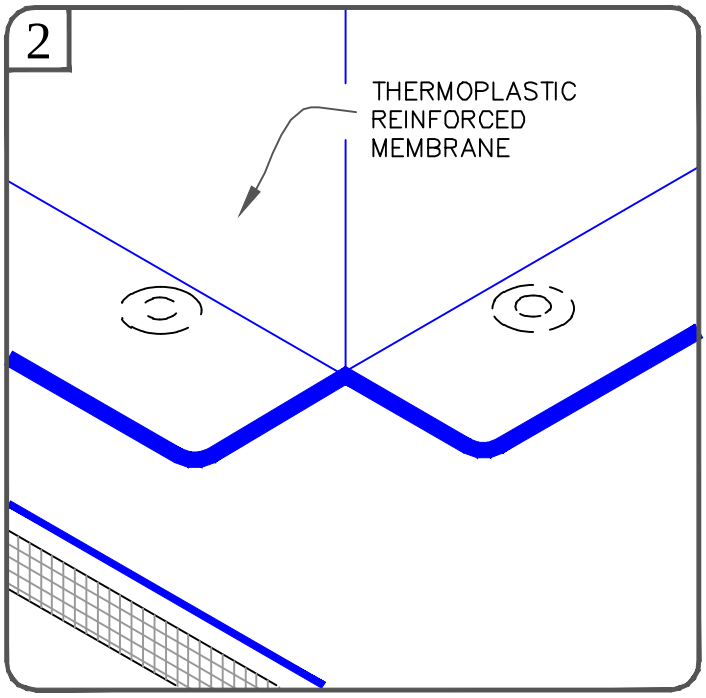
FIELD FABRICATED INSIDE CORNER FLASHING

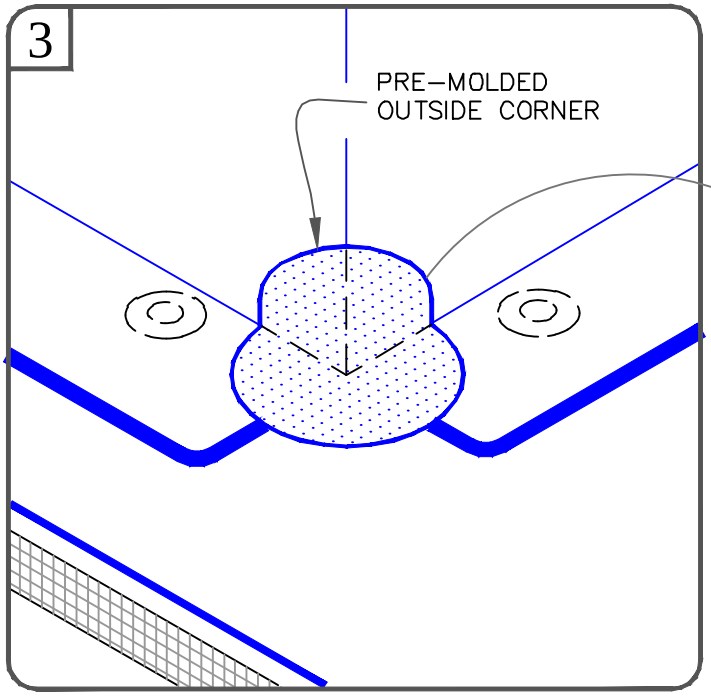
THERMOPLASTIC REINFORCED MEMBRANE
APPROVED SUBSTRATE
0 → SEE NOTE(S)

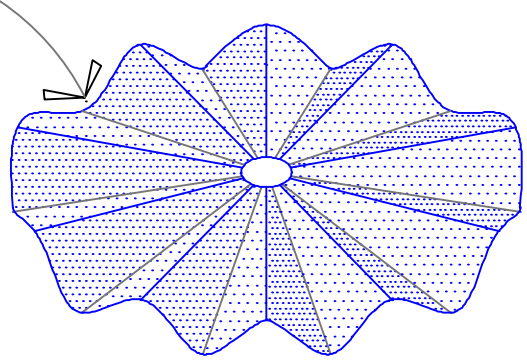
THERMOPLASTIC ROOFING SYSTEM

TPC-15.2









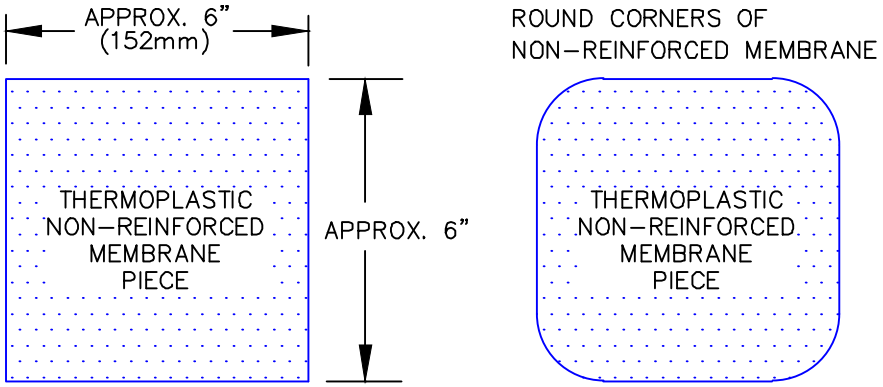
PRE-MOLDED OUTSIDE CORNER BEFORE INSTALLATION

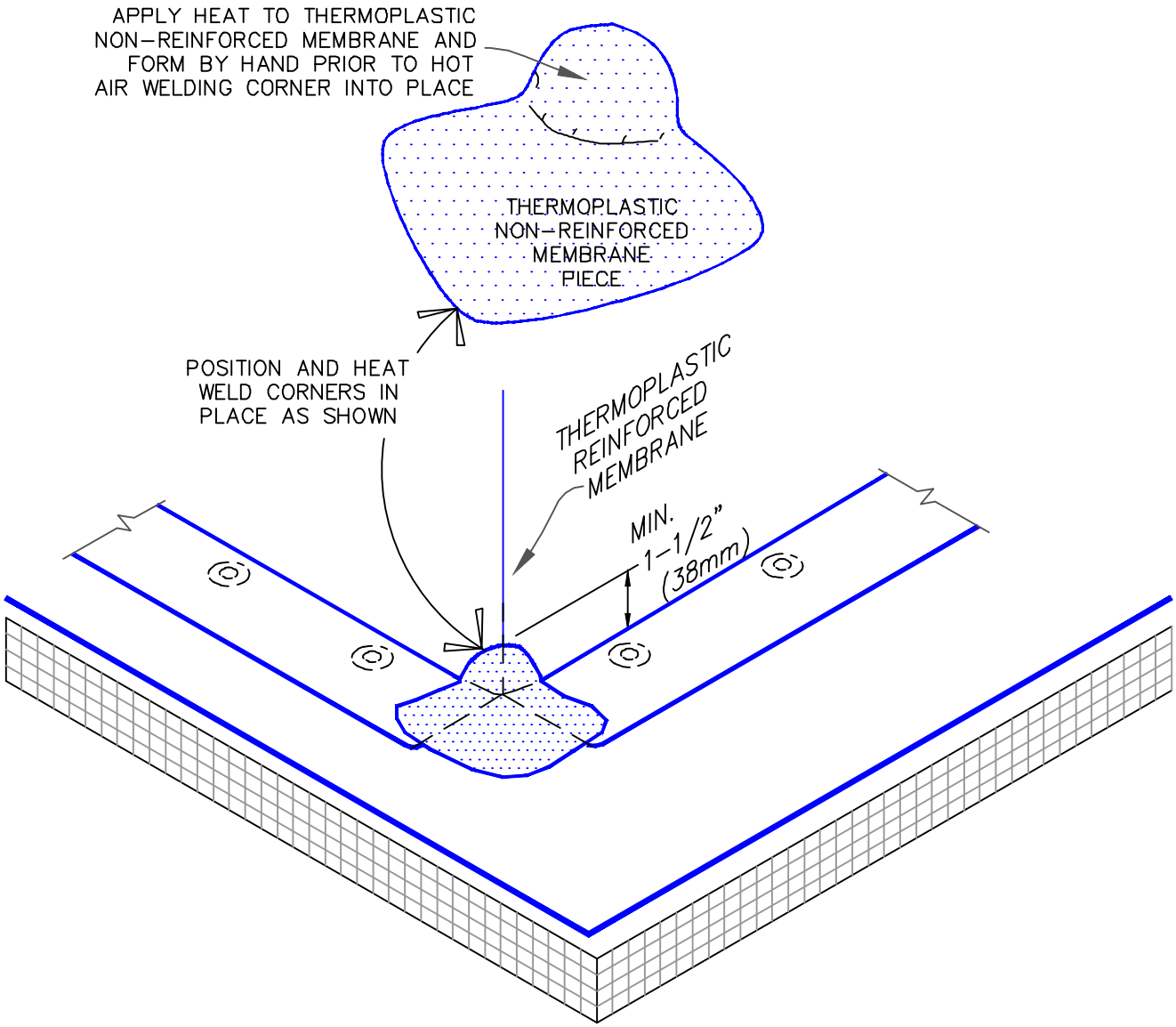
NOTES:

1. POSITION FASTENING PLATES 6" (152mm) FROM THE CORNER AND 1/2" TO 1" (13 TO 25mm) FROM EDGE OF MEMBRANE.
2. APPROXIMATELY 1/8" (3mm) DIAMETER BEAD OF CUT-EDGE SEALANT IS REQUIRED ON CUT EDGES OF REINFORCED TPO MEMBRANE AND RECOMMENDED ON CUT EDGES OF VERSIFLEX PVC MEMBRANE.
3. REFER TO VERSICO SPECIFICATIONS FOR ACCEPTABLE VERSICO FASTENERS AND PLATES.

CAUTION

DETAIL NOT FOR USE ON 25 OR 30-YEAR WARRANTY PROJECTS, PRE-FABRICATED/PRE-MOLDED ACCESSORIES MUST BE UTILIZED. ACCEPTABLE FLASHING SHALL CONFORM WITH THERMOPLASTIC COMMON DETAIL TPC-15.4.





VERSICO ROOFING SYSTEMS
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FIELD FABRICATED OUTSIDE CORNER FLASHING

→ THERMOPLASTIC REINFORCED MEMBRANE
→ APPROVED SUBSTRATE
0 → SEE NOTE(S)

THERMOPLASTIC ROOFING SYSTEM

TPC-15.5

Roof Assembly

Recommendations

Option C

This option is for continued maintenance of the existing Structural Standing Seam Metal Roof panels. A roofing contractor qualified and certified for work on SSSMR panel assemblies should be identified to quickly inspect the roof and submit pricing for repairs. This method is more about identifying those areas currently leaking, properly repairing them, and then repairing other items as they become apparent problems. This approach may be less costly upfront, but in the longrun could cost more than choosing to go with either Option A or B on the previous pages. The following maintenance guidelines are set forth in the *Manual for Inspection and Maintenance of Low-slope Structural Metal Panel Roof Assemblies: A Guide for Building Owners* published by the National Roofing Contractors Association (NRCA):

1. Minimize roof traffic.

2. Wash the roof periodically to keep panels clean and free of corrosive residue.

3. Take care of minor panel corrosion with a light sanding and application of rust-inhibiting primer and final coat of compatible paint or sealer. Never use asphaltic-based roof cement as it becomes hard and brittle and will not move with the expansion and contraction of the panels.

4. Make sure all HVAC and rooftop equipment and penetrations are in good repair and not missing elements such as connector bolts, fasteners, hinges, cabinet seals, etc. Make sure that all ductwork and associated HVAC units are properly flashed and sealed to prevent infiltration of water into the building envelope.

5. Never apply silicone sealant to metal roof panel components

6. Panels that are excessively deflected should be replaced so as to allow the proper flow of water to the gutter.

7. Inspect the fasteners and washers. The fasteners should be tight, and the neoprene or rubber washers should not be cracked or dried. For those fasteners and washers that have been deteriorated, they should be replaced with an oversized fastener and washer to ensure a tight seal.

8. End laps, screw heads, washers, and openings that are extensively deteriorated can be coated with a liquid-applied roof coating such as a polyurethane sealant. Consult the manufacturer for proper cleaning and preparation.

9. An elastomeric coating formulated for use on metal roof assemblies can be applied to larger areas of corrosion. Plastic Roof Cement, Sealants, Roof Tapes (EPDM or Butyl)/Duct Tape, Self-adhering Membrane, and Elastomeric coating are all considered appropriate for emergency repairs. However, they must be considered temporary repairs.

