

## University of California - Santa Barbara West Campus Point Faculty Housing

### **University of California - Santa Barbara West Campus Point Faculty Housing Reconstruction Guidelines and Considerations to Correct Exterior Building Envelope Weatherproofing Defects and Recommended Upgrades**

#### ● I. General Overview

- A. The following is intended to provide an overview of general recommendations that should be considered or evaluated relative to the correction of defects related to the exterior building envelope weatherproofing system.
- B. The general intent is to correct all known leaks and defects related to the exterior building envelope weatherproofing systems and where possible and practical, minimize excessive maintenance. In some instances, there will need to be significant changes to the exterior appearance of the buildings in order to provide overhangs and eliminate internal gutters.
- C. In order to obtain an understanding of the long-term problems, leak history and defects, the Architect is to review the individual Homeowner's 2006 Rainwater Intrusion Survey Forms as well as the photographs and video taken of the limited destructive testing of Unit 917 West Campus Point Lane in May of 2006. This information will provide a good overview of the typical problems and conditions that currently exist. The University can also provide additional historical information of other problems that have been encountered such as poor site drainage at some locations.
- D. The following outline is intended to provide a brief and general overview of items for the Architect to consider relative to the repair of the exterior building envelope weatherproofing systems. These items should be considered after a careful review of the available documents, comprehensive evaluation of the past problems and best alternatives for the repairs that meet the University's needs on a long-term basis.

#### ● II. General Recommendations and Considerations for the Redesign and Repairs (from a weatherproofing perspective)

##### ● A. Exterior Wall Weatherproofing System

##### ● 1. Stucco Wall Cladding System

- a. The stucco weather barrier was found to be in poor condition as a result of holes, tears and punctures in the building paper from the original construction as well as water damage from leaks at foundation-type wall vents, round gable end wall vents, doors, windows and stucco wall control joints.
- b. A significant and consistent leak location was found to be the V-shaped gable end wall conditions at the front elevations. This location is directly above the demising wall between the two (2) units and is bisected with a through-wall overflow scupper from the low-sloped roof and a vertical stucco control joint. The parapet wall geometry V-shape directs a substantial amount of water at the bottom of the V directly on the openings in the control joint below as well as the through-wall scupper and the demising wall coping termination to the stucco wall directly below this area.
- c. A previous repair attempt included the use of high-build elastomeric wall coatings over all exterior stucco surfaces. It was generally discovered that the detailing of the stucco wall system at the time of the application of the elastomeric coating was incomplete and the cold joints between the stucco and window and door frames as well as control joints were not properly detailed, which contributed to further water intrusion.
- d. In an attempt to address poor drainage at the exterior patios at grade, clay paver tiles were added over the concrete exterior slabs. This resulted in covering and burying the stucco wall weep screeds and the wood sill plates. It appears in the areas inspected that

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the wood sill plates have been significantly water damaged and will require replacement.

- e. During the invasive testing and removal of the stucco, termite damage was found to be significant, especially in locations where there was also evidence of water entry into the wall system. It should be anticipated that an allowance will need to be provided to address the termite damage and any active termite infestations.
- f. General Recommendations for Corrective Action to Address the Stucco Wall System Deficiencies:
  - 1. The redesign should incorporate ASTM Standard # 2266-04 "Standard Guide for Design and Construction of Low-Rise Frame Building Wall Systems to Resist Water Intrusion"
  - 2. The recommended remedy will be to remove the existing stucco cladding system in its entirety inclusive of the doors, windows, wall vents, foundation vents (used as wall vents) and all associated flashings, screeds, and plaster accessories down to the wood framing.
  - 3. All damaged wood framing is to be repaired/replaced.
  - 4. Consideration should also be given to treat all exposed framing and sheathing with a borate-based solution such as Bora-Care or similar products as a preventative measure to minimize or mitigate future termite infestations as well as wood-decaying fungi.
  - 5. Since the Units/Buildings lack overhangs, the exterior wall flashings inclusive of the door and window openings and wall penetrations must be properly flashed. One option that should be considered during the redesign would be to add overhangs to minimize the amount of water that reaches the exterior wall surfaces. This option should be looked at in concert with the elimination of the internal gutters at various roof sections at the bottom of the concrete tile roof sections.
  - 6. Consideration should be given to addressing the use of a roof ventilation system at the cathedral ceilings in lieu of wall vents. Where wall vents must be utilized, more appropriate vents are to be utilized that are more weather resistant and have continuous flanges that can be integrated into the stucco wall weather barrier system.
  - 7. Consideration should be given to add continuous wall sheathing over the non-shear paneled walls to provide solid backing for the weather barrier and to aid flashing.
  - 8. Consideration needs to be given to changing the parapet wall configuration to eliminate the V-shape at the gable end wall intersections at the front and rear elevations. The redesign should consider a wall geometry that does not direct the water to a single location that is intersected by the stucco wall system control joints and through-wall scupper(s).
  - 9. The new, stucco wall system weather barrier should utilize a combination of Grade D, 60-minute building paper as well as a polyolefin weather barrier such as Tyvar or Tyvek for longevity.
  - 10. The tops of all parapet walls are to be weatherproofed with a self-adhering waterproofing membrane covered with either a metal coping (best practice) or if the redesign requires a more monolithic appearance, the stucco cladding system.

