

# Immaculate Conception Church – Diocese of Charleston

## 510 Saint James Blvd. – Goose Creek, SC

### Roof Replacement / Selective Repairs Design

The design project included drawings, specifications, project administration and coordination with Owner on safety, security and access requirements. Advertising, bidding, submittals and project close out were also included.

Due to a variety of issues including (1) a trapezoidal shaped roof, (2) varying slopes / shapes in the main roof, (3) curved shingle application, (4) insufficient slopes for typical shingle applications, (5) shingle nail pop-up due to metal deck directly below the plywood deck at the canopies and (6) a lack of sufficient thru wall flashings at the windows. This was the most unique and complex roofing project ADC has done to date.

Due to the budget, both a shingle roof replacement and a fully adhered single-ply (with a standing seam profile) were included in the Bid Documents, for the steep-sloped roof areas.

Base Bid One: Work included roof replacement of low-sloped (EPDM) and steep-sloped (shingles) with thermoplastic single-ply roof system including all related sheet metal and accessories.

Base Bid Two: Work included all items in Base Bid One, but changes system to architectural shingles with plywood in lieu of cover board for thermoplastic single-ply with standing seam ribs for Areas A-D.

Alternate Number One: Included window / wall work to front elevation between the lower and upper steep-sloped roof areas. This includes new thru-wall flashings above and below the fenestrations (windows) between the upper and lower-sloped roofs. Complete replacement of sealants and wet sealing all of the fenestrations in this same area.

Alternate Number Two: Work included cleaning, preparation, priming and a two-coat paint system for the Steeple / Tower.

Base Bid Two and both Alternates were awarded.

Specifications included front-end criteria for the Owners unique requirements. Documents for the Diocese required design review and coordination with both the Church and the Diocese. Quality control procedures for the design process focus on a system of regular multi-discipline review meetings with the Owner. The drawings and specifications were reviewed and coordinated during each scheduled design phase. Numerous quality assurance checks were performed of the documents using guide checklists in an effort to prevent discrepancies that could impact client expectations and prevent costly change orders. Although ADC Engineering has an extensive library of standard isometric details, the project's details were tailored to the projects specific needs. The construction phase was in budget. A change order was requested by the Contractor to perform additional masonry work due to inadequate / missing attachment / flashing.

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This project is very unique based on the jobsite conditions justifying a re-roof design that adheres to all categories of the RoofPoint concept, while substantially improving the public's perception of the facility aesthetically. ADC Engineering, Inc. initially became involved, trying to assist various individuals and companies we knew in our community. We continually work to assist the church gratis, to maintain and extend the life of the roofs. In 2011, we completed an Investigation and Written Report and in 2012 completed a design. Construction finished in January 2013.

► **Energy Management:**

The design / construction of this roof system applied credits E1-E4.

- E1 The existing asphalt, shingle system had an R-value of approximately fifteen (15). The R-value was increased by ten (10) over 40%.
- E2 Substantial insulation directly below an asphalt shingle roof with limited ventilation will have an adverse effect on the performance and the longevity of the roof. The increased R-values will not have the significant effect on the thermoplastic roof system, which will also provide a longer service life for the roof system.
- E3 A considerable increase in reflectivity and decrease in emissivity from a medium colored asphalt shingle, to a medium colored, 72 mil thermoplastic single-ply.
- E4 The thermoplastic single-ply system provides a moisture, vapor and air barrier at its exterior surface, with the design details transitioning this at the terminations.

► **Material Management:**

The design / construction of this roof system applied credits M2 – M4.

- M2 the original roof insulation was re-used; only lifted to verify underlying conditions and to re-secure.
- M3 All materials less shingles were re-used, with selective materials repaired using unit prices (masonry, metal deck, windows, wood, etc.).
- M4 No VOC and low VOC metal deck coatings, paints for steeple / tower, and adhesives for insulations were specified for the project.


► **Water Management:**

Not applicable to this project.

► **Innovation in Roofing:**

The design / construction of this roof system applied credits IR1 – IR2.

- 1R1 The use of the fully adhered single-ply roof system (with the standing seam configuration) provided a series of solutions to various facility issues, while simultaneously improving the energy efficiency, life cycle costs, overall performance and aesthetics. The standing seam lay-out was custom designed based on the geometry of the trapezoidal upper and lower roofs.
- 1R2 The aesthetic improvement is truly eye catching and commented on in the Goose Creek community on a regular basis. Many think it is a custom fabricated copper roof. The elimination of the substantial leaks that have plagued the roof since it was built in 1995 is truly a blessing.



**Durability / Life Cycle Management:**

The design / construction of this roof system applied credits D1 – D7 and L1 – L2.