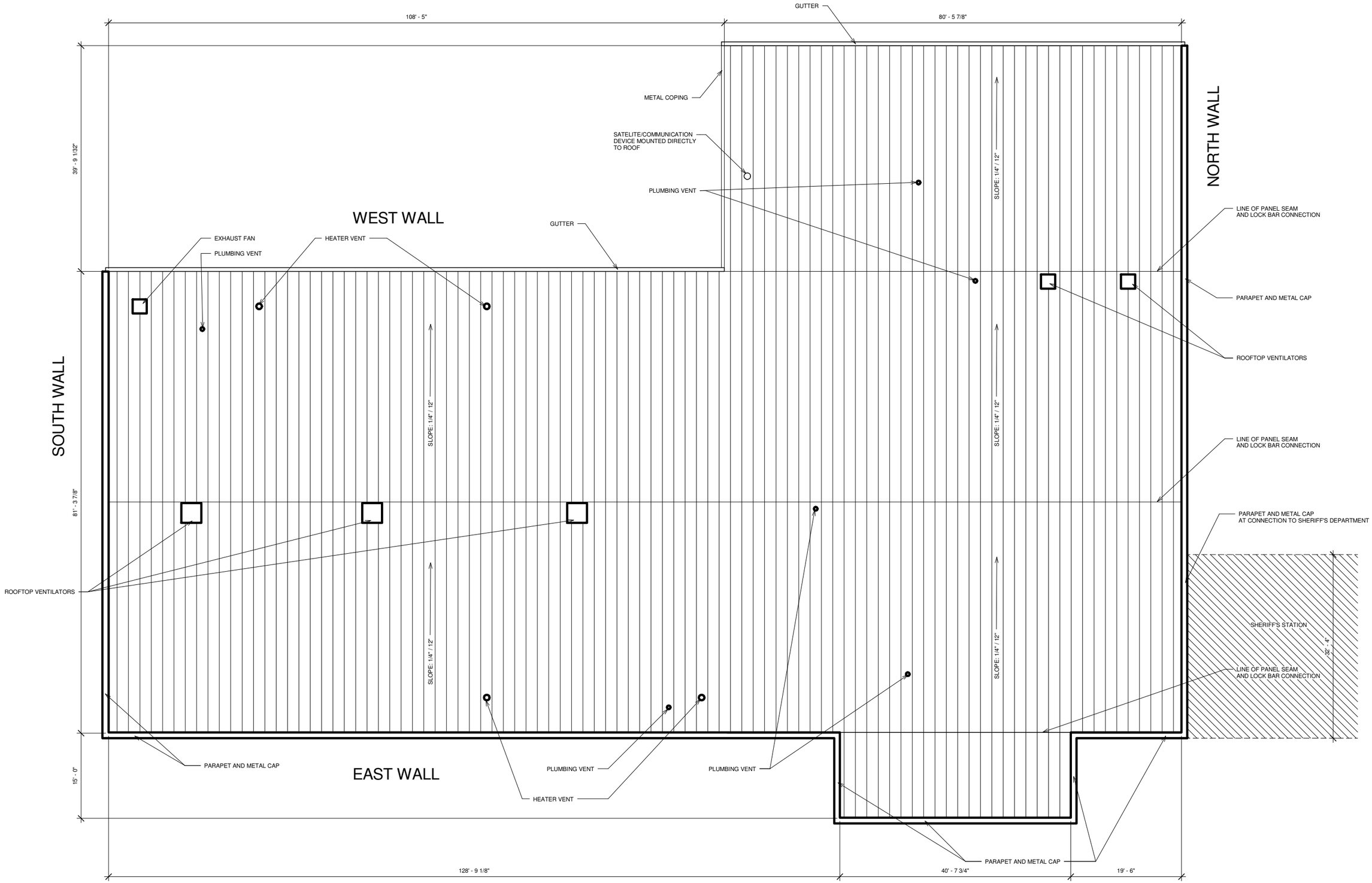
10. Clean any clogged downspouts and drains

11. Maintain sealants at surface-mounted counterflashing details, closures, and other similar conditions.

12. Check all roof penetrations for condition of flashing, sealants, washers, fasteners, etc.

13. Refill or reseal any and all pitch pockets.

Please consult the NRCA's Manual listed above for more detailed information.



ROOF DIAGRAM OF EXISTING CONDITIONS
1/8" = 1'-0"

0 8 16 20 24 28 32

NOTE: IF DRAWING DOESN'T MEASURE 24"X36", IT IS NOT PRINTED TO SCALE SHOWN ON PLAN. ADJUST SCALE ACCORDINGLY.

MEADORS, INC.
2811 AZALEA DRIVE ■ CHARLESTON, SC ■ 843.723.8585

FIRE STATION ASSESSMENT
CLARENDON COUNTY, SC

PROJ. NO.	Project Number
DATE:	Issue Date
DRAWN BY:	Author

REVISIONS

NO.	DATE	NOTES

ROOF DIAGRAM OF EXISTING CONDITIONS

A104

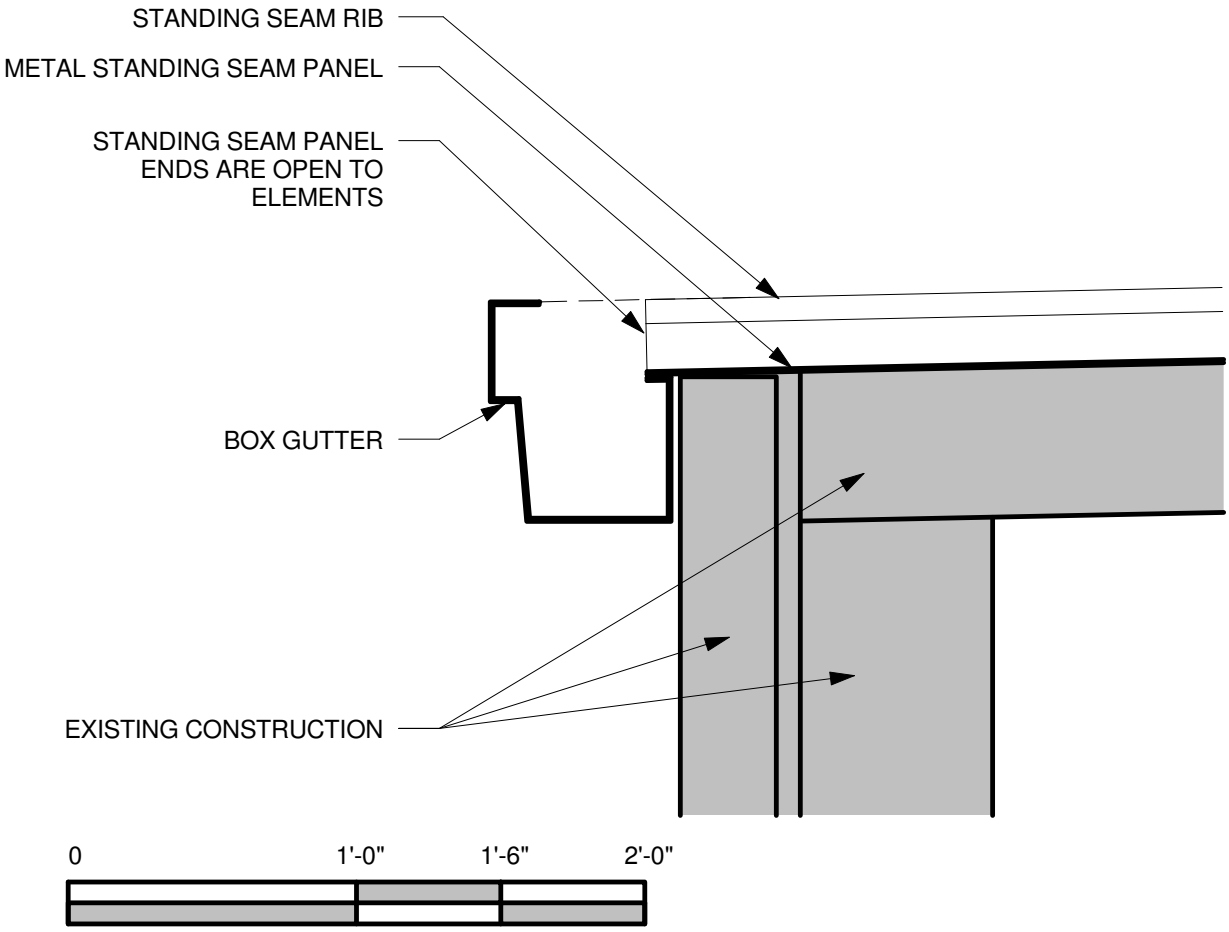
ROOF CONSIDERATIONS REGARDLESS OF ROOF OPTION SELECTED

1. Existing gutter is set too high in relation to the pan of the metal seam roofing. In the event of the gutter being overwhelmed during a heavy rain event, the water in the gutter has the potential to overflow the roof edge allowing water into the building enclosure. (See drawing A4).

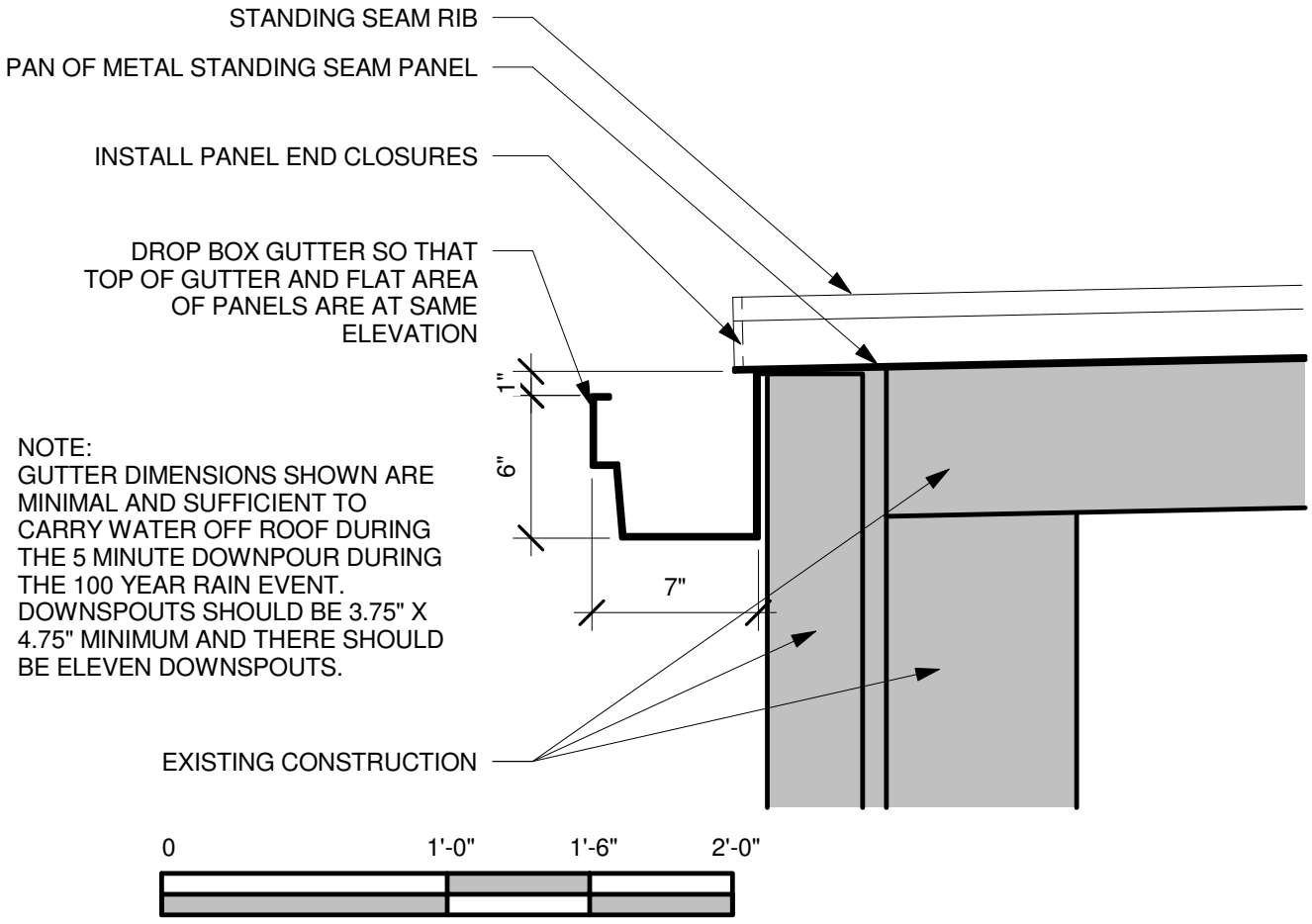
2. The existing gutter shall be removed and either reinstalled or a new gutter installed with proper relationship to SSSMR panels. (See drawing A5).

3. The ends of the structural standing seam metal roof panel are open to the elements along the western edge, which is also where the gutter is installed. Panel end closures shuold be installed to seal the ends of the roof panels from the intrusion of water and unconditioned air.