## University of California - Santa Barbara West Campus Point Faculty Housing

### University of California - Santa Barbara West Campus Point Faculty Housing Reconstruction Guidelines and Considerations to Correct Exterior Building Envelope Weatherproofing Defects and Recommended Upgrades

- 11. All wall penetrations are to be flashed and fully sealed prior to the application of the stucco or other wall cladding system.
- 12. Given the past problems with the height of the weep screeds and plate line water damage relative to the hardscape and landscaping, consideration should be given to the installation of a fully adhered waterproofing membrane at the bottom of the walls at the first floor level. This will prevent future water entry and water damage if the grade is increased or future changes are made to the hardscape that may encroach on the foundation plate line elevation. This will also require some further thought on the flashing detail at the bottom of the walls near grade.
- 13. At the time of the reconstruction a further study will need to be made of the locations that will require special counterflashings and transitional flashings where the parapet walls intersect with the stucco walls and to make certain the roof system counterflashings are continuous.
- 2. Exterior Doors
  - a. Door leaks appeared to have been pervasive due to the use of wood thresholds and improper flashing of the doors into the stucco wall system. Previous repair attempts included the installation of aluminum thresholds, which helped minimize and in some instances correct leaks at the door openings.
    - 1. Door Recommendations:
      - a. Consideration should be given to the use of higher quality vinyl or metal clad doors with continuous flanges that can be incorporated into the exterior weather barrier.
      - b. Aluminum, ADA compliant door thresholds should be considered as a minimum. Wood thresholds are not to be utilized.
      - c. Non-corrosive, sheet metal door threshold pan flashings with lead-soldered joints, back and end dams and continuous outer flanges are to be designed and provided at the second floor exterior deck and the Juliet false balcony deck (if it is to remain). These threshold pan flashings must be integrated into the exterior weather barrier and deck coating system as applicable.
      - d. If roof overhangs can not be provided in the redesign, overhangs should be provided above the exterior doors.
- 3. Windows
  - a. Wood Windows
    - 1. The wood windows were found to be a significant source of leaks especially at the sills and in some instances the heads (lack of head flashings) and should be removed and replaced with new aluminum or vinyl or metal-clad windows with continuous, integral nail fins and an appropriate non-wood sill.
  - b. Aluminum Framed Windows
    - 1. Typical leaks at the aluminum framed (Metal Window Corp.) windows were found to be related to openings in the weather barrier and flashing materials at the recessed window sills as well as some leaks occurring at the window frames at the sill/jamb corners.