- D1 The insulations (Polyisocyanurate) and coverboard (Densdeck) are durable and will permit re-use in the future.
- D2 Roof drainage, including properly designed gutters and downspouts, but more specific metal splash pans on the roofs and overflow connectors at the storm drainage connectors.
- D3 The roof system type, thickness (72 mils) with fleece backing and ½ inch Densdeck make this roof far superior to the original shingle and mechanically fastened EPDM roofs.
- D4 The wind resistance is improved substantially for both the steep-sloped shingles, now being fully adhered thermoplastic over mechanically fastened cover board and insulation, and the low-sloped roofs are also substantially more wind resistant. Between the code changes and industry improvements since 1995, to the actual systems installed exceeding the current code requirements.
- D5 The roof assembly and the material used are far less susceptible to water absorption or damage compared to the products in the original construction or other product options available today.
- D6 The 72 mil, fleece backed thermoplastic fully adhered to a ½ inch Densdeck substantially improves impact resistance and substantially reduces water migration if a puncture occurs.
- D7 Durability enhancements in addition to the roof assembly noted above; are the custom fabricated, ISO metric details requiring redundancy at all key locations (penetrations and terminations where 90% of all leaks occur).
- L1 The Close-Out Documents provide for and ADC will assist with an ongoing maintenance program.
- L2 As outlined in the Contract Documents, submittals, Pre-Roofing Conference and Milestone Site Visits, a combined Quality Control (QC) program (Contractor and Manufacturer) and QA program (ADC Engineering, Inc.) provides for increased service life and documented decrease in call backs.



Before Photo of Roof



After Photo of Roof



Right Side - Before



Right Side - After



Coping Termination - Before



Coping Termination - After

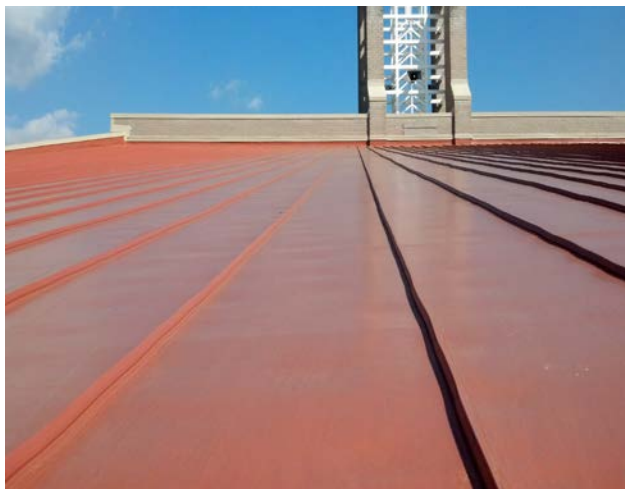




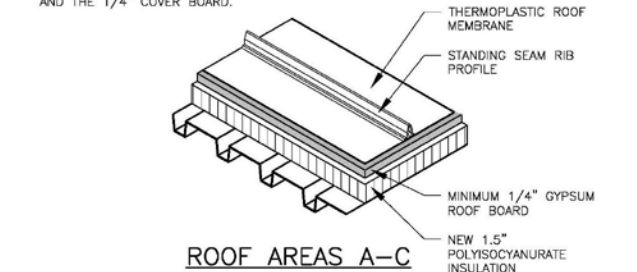
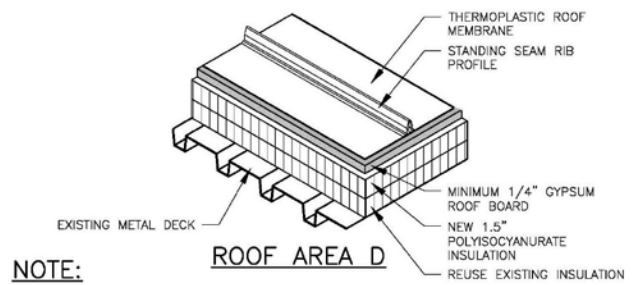
Sidewall Flashing – Before



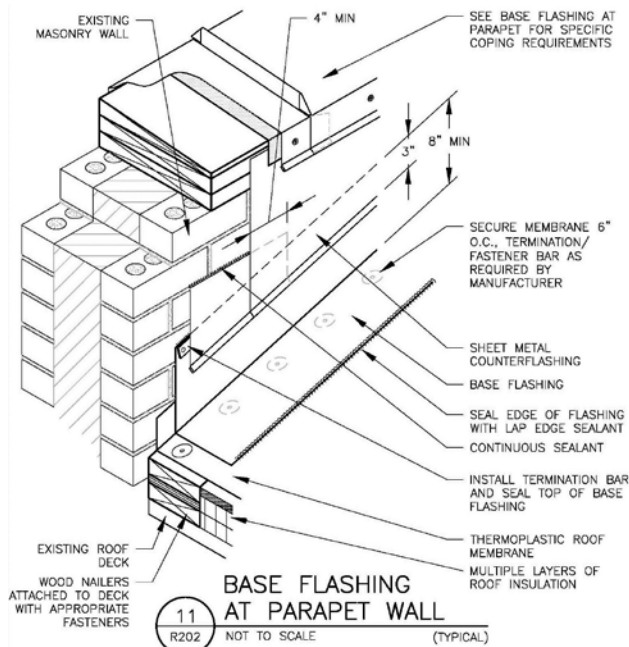
Sidewall Flashing – After



Assembly – After with Assembly Detail



1 ROOF ASSEMBLY (BASE BID 1)  
R201 NOT TO SCALE (TYPICAL)



Sidewall Step Flashing Detail



Sidewall Step Flashing – After