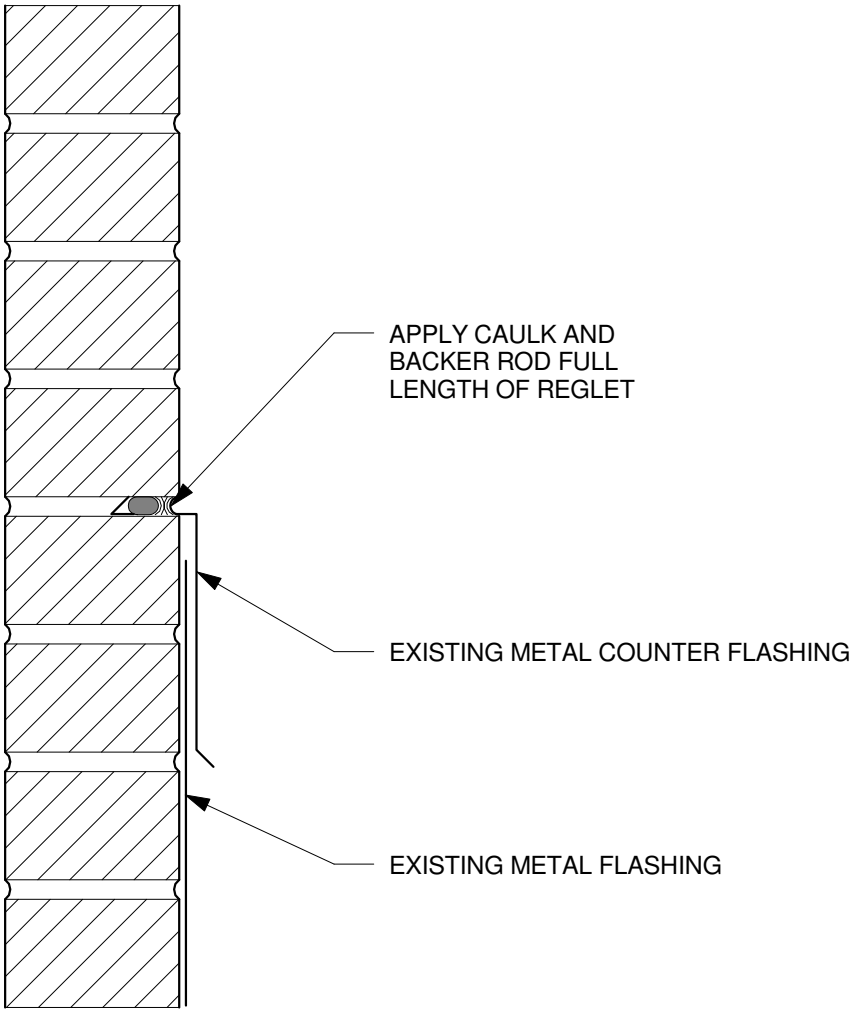
4. The expansion joint where the roof of the Fire Department and Sheriff's Department adjoin has a metal counterflashing installed into the reglet of a mortar joint. The joint is dry and has never been caulked. This joint should be caulked with an appropriate flexible non-shrinking sealant. (See drawing A6).



1 EXISTING GUTTER CONDITION
1 1/2" = 1'-0"



1 PROPOSED GUTTER CONDITION
1 1/2" = 1'-0"


APPLY CAULK AND
BACKER ROD FULL
LENGTH OF REGLET
EXISTING METAL COUNTER FLASHING
EXISTING METAL FLASHING

1 REGLET
3" = 1'-0"

STRUCTURAL CURTAIN WALL

Michael H. Hance, PE LLC
STRUCTURAL DESIGN AND CONSULTING

1133 Club Terrace
Mount Pleasant, S.C. 29464
Telephone: (843) 856-2649
mhancepe@comcast.net

November 27, 2012

DRAFT COPY

James C. Meadors
Meadors, Inc.
2811 Azalea Drive
Charleston SC 29407

SUBJECT: Structural Investigation – Exterior Wall Components
Clarendon County Fire Department
Manning, South Carolina

Mr. Meadors:

The following outline details the findings and recommendations regarding the condition of the exterior wall components and foundation at the Clarendon County Fire Station in Manning, SC. The findings described within this outline are limited to visual observations of existing structural components obtained during the October 10th, 2012 site inspection performed with Meadors, Inc. An invasive investigation of the exterior curtain walls was also performed using non-structural demolition methods to verify wall reinforcement and grouting patterns. The inspection was performed with Meadors Construction per request as part of an overall investigation of the subject property. The following documents were reviewed prior to and following the site investigation:

- Architectural – Fire Department Headquarters, May 20, 1998 Stewart Cooper Architects., Gastonia, NC
- Structural – Fire Department Headquarters, May 20, 1998, A. Daniel Coogan, PE

Structural drawings reviewed indicate final revisions for the foundation plan were provided on November 20, 1998. Project Code Data listed in the architectural drawings indicate the following as the applicable building codes and design criteria.

- The Standard Building Code
- ASCE 7-93, Minimum Design Loads for Buildings and Other Structures
- Seismic Performance Category C
- Wind Speed Zone = 80 mph, Exposure Category C, Importance Factor = 1.11

The existing structure consists of a pre-engineered metal building enclosed with a masonry block curtain wall at the bay areas and metal stud curtain wall at office space locations. The structure abuts the two story Clarendon County Sheriff's Department facility. The exterior curtain walls are covered with a combination of brick veneer and split-face block veneer. The roof system is supported by pre-engineered steel purlins covered with insulation and metal panel sheeting. The rigid frame columns at the exterior and interior of the structure are supported by isolated spread footings. Exterior curtain walls are supported by a continuous reinforced footing along the building perimeter. The floor of the structure consists of slab-on-grade construction at the bay areas and enclosed office space. In the truck bay area, interior mezzanine walls are constructed of 8" masonry block. The office area and truck bays are separated by a 12" masonry block wall that extends from finish floor to the roof ceiling. Interior partition walls in the office areas are constructed of light gage metal studs covered with gypsum wall board.

STRUCTURAL SYSTEMS / BUILDING COMPONENTS:

Exterior Wall Components:

According to Sheet A7 of the architectural drawings, the masonry curtain wall assemblies for the structure are to consist of the following:

Section 1/A7: Front Wall @ Truck Bays – East Side

1. 8" CMU block wall to be filled with Styrofoam loose fill insulation
2. 8" CMU bond beams reinforced with (2) #4 bars continuous. Bond beams vertically spaced @ 4 ft on center.
3. Wind girt attachment to upper bond beam with 5/8" dia. thru bolts at 4 ft on center
4. Dur-O-Wall horizontal joint reinforcement at 16" on center vertically
5. #5 Dowels from footing to wall. Lap 24" with vertical rebar
6. 12" deep continuous reinforced wall footing
7. 6" concrete slab-on-grade reinforced with #4 bars @ 12" o.c. each way
8. Distance from floor slab to top of wall plate: 22'-11"

Section 2/A7: Rear Wall @ Truck Bays – West Side

1. 8" CMU block wall to be filled with Styrofoam loose fill insulation
2. 8" CMU bond beams reinforced with (2) #4 bars continuous. Bond beams vertically spaced @ 4 ft on center.
3. Wind girt attachment to upper bond beam with 5/8" dia. thru bolts at 4 ft on center
4. Dur-O-Wall horizontal joint reinforcement at 16" on center vertically
5. #5 Dowels from footing to wall. Lap 24" with vertical rebar
6. 12" deep continuous reinforced wall footing
7. 6" concrete slab-on-grade reinforced with #4 bars @ 12" o.c. each way
8. Distance from floor slab to top of eave: 19'-0"

Section 3/A7: End Wall @ Truck Bays – South Side

1. 8" CMU block wall reinforced with #5 vertical bar @ 48" on center. Reinforced cells to be filled with grout. Lap vertical bars 36".
2. 8" CMU bond beams reinforced with (2) #4 bars continuous. Bond beams vertically spaced @ 4 ft on center.
3. Rigid frame beam attachment to upper bond beam with 2x2x1/4" angle and 4x4x1/4" plate with 5/8" dia. thru bolts at 4 ft on center.
4. Dur-O-Wall horizontal joint reinforcement at 16" on center vertically
5. #5 Dowels from footing to wall. Lap 24" with vertical rebar
6. 12" deep continuous reinforced wall footing
7. 6" concrete slab-on-grade reinforced with #4 bars @ 12" o.c. each way
8. Distance from floor slab to top of wall plate: 22'-11

Exterior Wall Components: (Continued)

According to Sheet A8 of the architectural drawings, the metal curtain wall assemblies for the structure are to consist of the following:

Sections 1/A8, 2/A8 and 3/A8: Typical Wall Construction

1. 6" 14 gauge metal studs @ 16" o.c. covered with 5/8" exterior gypsum board sheathing.
2. 6" batt insulation.
3. 5/8" gypsum board at interior face of metal studs
4. Adjustable masonry veneer ties at 16" horizontally and vertically
5. #5 Dowels from footing to stemwall at 48" on center
6. 24" wide by 12" deep continuous reinforced wall footing support cmu stemwall
7. 4" concrete slab-on-grade reinforced with 6x6 10/10 welded wire fabric

Rigid Frame Components:

According to Sheet A7 of the architectural drawings, the rigid frame connection at the truck bay section of the structure is to consist of the following:

Sheet A7: Rigid Frame to 6 ft masonry curtain between bays

1. 6 ft wide 8" CMU block wall reinforced with (3) #5 vertical bar @ 24" on center. Reinforced cells to be filled with grout. Lap vertical bars 36".
2. 8" CMU bond beams reinforced with (2) #4 bars continuous. Bond beams vertically spaced @ 4 ft on center.
3. Rigid frame column attachment to masonry curtain wall with 3x3x1/4" x 6" long column ties welded to rigid frame at 4 ft on center vertically.
4. #5 vertical rebar at door jamb from foundation to lintel bearing

Interior Wall Components:

According to Sheet A6 of the architectural drawings, the interior walls of the structure are to consist of the following:

Sections 1/A6 and 5/A6: Interior Masonry Wall between Truck Bays & Office Space – North Side

1. 12" CMU block wall reinforced with #5 vertical bar @ 48" on center. Reinforced cells to be filled with grout and loose fill insulation.
2. Rigid frame beam attachment to top of cmu wall with 6x3x5/16"x 4" long angle with ¾" x 3" vertical slot welded to frame at 4 ft on center. Angle epoxied to cmu wall ½" dia. epoxy anchor.
3. #5 Dowels from footing to wall. Lap 24" with vertical rebar
4. 24" wide x 12" deep continuous thickened slab wall footing reinforced with (2) #5 bars continuous
5. Distance from floor slab to top of wall plate: varies
6. Bond beams and horizontal wall reinforcement not indicated.

Interior Wall Components: (Continued)

Sections 1/A6 2/A8 and 3/A8: Typical Wall Construction at interior office space

1. 3 -5/8" light gauge metal studs @ 16" o.c. covered with 5/8" gypsum board sheathing each side
2. 4" concrete slab-on-grade reinforced with 6x6 10/10 welded wire fabric

Foundations:

According to Sheet A6, A7 and A8 of the architectural drawings, the foundation system for the structure is to consist of the following:

1. Exterior cmu curtain wall: 24"x12" deep continuous wall footing reinforced with (3) #5 bars continuous and #3 bar @ 48" on center.
2. Exterior and Interior Rigid Frame Columns: Isolated spread footings with 2' depth and width per footing schedule provided on S1 of the structural drawings
3. Exterior metal stud curtain wall: 24"x12" deep continuous wall footing reinforced with (3) #5 bars continuous and #3 bar @ 48" on center.
4. #5 Dowels from footing to stemwall at 48" on center
5. Interior masonry wall footings: 24" wide x 12" deep continuous thickened slab wall footing reinforced with (2) #5 bars continuous
6. Office Areas: 4" concrete slab-on-grade reinforced with 6x6 10/10 welded wire fabric
7. Truck Bay Areas: 6" concrete slab-on-grade reinforced with #4 bars @ 12" o.c. each way
8. At rigid frame columns, #5 hairpin installed in slab at anchor bolt locations
9. According to Sheet S3, the compressive strength for concrete at the slabs and footings provided is to be f'c = 3000 psi.
10. According to Sheet S3, the foundation design is based on a subsurface investigation provided by Geo-Systems Design and Testing Inc. and dated December 17, 1997. The geotechnical report was not able for review during this investigation.
11. Spread footings are to be design for a soil bearing pressure of 2,500 psf.

Lintels:

According to Sheet 3/S3 of the structural drawings, the lintels at the bay openings are to consist of the following:

1. Steel lintel for 14 ft bay opening: W16x26 with a ¼" x 12" plate. Lintel bearing is to be 8" minimum on masonry at each end.
2. Masonry openings are to be provided with a 8" bond beam reinforced with (2) #4 bars and grouted solid. Masonry bond beam is to extend 2 feet beyond the opening at each end.
3. Openings for brick and stone veneer spanning up to 7'-6" are to be supported by 3.5x3.5x5/16" loose steel lintels.

FINDINGS:

These findings are based on field observations of the exterior wall components and selective non-structural demolition of the exterior masonry walls to determine the presence of grouted cells and reinforcement.

Field Observations:

In the truck bay area, cracks in the masonry block walls and exterior brick veneer was observed at the following locations.

1. *Northeast corner at the front of the truck bay area:* Stepped cracking in the masonry block wall and brick veneer was observed above the right corner of the bay opening and extends downward to the northeast corner above the single door.
2. *Southeast corner at the front of the truck bay area:* Stepped cracking in the masonry block wall and brick veneer was observed above the left corner of the bay opening and extends downward to the southeast corner.
3. *Southwest corner at the rear of the truck bay area:* Stepped cracking in the upper portion of the masonry block wall and brick veneer was observed between the bay opening and the southwest corner.
4. *Northwest corner at the rear of the truck bay area:* Minor cracking in the upper portion of the masonry block wall and brick veneer was observed between the bay opening and the northwest corner.
5. *Split Face Masonry Veneer:* Minor cracks were noted along the split face 2'-8" high wainscoat at the base of the structure throughout. The vertical cracks in the masonry veneer are located just above grade and do not extend into the brick veneer above. Based on field observations and lack of evidence supporting differential settlement occurring at the structure, it appears the cracks in the masonry veneer are most likely attributed to the connection methods to the substrate and loading of the veneer above.