## University of California - Santa Barbara West Campus Point Faculty Housing

### University of California - Santa Barbara West Campus Point Faculty Housing Reconstruction Guidelines and Considerations to Correct Exterior Building Envelope Weatherproofing Defects and Recommended Upgrades

- a. Repair Considerations: The existing windows should ideally be considered for replacement given the extent of the removal of the stucco wall system.
- b. The recessed sills are to be fully waterproofed utilizing, as a minimum, high quality self-adhering waterproofing membranes integrated into the stucco wall system weather barrier in a shingled fashion. Solid, continuous backing will be required to support the waterproofing membrane to provide full and continuous support.
- 4. Wood Trellis
  - a. There have been numerous leaks associated with the attachment of the wood trellises to the stucco walls throughout the complex. There has also been substantial maintenance required to repair and maintain the wood trellises.
  - b. Repair Considerations: A number of options should be considered relative to the wood trellises, which include - but may not be limited to - the following:
    - 1. Reconstructing the trellises making them free-standing and utilizing a composite wood product or a more decay resistant wood species for the horizontal members.
    - 2. The vertical supports at the second floor balcony decks, if they are to remain, will need to be flashed at their bases and wrapped with a self-adhering waterproofing membrane and clad with wood or other trim that will cover and protect the underlying waterproofing membrane. The tops of these vertical supports will then need to be capped with a non-corrosive metal cap.
    - 3. If the trellises must be fastened to the buildings, then they must utilize a continuous metal flashing that will divert any water from the wall surface over the wood framing and especially wall anchors.
    - 4. Elimination of the wood trellises.
- B. **Patio Decks On Grade**
  - 1. Courtyard and Rear Patios • Tile-covered Slab-on-Grade
    - a. As previously indicated, the addition of clay paver tiles over the concrete slabs-on-grade at the first floor patio decks resulted in covering and burying the stucco wall weep screeds and the wood sill plates. The water damaged sill plates will require replacement.
    - b. Repair options include, but are not necessarily limited to:
      - 1. Saw cutting the existing tile and concrete slab followed by the installation of a perimeter trench drain and drain lines connected to the storm drainage system.
      - 2. Removal of the tile-covered concrete slabs, re-sloping the on-grade areas to drain along with the incorporation of additional landscaping drains and a suitable alternative for the slab replacement. This alternative would also need to incorporate the concept of not covering the bottom of the exterior walls and providing the Code required height separation from the surface of the new hardscape or landscaping and the plate line or weep screed.
- C. **Roofing Systems**
  - 1. Asphalt Shingles (Under Solar Panels)
    - a. A decision needs to be made as to whether or not the solar panels are to remain or be replaced.

**University of California - Santa Barbara West Campus Point Faculty Housing Reconstruction Guidelines and Considerations to Correct Exterior Building Envelope Weatherproofing Defects and Recommended Upgrades**

- b. The existing asphalt shingles are nearing the end of their serviceable life expectancy. A number of the galvanized metal roof flashings are also beginning to corrode and rust.
- c. At the time of the reconstruction, the asphalt shingle roofs need to be removed and replaced along with the necessary flashings.
- d. Where possible and practical, all roofing-related sheet metal flashings should be fabricated from either Zinalume or Galvalume. This coating will perform significantly better than galvanized metal especially in the moist salt air environment at the site.
- **2. Concrete Tile**
  - a. Given the interface of the low-sloped roofs up and under the concrete tile roofs, the roofing membrane in the internal gutters, improper termination of the tile underlayment at the stucco walls (at some locations), as well as the limited area of the concrete tile roof areas, the need to modify the ventilation in some areas and the possible reframing, the concrete tile roof sections should be removed and replaced. The concrete tiles will still be in useable condition and could be reused. However, a separate cost should be obtained for the replacement of the existing 20-year-old tile with a new tile and underlayment system.
  - b. The tile underlayment system should include the use of a self-adhering waterproofing membrane at the eaves, open and confined rake edges as well as the valley waterways. The tile underlayment system should consist of two (2) layers of an SBS modified bitumen, fiberglass reinforced roofing material. All tile fasteners should be non-corrosive due to the ocean, salt air environment. The exposed roof penetration flashings should be non-corrosive with galvanized sub-flashings used that are incorporated into the tile underlayment system.
  - c. Where the internal gutters are eliminated, new external gutters and downspouts should be installed as well as the necessary plumbing work that will be necessary to connect the external downspouts to the storm drainage system.
- **3. Low-sloped Roofs**
  - a. The existing low-sloped roof system consists of the plywood substrate, a granule-surfaced torch-applied modified bitumen roofing membrane. The original roof was recovered with what appeared to be a conventional mineral-surfaced cap sheet built-up roof. This last roof was then covered with an acrylic coating system with a polyester fabric reinforcing. Test cuts have revealed that in some limited locations, water is present under the acrylic coating system.
  - b. The openings for the roof and overflow drains were found to be undersized, most likely due to the accumulation of two (2) roofing systems and the acrylic coating. During the redesign, a further investigation will need to be undertaken to investigate the roof system drainage and to assure positive drainage.
  - c. Where possible, the low-sloped roofing system should utilize internal all cast-iron drains and overflows with cast-iron clamping rings and strainer baskets. Consideration should also be given to providing at least partial, external roof access ladders for roof maintenance. Numerous locations were found where evidence exists that would seem to indicate that the concrete tiles were removed and replaced most likely from breakage due to roof traffic over the concrete tile roofs at the lower elevations. Given the abundance of trees surrounding some of the buildings, semi-annual roof inspections should be made to keep the roof drains clear of leaves and debris.

## University of California - Santa Barbara West Campus Point Faculty Housing

### University of California - Santa Barbara West Campus Point Faculty Housing Reconstruction Guidelines and Considerations to Correct Exterior Building Envelope Weatherproofing Defects and Recommended Upgrades

- d. One reroofing option would be to install a phased, multi-ply SBS modified bitumen roofing system that utilizes a granule-surfaced cap sheet. The SBS modified bitumen roofing membrane layers can be adhered in hot asphalt or a cold adhesive. One advantage with this type of system is that it would be best to tear off the old roofing after the second floor level stucco is removed. This would be followed by the installation of a nailed fiberglass base sheet and the adhesive and intermediate layer of the SBS roofing system. This would allow the buildings to be "dried-in" without the final surfacing sheet, which would be installed once all roof damages are repaired and rooftop activity is completed. Roof protection pads will also need to be provided in the areas of primary roof egress. It would also be recommended that two- (2) piece counterflashings be installed at the roof-to-stucco wall transitions.
- **D. Exterior Deck**
  - 1. Private Second Floor Exterior Decks (over garages)
    - a. The most common areas of leaks at the private, second floor decks were at the interior corner just below the interface of the demising wall (between the two decks to the two- (2) story wall section) and the perpendicular stucco wall. This is the area directly below the V-shaped portion of the parapet wall that is bisected by the vertical stucco wall control joint. In a number of units inspected, water stains and interior drywall damage were found in the ceiling as well as a significant portion of the wall just below the demising wall. Water leaks were also common below the deck scupper, door threshold (from the Master Bathroom) and the wood trellis supports as well as locations where the wood trellises were fastened through the stucco walls.
    - b. The existing deck plywood and fasteners will need to be investigated to verify that the sheathing is either T & G or all joints cross blocked, a minimum of 3/4 inches in thickness and in good condition. Additionally, all sheathing nails must be ring shank, annular shank or screws.
    - c. Diato or combination, one-piece deck-to-wall flashings should not be used. The deck-to-wall flashings should be 24-gauge, bonderized L-metal with a four- (4) inch horizontal flange and eight- (8) inch vertical leg. All joints are to be fully lapped and fully sealed with urethane sealant. The horizontal leg of the flashings should be fully bedded in urethane sealant and fastened at three (3) inches o.c. using 3/8-inch diameter stainless steel ring shank nails placed in a staggered pattern. The door threshold requires a full pan flashing with a continuous flange that is lapped onto the deck-to-wall flashings. The threshold flashing is also to be fabricated with a back dam that fully extends into the interior as well as end dams. All joints and seams are to be hot lead soldered and riveted. The horizontal and vertical legs of the deck flashings as well as the inside faces and flanges of the threshold flashing are also to be fully waterproofed prior to being covered with the stucco wall weep screed and prior to the door being set into the threshold pan flashing.
    - d. A high quality, ICBO/ICC ES approved acrylic deck coating system applied over the material manufacturer's expanded metal lath reinforced, polymer-modified cementitious underlayment could be considered as well as other deck waterproofing systems that provide a UL Class A fire-resistance rating over a plywood substrate.