A review of the architectural drawings was performed during the site investigation to verify wall reinforcement and rigid frame connection methods. To determine the presence of bond beams and reinforcement in the masonry walls, information provided in the architectural drawings was utilized to select areas for non-structural demolition. To limit damage to wall components, holes were drilled in selected areas to verify grouting patterns as well as camera scope placement in unfilled masonry cells. It should be noted that verification of structural components and rigid frame connections were limited to visible areas only. The following items detail visual observations and reinforcement of the masonry walls as compared to the architectural drawings.

Sheet A7: Front and Rear Masonry Curtain Walls @ Truck Bays – East/West Side

1. 8" CMU block wall filled with Styrofoam loose fill insulation was confirmed.
2. Bond beams were confirmed at 4 ft and 8 ft above the slab only. According to Section 1/A7, bond beams are to be vertically spaced @ 4 ft on center to the top of the masonry curtain wall.
3. Wind girt attachment to upper bond beam with 5/8" dia. thru bolts at 4 ft on center was not installed.
4. Rigid frame column attachment to masonry curtain wall with steel column ties welded to rigid frame at 4 ft on center vertically was confirmed.

Field Observations: (Continued)

Section 3/A7: End Wall @ Truck Bays – South Side

1. 8" CMU block wall is to be reinforced with #5 vertical bar @ 48" on center. Reinforced cells to be filled with grout. Grouted cells at 48" on center were confirmed.
2. 8" CMU bond beams is to be reinforced with (2) #4 bars continuous. Bond beams vertically spaced @ 4 ft on center were confirmed.
3. Rigid frame beam attachment to upper bond beam with steel angle bolted at 4 ft on center was confirmed.

Sections 1/A6 and 5/A6: Interior Masonry Wall between Truck Bays & Office Space – North Side

1. 12" CMU block wall is to be reinforced with #5 vertical bar @ 48" on center. Reinforced cells to be filled with grout and loose fill insulation. At random test locations, no vertical reinforcement or grout in the masonry wall was observed.
2. Bond beams and horizontal wall reinforcement were not indicated on architectural drawings.

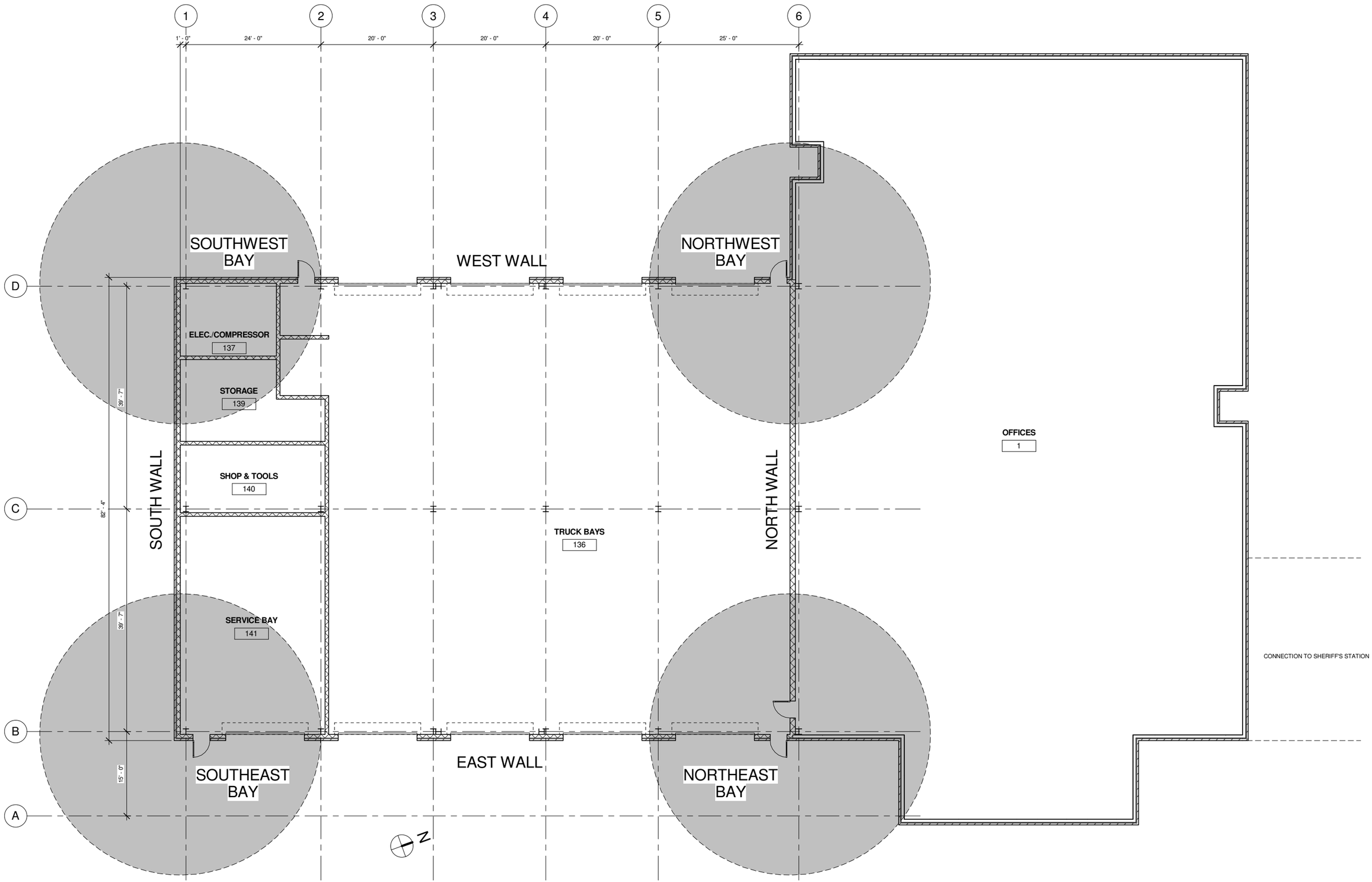
Sheet A7: Rigid Frame to 6 ft masonry curtain between bays

1. Rigid frame column attachment to masonry curtain wall with steel column ties welded to rigid frame at 4 ft on center vertically was confirmed.

Based on the field observations and non-structural demolition investigation describe above, the masonry curtain walls at the corners of the truck bay area do not have adequate lateral bracing and are not properly tied into the rigid frame steel columns that support the roof structure. The absence of proper vertical reinforcement, bond beams and rigid frame connections between the building corner and bay opening can result in lateral deflection of masonry curtain walls of this height and allow cracking to develop in masonry mortar joints and exterior brick veneer. In addition, stepped cracking in the masonry block was limited to the areas described above.

No evidence indicating major differential settlement of the foundation that would cause step cracks of this nature was observed along the building perimeter during the field investigation. In addition, no sign of differential settlement at the concrete slab floor, interior masonry walls or rigid frame columns was found during the site investigation. Based on these observations, it was determined invasive testing at the foundation is not required at this time.

Minor cracks were noted along the split face 2'-8" high wainscoat at the base of the structure throughout. The vertical cracks in the masonry veneer are located just above grade and do not extend into the brick veneer above. Based on field observations and lack of evidence supporting differential settlement occurring at the structure, it appears the cracks in the masonry veneer are most likely attributed to the connection methods to the substrate and loading of the veneer above.



1 FIRST FLOOR DIAGRAM OF EXISTING CONDITIONS
1/8" = 1'-0"

NOTE: IF DRAWING DOESN'T MEASURE 24"X36", IT IS NOT PRINTED TO SCALE SHOWN ON PLAN. ADJUST SCALE ACCORDINGLY.

MEADORS, INC.
2811 AZALEA DRIVE ■ CHARLESTON, SC ■ 843.723.8585

FIRE STATION ASSESSMENT
CLARENDON COUNTY, SC

PROJ. NO. Project Number
DATE: Issue Date
DRAWN BY: Author

REVISIONS		
NO.	DATE	NOTES

FIRST FLOOR PLAN

A101

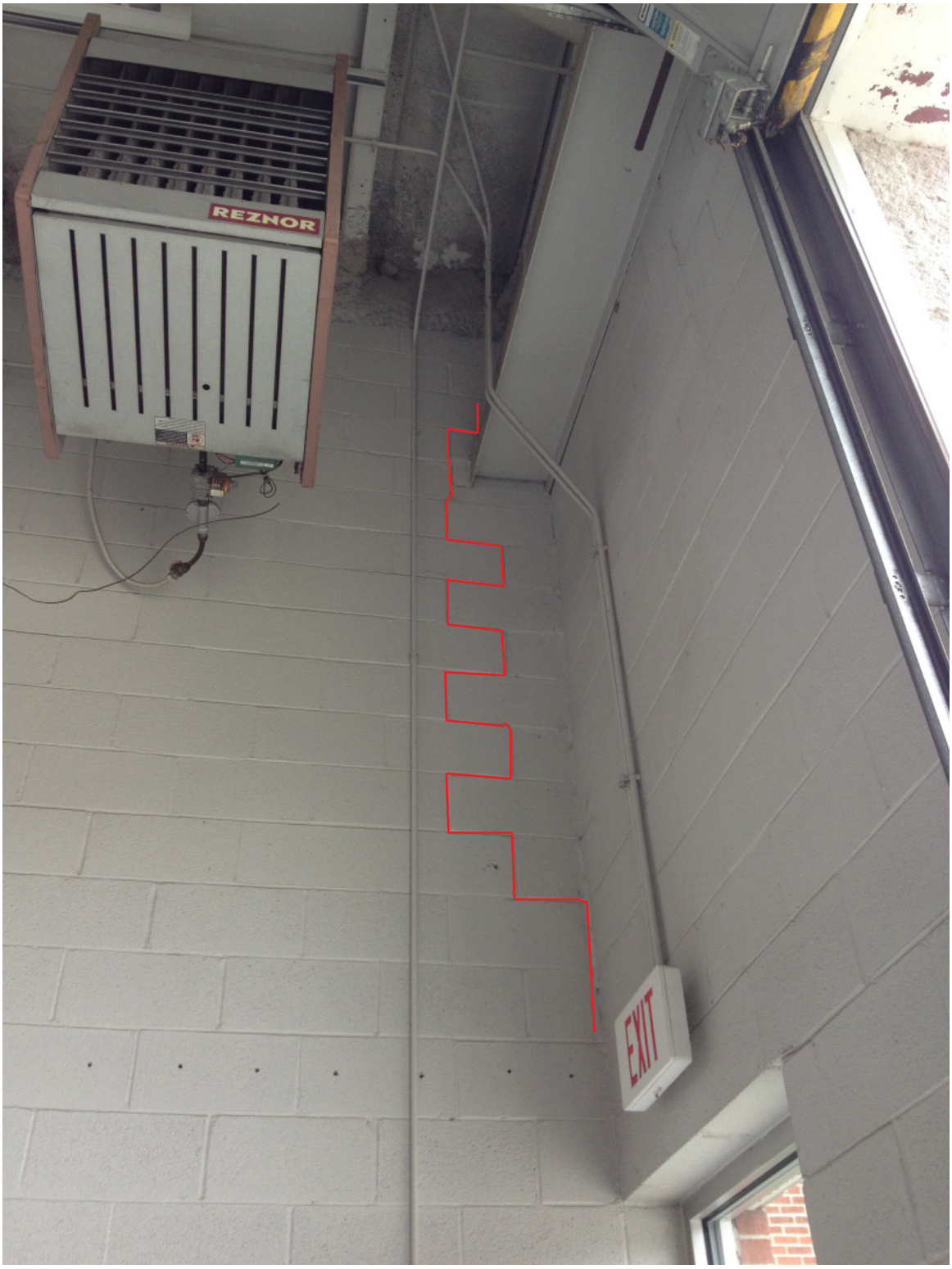


Photo 43: Interior photograph on Northeast quadrant of truck bay. The red line highlights the existing crack in the mortar joint of the 12" concrete masonry block wall that separates the truck bays from the fire station offices and main lobby.

Photo 44: Interior photograph on Northeast quadrant of truck bay. The red line highlights the existing crack in the mortar joint of the exterior concrete masonry unit wall (east side). This crack also is visible in the brick and split face veneer just opposite this picture.

Photo 45: Exterior photograph on Northeast quadrant of truck bay. The red line highlights the existing crack in the brick and split face veneer.

Photo 46: Interior photograph on Northwest quadrant of truck bay. The red line highlights the existing crack in the mortar joint of the exterior concrete masonry unit wall (west side).

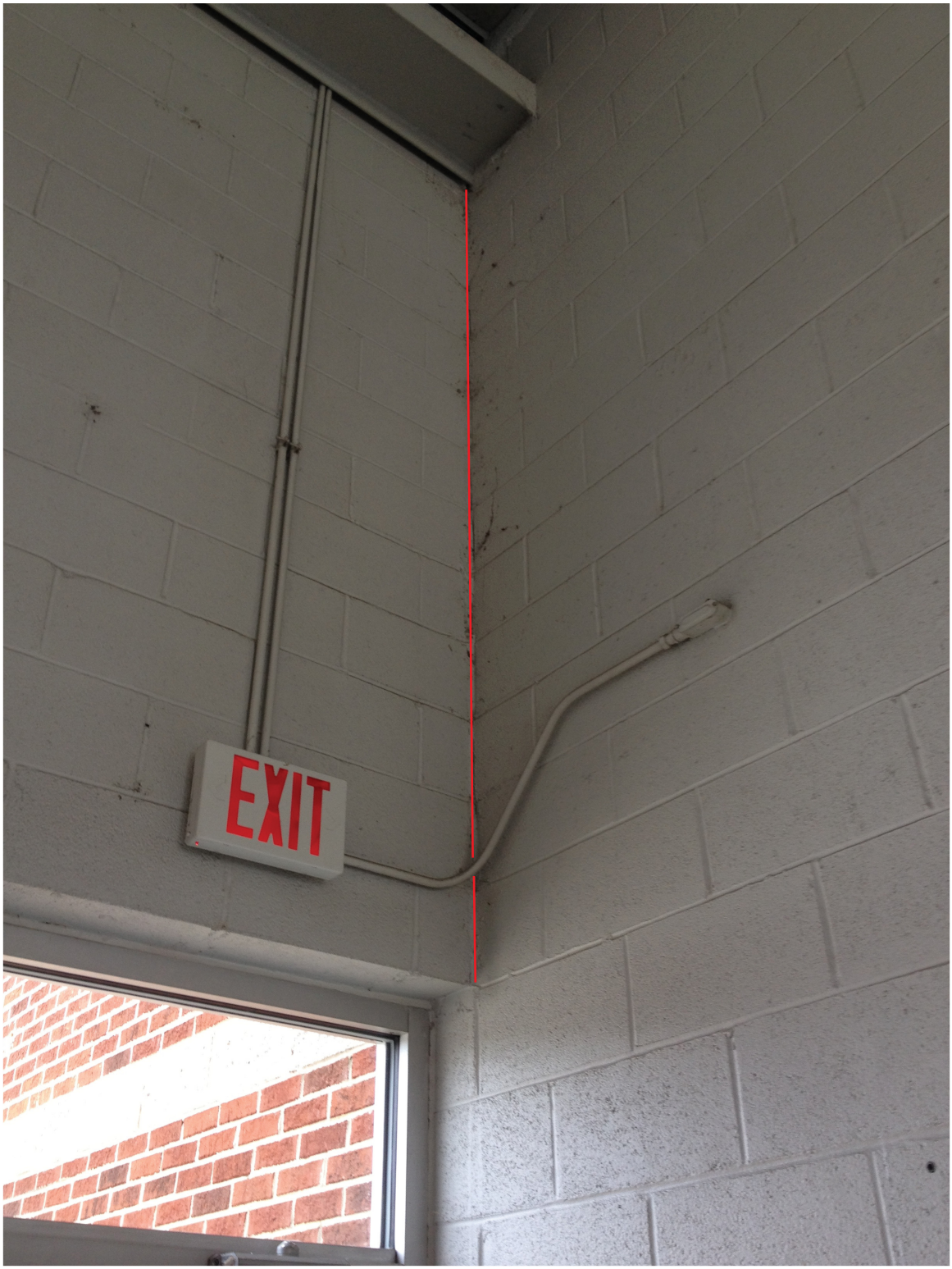


Photo 47: Interior photograph on Northwest quadrant of truck bay. The red line highlights the existing crack at the intersection of the west and north walls of the truck bay.

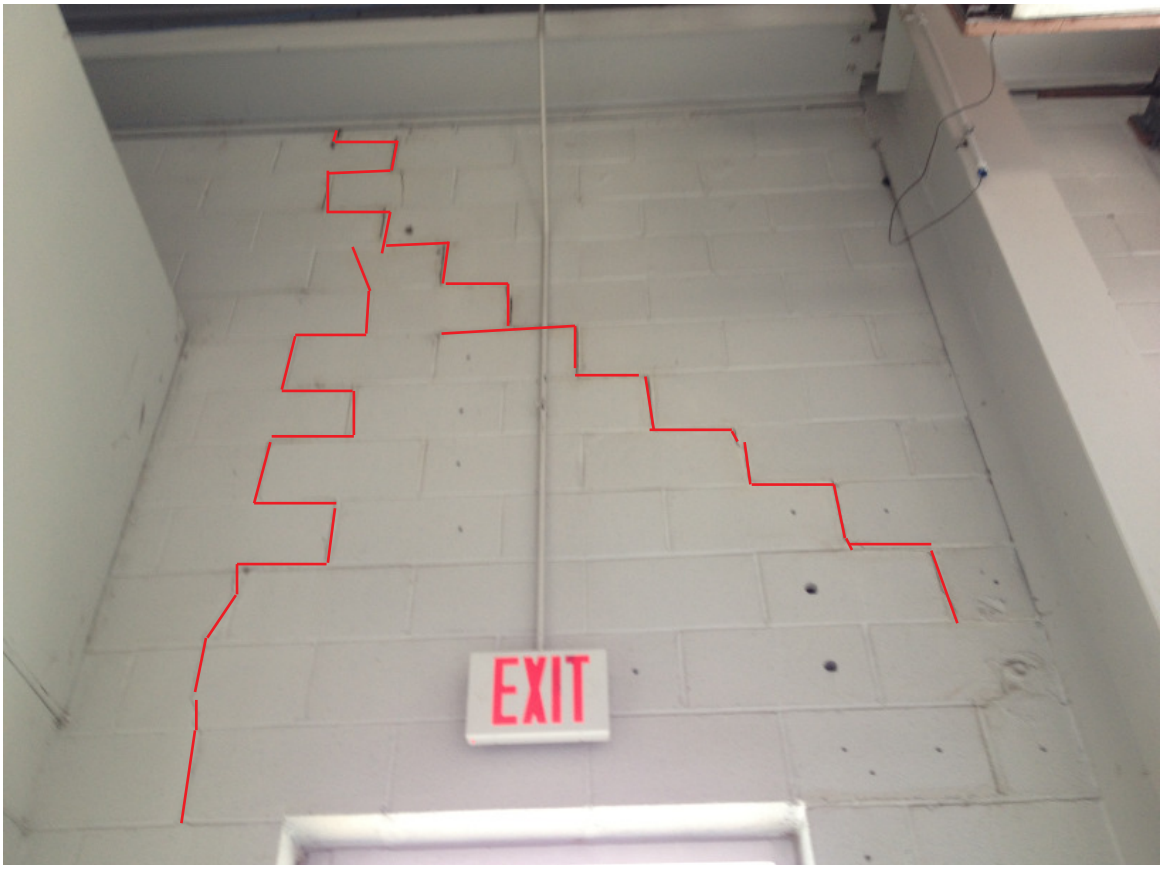


Photo 48: Interior photograph on Southwest quadrant of truck bay. The red line highlights the existing crack in the interior concrete masonry wall (west side).

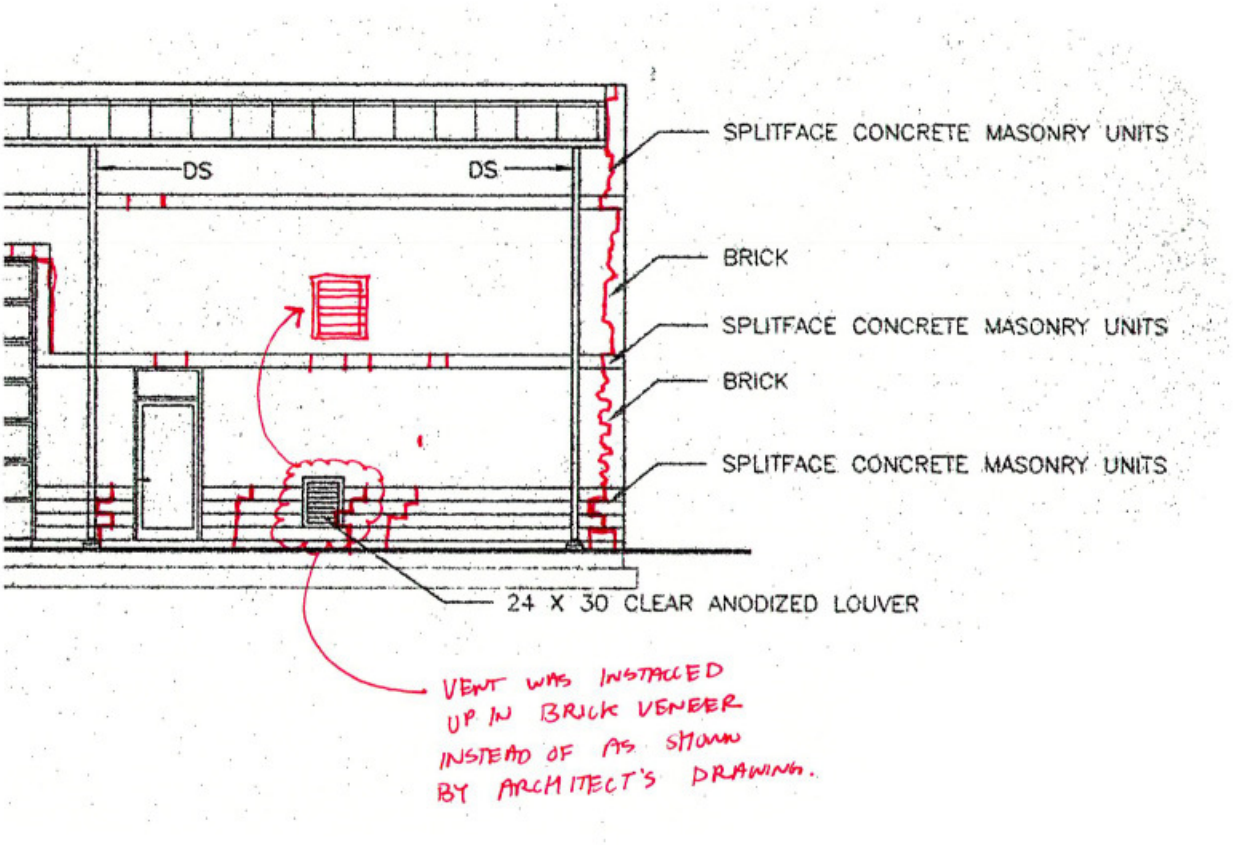


Photo 49: This drawing illustrates the locations of exterior cracks in the masonry veneer at the southwest corner of the building. Many of these cracks are consistent with other non-structural veneer cracks that will be covered in another section later in this report. However, due to the extensiveness of some of the cracks in this area (both interior and exterior), it is believed that most of the cracks in the veneer in this area are the result of horizontal movement of the structural curtain wall. The vertical crack, as seen in the illustration above at the right most corner of the building, is a stress fracture at the point where the west wall meets the more rigid south wall. Due to improper pinning of the curtain wall to the steel structure, this section of wall experiences horizontal movement which causes these stresses in the curtain wall.

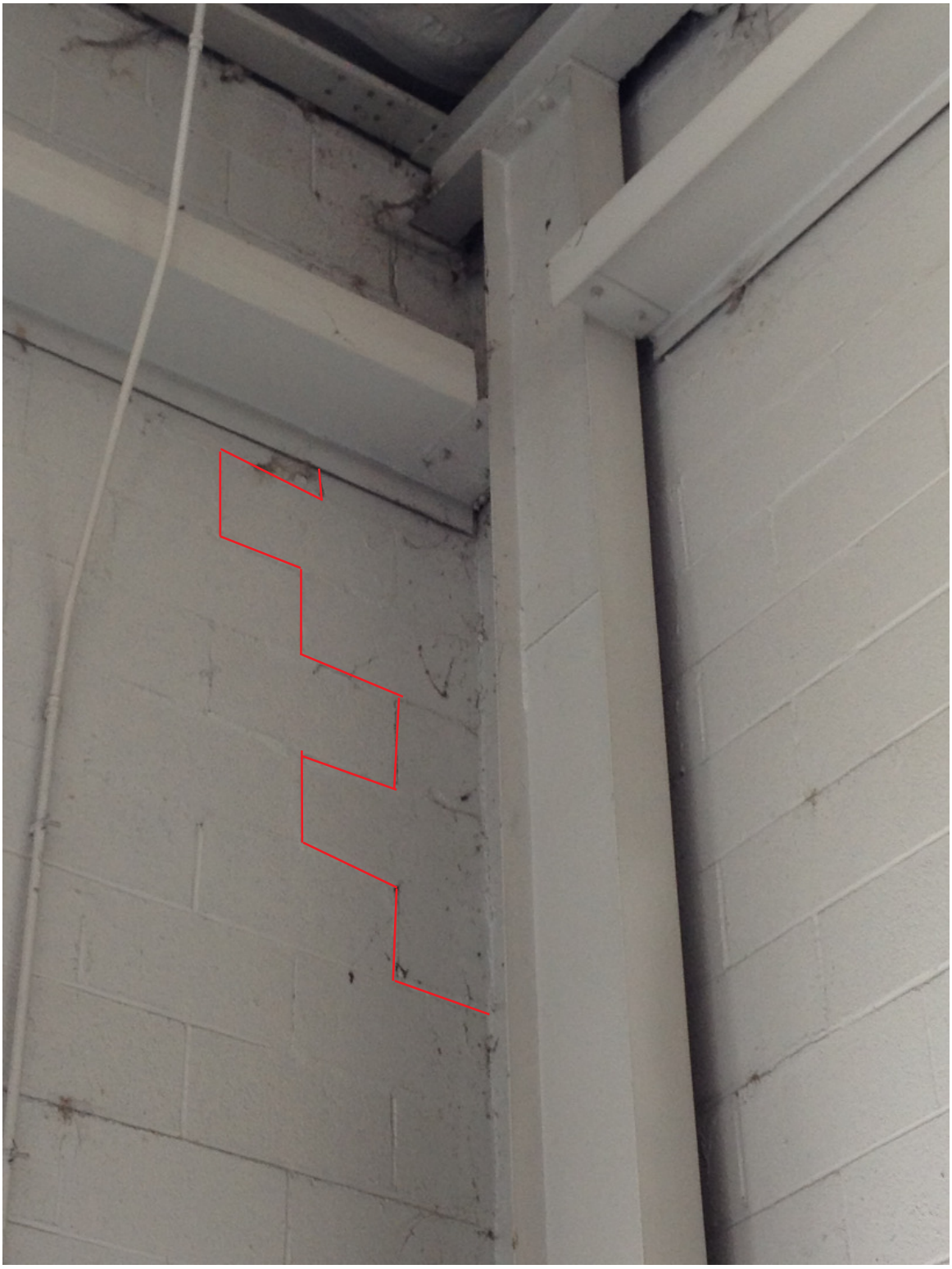


Photo 50: Interior photograph on Southeast quadrant of truck bay. The red line highlights the existing crack at the intersection of the east and south walls of the truck bay.

Photo 51: Interior photograph on Southeast quadrant of truck bay. The red line highlights the existing crack at the interior concrete masonry unit wall (east wall).

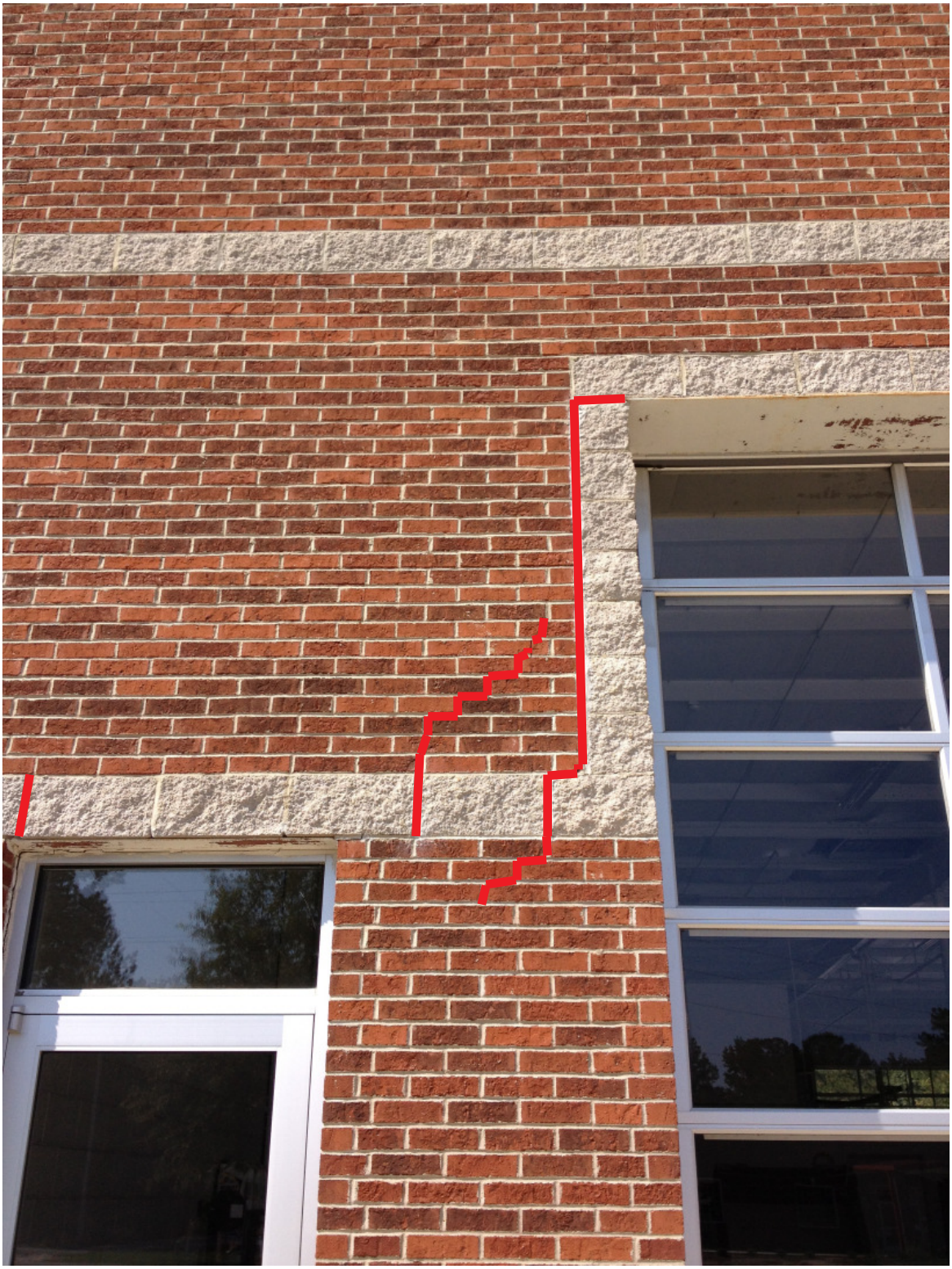


Photo 52: Cracks in the brick and split face at the pedestrian door on the front of the building. These cracks are likely caused by movement of the building veneer, and not due to differential settlement.

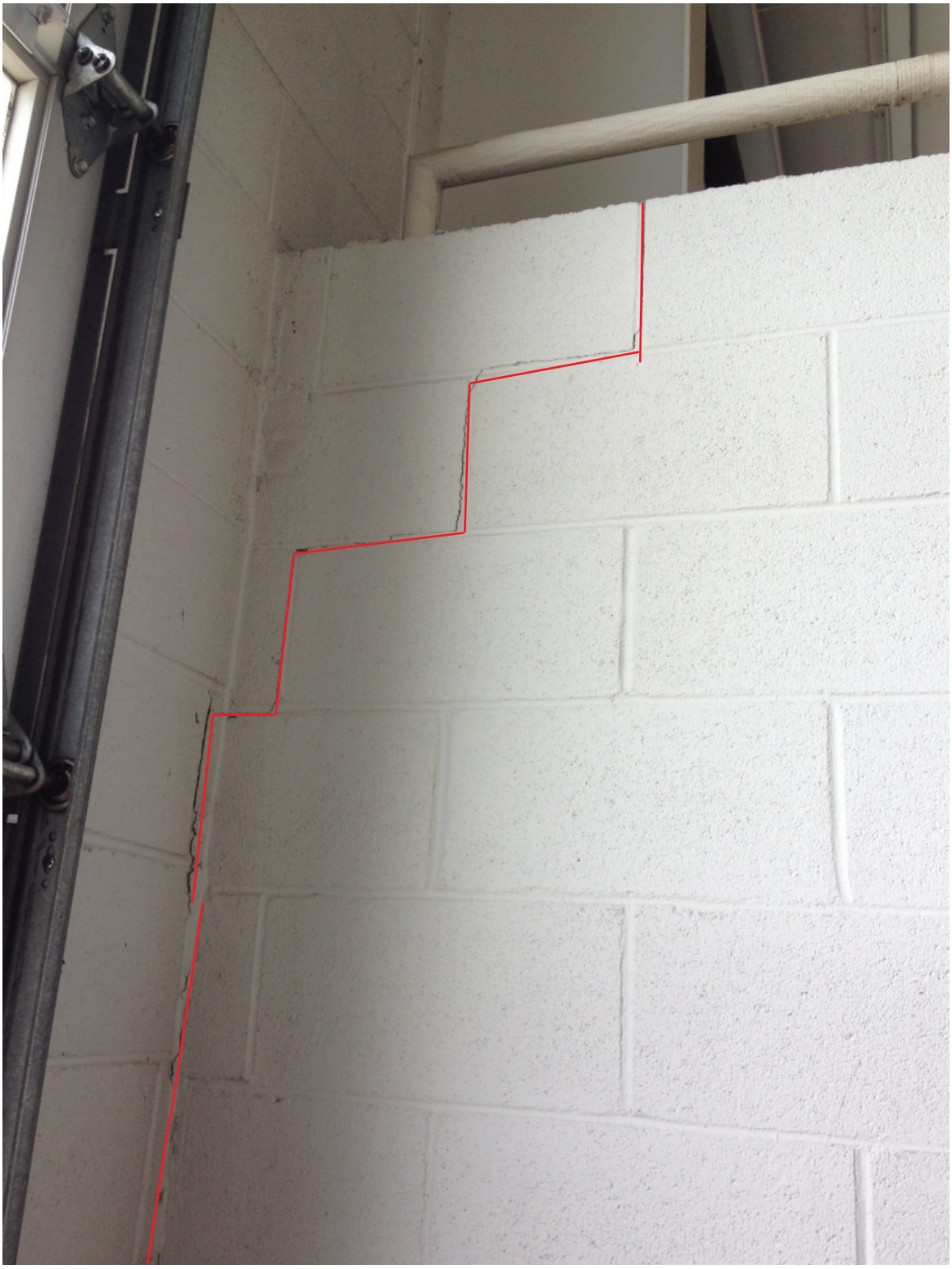


Photo 53: Interior photograph on Southeast quadrant of truck bay. The red line highlights the existing crack at the interior concrete masonry unit wall that separates the service bay from truck bay.

STRUCTURAL CURTAIN WALL RECOMMENDATIONS

RECOMMENDATIONS:

The following bulleted items are recommendations for stabilizing the exterior masonry curtain walls at the building corners in the truck bay area of the structure.

- To improve the lateral stability of the masonry curtain walls, consideration should be given to installing a 4x4x1/4" steel column with channel bracing between the bay opening and endwall at each building corner in the truck bay area. The column should be installed adjacent to the exterior masonry curtain wall and extend from the floor slab to the steel wind beam at the upper portion of the wall. At each side of the column, a 10" steel channel is to be set above the bay opening and extend to the rigid frame column at each side of the corner bay. The steel channel will be welded to the existing rigid frame columns and bolted to the masonry curtain wall with 5/8" epoxy anchors @ 3'-0" on center. Based on the architectural drawings, a footing for the new column will be required at these locations. It is recommended the new footing be 1'-6" x1'-6" x 12" deep and reinforced with (2) #4 bars each way. Details for the column footing and channel connections are provided within this report.

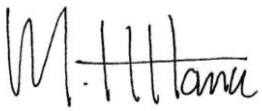
- It is recommended the existing wind girts located at the front (East) and rear (West) wall of the truck bay area be attached in accordance with the architectural drawings. Wind girt may be fastened to the masonry curtain wall with 5/8" dia. epoxy anchors at 4'-0" on center.

- Following the installation of steel columns and additional bracing as described above, it is recommended all masonry curtain wall components be monitored closely to verify if further cracking develops. If additional cracking is observed in these areas, further stabilization of the masonry curtain walls might be required.

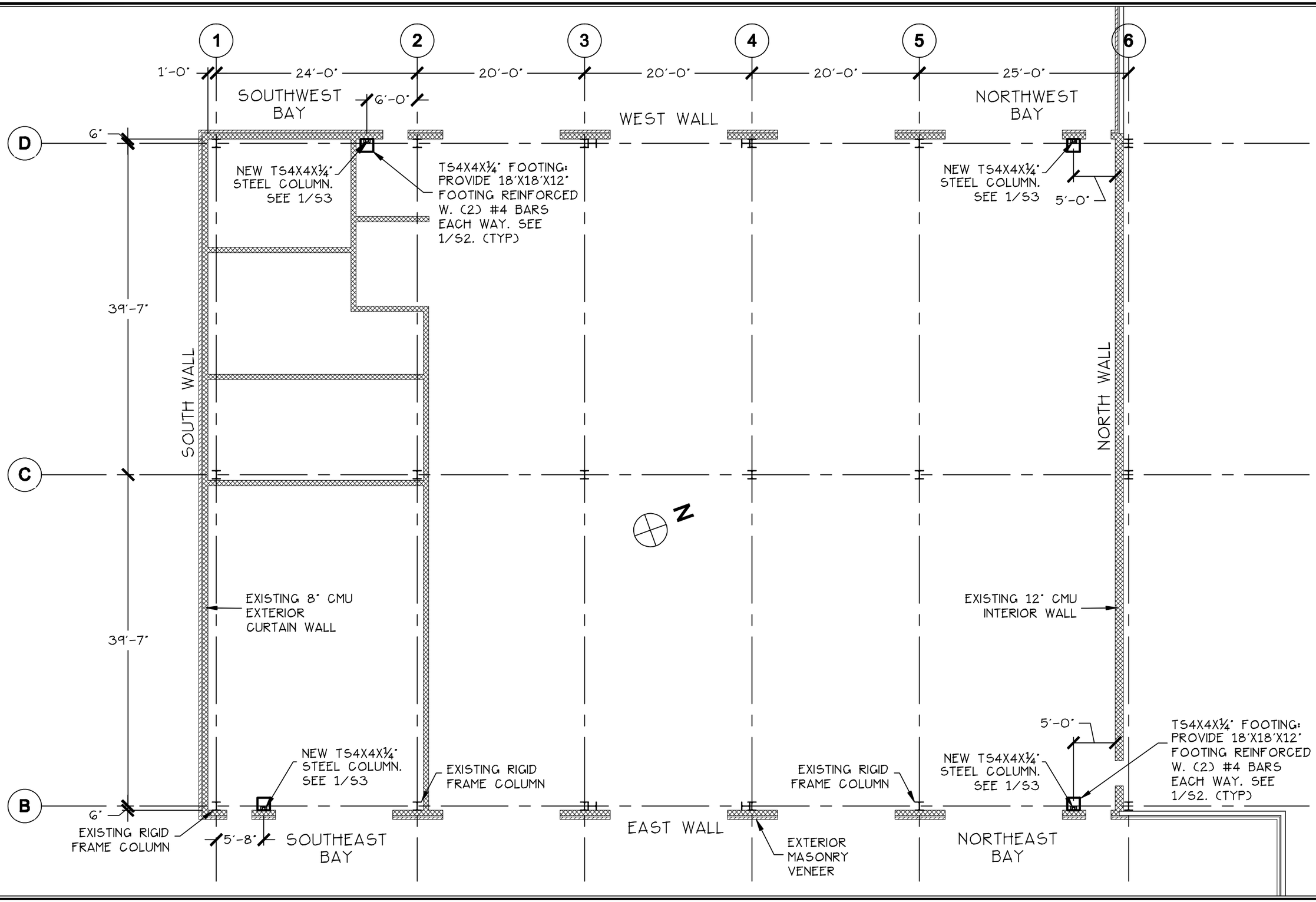
- Although no signs of differential settlement at the perimeter walls and interior columns were observed during the investigation, it is recommended all floor slabs and walls be checked periodically for evidence of movement in the foundation system.

I appreciate the opportunity to provide you with this letter and if I can answer any questions or provide any additional services, please contact my office.

Respectfully yours,



Michael H. Hance, PE
Michael H. Hance PE LLC



MICHAEL H. HANCE, PE LLC
1133 Club Terrace
Mount Pleasant, South Carolina 29464
MT. PLEASANT OFFICE: (843) 856-2649

REVISIONS

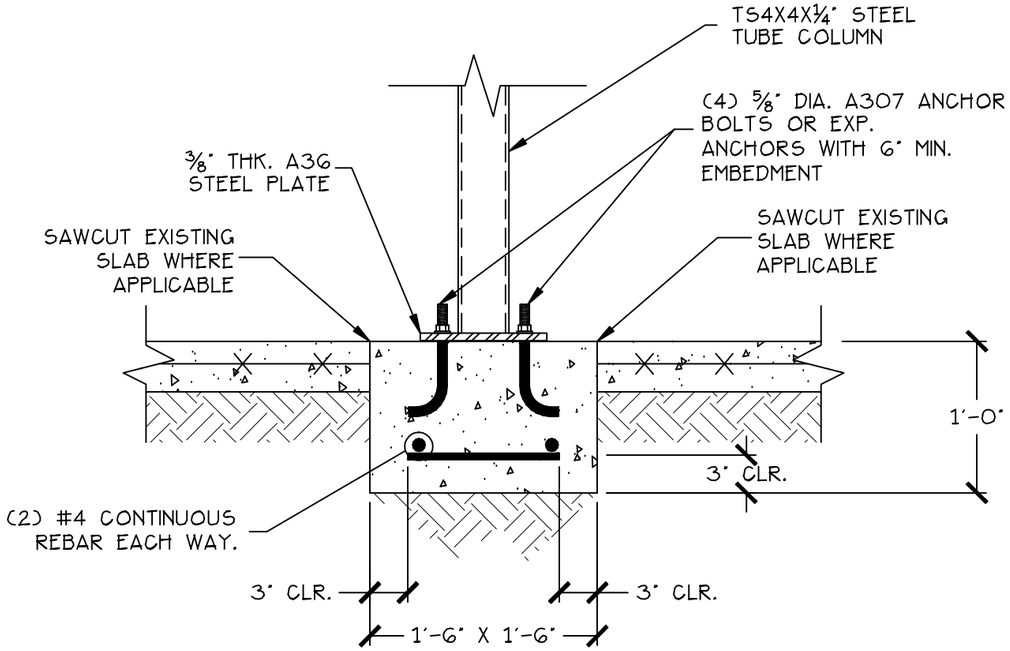
DRAWN	DESIGNED	CHECKED
MHH	MHH	MHH

DATE: 3/7/13

JOB #:

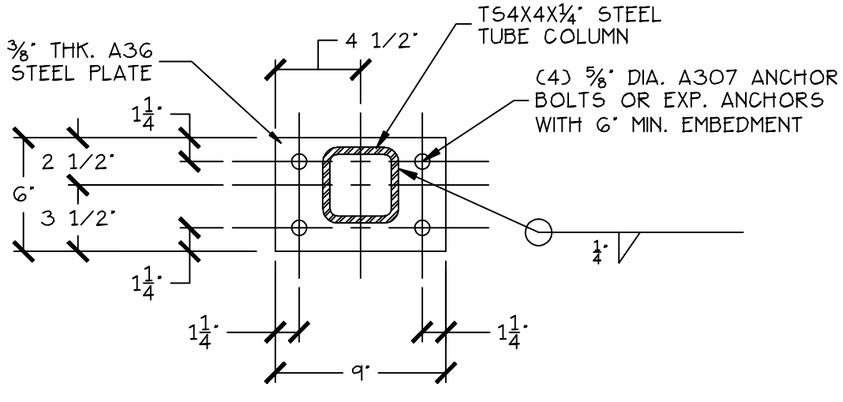
CHARLESTON COUNTY FIRE STATION
MANNING, SC
COLUMN BRACING PLAN

DRAWING NUMBER
S1
OF



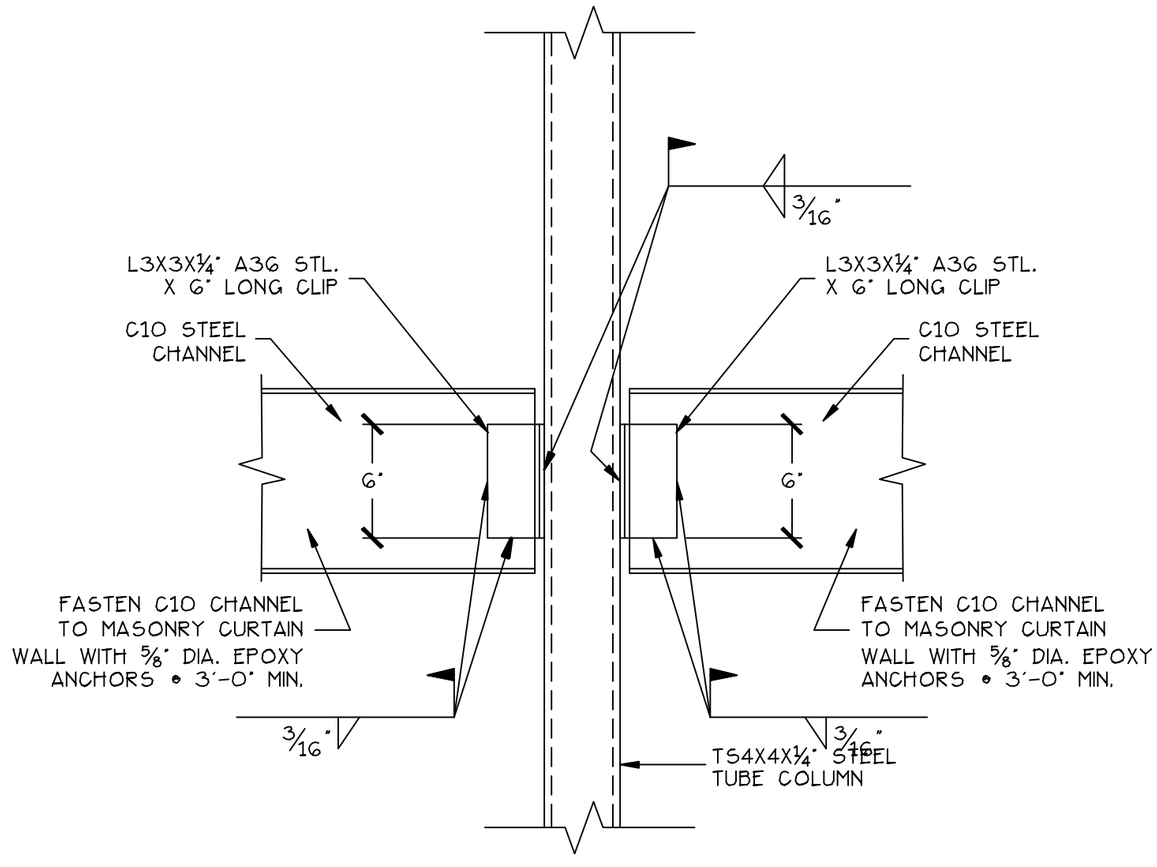
1 / S2 COLUMN FTG. SECTION

SCALE: 1" = 1'-0"



2 / S2 4X4 COLUMN BASE PLATE

SCALE: 1-1/2" = 1'-0"



3 / S2 CHANNEL/COLUMN CONNECTION

SCALE: 1-1/2" = 1'-0"

MICHAEL H. HANCE, PE LLC
1133 Club Terrace
Mount Pleasant, South Carolina 29464
MT. PLEASANT OFFICE: (843) 856-2649

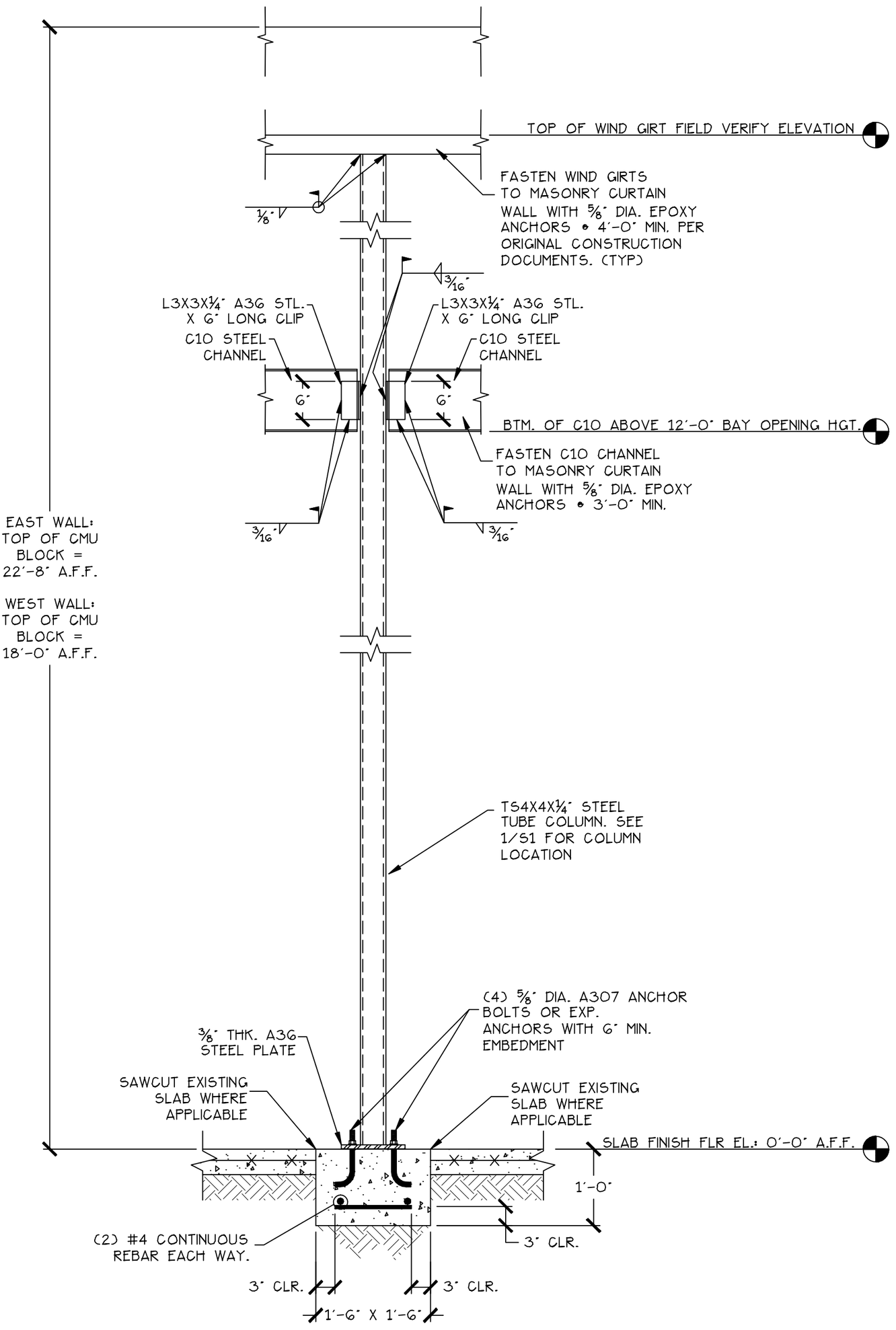
REVISIONS

DRAWN MHH | DESIGNED MHH | CHECKED MHH | DATE: 3/28/13 | JOB #:

CHARLESTON COUNTY FIRE STATION
MANNING, SC

COLUMN SECTIONS AND DETAILS

DRAWING NUMBER S2 OF



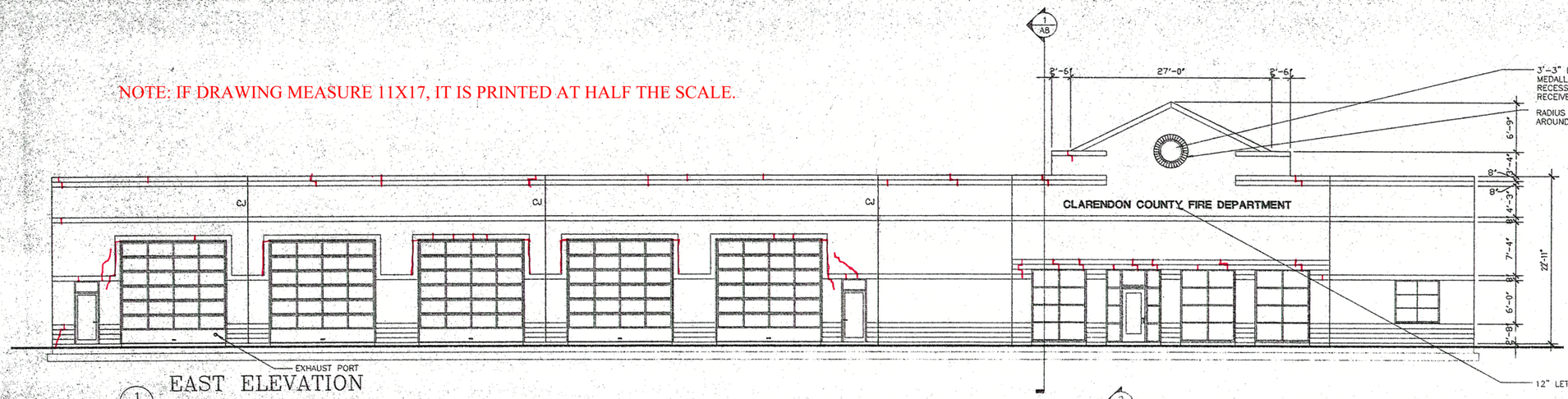
1/53 COLUMN ELEVATION

SCALE: 3/4" = 1'-0"

DRAWING NUMBER S3 R	CHARLESTON COUNTY FIRE STATION MANNING, SC COLUMN ELEVATION	DRAWN MHH DESIGNED MHH CHECKED MHH DATE: 3/26/13 JOB # :	REVISIONS	MICHAEL H. HANCE, PE LLC 1133 Club Terrace Mount Pleasant, South Carolina 29464 MT. PLEASANT OFFICE: (843) 856-2649	

NON-STRUCTURAL
VENEER CRACKS

NOTE: IF DRAWING MEASURE 11X17, IT IS PRINTED AT HALF THE SCALE.

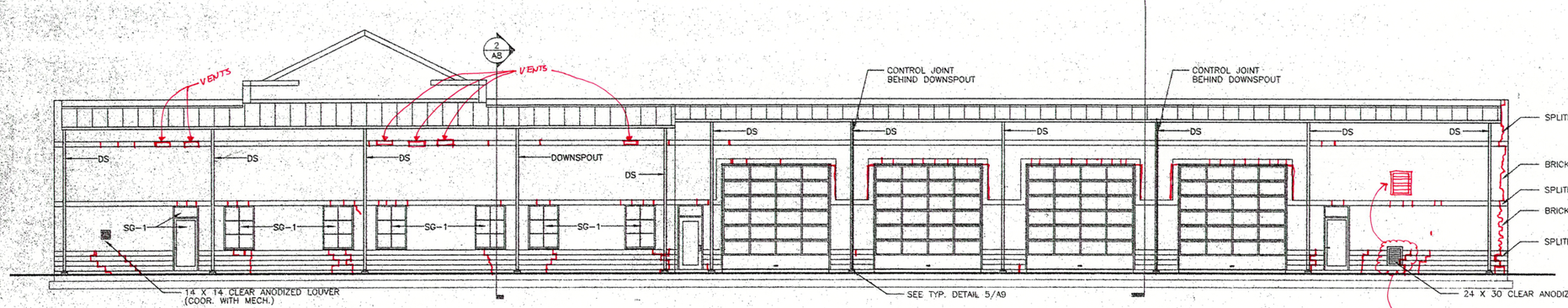


EAST ELEVATION

1/A4 — 1/8" = 1'-0"

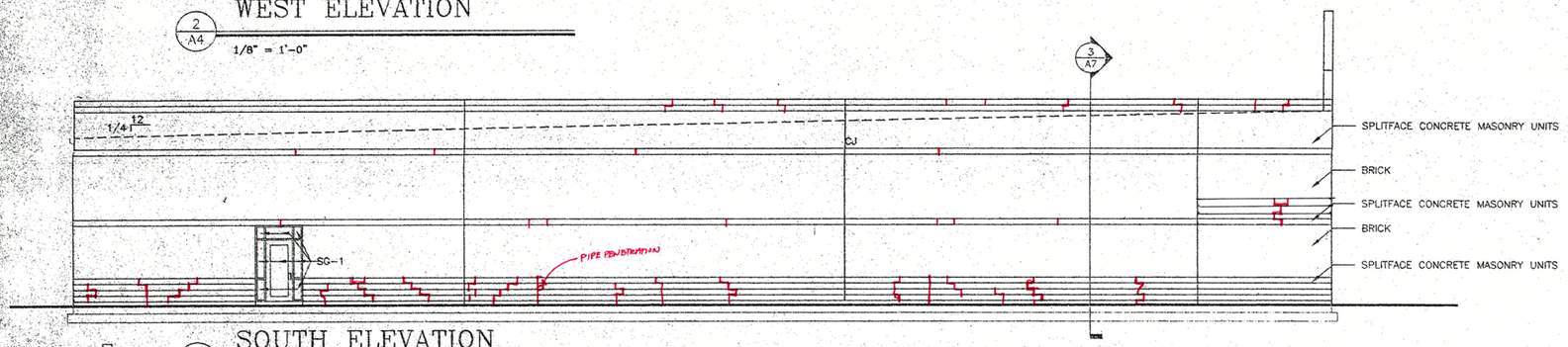
MASONRY NOTES:

1) BRICK SHALL BE AS FOLLOWS:
   - A) PINE HALL BRICK CO. DAN RIVER HANDCRAFT
   - B) PROVIDE MATCHING COLORED MORTAR FOR LAYING THE BRICK.
   - C) RUNNING BOND
   - D) BRICK JOINTS – BOTH HORIZONTAL AND VERTICAL TO BE TOOLED V-GROOVE.
2) PROFILE SPLIT FACE CONCRETE MASONRY UNITS SHALL BE AS FOLLOWS:
   - A) ADAMS PRODUCTS CO. OR METROMONT
   - B) UNIT – PROFILE SPLIT FACE
   - C) COLOR – MATCH – METROMONT GUN POWDER/GRAY COLOR – L – 88
   - D) PROVIDE MATCHING COLORED MORTAR FOR LAYING THE CONCRETE MASONRY UNITS.
   - E) STACKED BOND
   - F) BLOCK JOINTS SHALL BE STRUCK FLUSH AND BRUSHED TO MATCH THE SPLIT FACE TEXTURE.



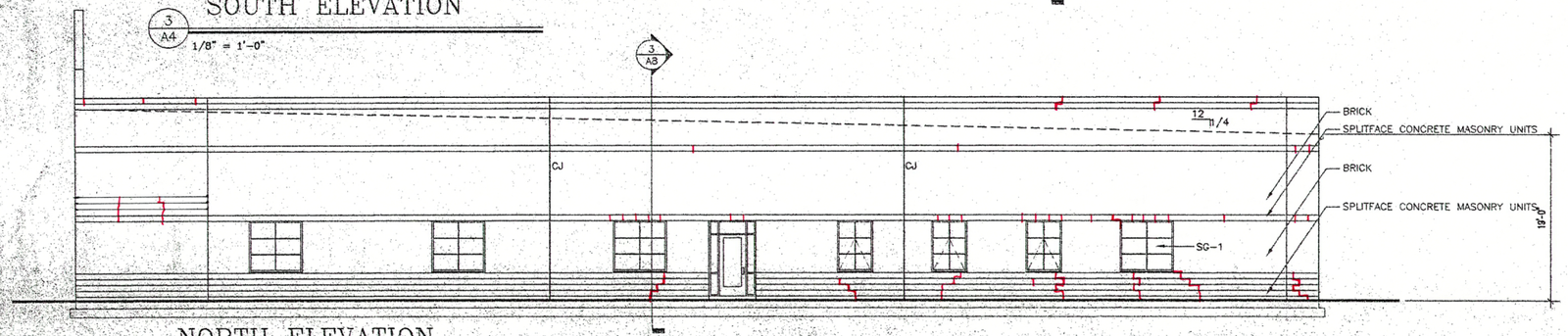
WEST ELEVATION

2/A4 — 1/8" = 1'-0"



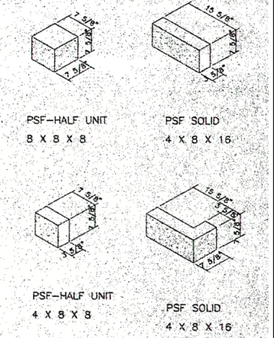
SOUTH ELEVATION

3/A4 — 1/8" = 1'-0"



NORTH ELEVATION

4/A4 — 1/8" = 1'-0"



PSF–HALF UNIT 8 X 8 X 8

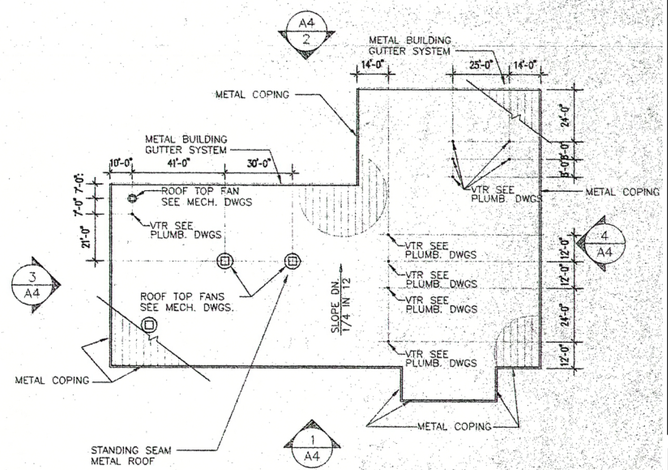
PSF SOLID 4 X 8 X 16

PSF–HALF UNIT 4 X 8 X 8

PSF SOLID 4 X 8 X 16

PROFILE SPLIT FACE UNIT DETAIL

6/A4 — 1/2" = 1'-0"



ROOF PLAN

5/A4 — NTS

NOTE: COORDINATE EQUIPMENT LOCATIONS WITH PLUMBING AND MECHANICAL
COORDINATE COPING WIDTHS WITH VARYING

VENEER CRACKS

A7

Photo 54: Separation of the door frame and the building veneer at the pedestrian door on the front of the building. This is likely caused by movement of the building veneer, and not due to differential settlement. Also, the caulk has failed in this area and should cleaned off and reapplied.

Photos 55: Cracks in the split face veneer on base of the building. These cracks are likely caused by movement in the building veneer and are not structural.

Photos 56: Cracks in the split face veneer on base of the building. These cracks are likely caused by movement in the building veneer and are not structural.

Photos 57: Cracks in the split face veneer under the windows in the building. These cracks are likely caused by movement in the building veneer and are not structural.

Photos 58: Cracks in the split face veneer under the windows in the building. These cracks are likely caused by movement in the building veneer and are not structural.

Photos 59: Cracks in the split face veneer under the windows in the building. These cracks are likely caused by movement in the building veneer and are not structural.

Photos 60: Cracks in the split face veneer under the windows in the building. These cracks are likely caused by movement in the building veneer and are not structural.

Photo 61: Separation in the caulking at the cold joint between the structures. The movement is not extreme, but should be re-caulked.

Recommendations

The non-structural veneer cracks appear to be the result of poor workmanship. As such, we recommend the removal of cracked and damaged mortar and the repointing of the affected areas with mortar that matches the consistency, texture, composition, and color of the existing mortar. Any cracked and damaged bricks and split face block should be replaced. We further recommend the installation of crack monitors in select areas to track any further and future movement of the veneer. Should the cracks persist in the future, another repair method should be employed. A possible repair would include the installation of block locks at a space specified by the manufacturer. Any broken blocks should be replaced.

EFFLORESCENCE

Photos 62: Southwest corner of Fire Station Offices. Note the white effluorescence on the brick, espically near top of wall.

Photos 63: Wall of fire station offices. Note the white effluorescence on the brick.

Photos 64: Effluorescence on brick is widespread on west wall of offices.

Photos 65: Effluorescence on brick is widespread on west wall of offices.

Photos 66: Effluorescene on brick is widespread on west wall of offices.

Photos 67: Effluorescence on brick in widespread on west wall of offices.

Photos 68: Effluorescence on brick is widespread on west wall of offices.

Photos 69: Effluorescence on brick is widespread on west wall of offices. Photo is at northwest corner.

Photos 70 & 71: The mortar on top of the wall vents is cracked and is missing in some places. This allows water to intrude into the structure behind the brick veneer. There is evidence of efflorescence in this area which is the result of moisture behind the brick veneer. The efflorescence is extensive along this entire wall.

Photo 72:

Recommendations

Once the issues with the surface applied box gutter and roof panel surface fasteners are addressed and the roof panel end closures installed under the western edge of the standing seam roof panels, the moisture intrusion into the wall assembly should be prevented. The wall assembly should be cleaned. As a further precaution, weep holes should be drilled in the second course of mortar from the base of the exposed wall. The weep holes should be drilled with a 3/8" bit and run the full depth of the veneer to gain access to the cavity. The weeps should be spaced at 32" on center.

APPENDIX A:
ORIGINAL ARCHITECTURE AND ENGINEERING DRAWINGS