

WOOD Inspection Services, Inc.

EIFS Moisture Intrusion Inspection Report

October 6th 2004

Prepared for:

XXXXXX XXXXXX

Location:

XXXX XXX XXXXXX, Allen, TX

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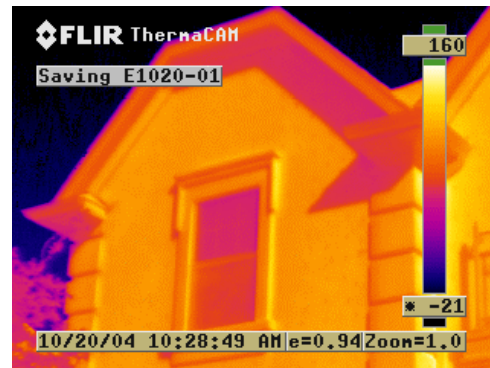
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1. Executive Summary:

Overall, the cladding on the house is in excellent physical condition. We observed some previous repairs of which the homeowner confirmed. Using color infrared imaging equipment we scanned the front of the home and chimney, which is the only area of the home with EFIS. We observed no indications of thermal difference during the scan.

As a result of the thermal scan, it is my opinion that there is not currently any trapped moisture in the EFIS siding. Thermal infrared imaging, would have, if present indicated a thermal difference in parts of the EFIS system. However as part of an ongoing EFIS maintenance program we recommend the seals be inspected on a yearly basis, upgraded and repaired as necessary. This should be done annually as a part of the general maintenance of the building.

Note that superior performance can often be achieved if the entire system is stripped off and replaced. Removal and replacement of the system is likely to provide the best performance over time, and may be a more cost-effective approach than a comprehensive upgrade to the existing system. Consult with a stucco applicator for cost estimates and details.



2. EIFS Installation Details At-A-Glance:

No.	Description	Present?		Correct?	
		Yes	No	Yes	No
1	Window Head Flashings	X		X	
2	Window Sill Flashings	X		X	
3	Window Joint Detail (backwrap, backer rod, caulk)	X		X	
4	Door Head Flashings	X		X	
5	Door joint detail (backwrap, backer rod, caulk)	X		X	
6	Roof/Wall Intersections: step flashings	X		X	
7	Roof/Wall Intersections: EIFS 1"-2" above roof surface	X		X	
8	Roof/Wall Intersections: Kickout flashings	X		X	
9	Gutter Ends Spaced away from EIFS	X		X	
10	Joints at Dissimilar Materials (backwrap, backer rod, caulk)	X		X	
11	EIFS Terminates Above Grade	X		X	
12	Deck & Other Ledger Flashings	N/A			
13	Control Joint at Floor Bands		X		X
14	Seals Around Utility Penetrations	N/A			
15	Fixture Attachment (sealed, not nailed/screwed directly)		X		X
16	Beveled Tops on Architectural Accents		X		X
17	Is Mesh Covered by Base Coat (should not be visible)		X		X
18	Mechanical Damage		X	X	
19	Visible Cracks		X	X	
20	Telegraphing Joints		X	X	
21	Loose / Bulging Material		X	X	
22	Trapped Moisture and Damage Detected		X	X	

1. These are comparisons against typical manufacturer's installation requirements. See full discussion inside for complete details.

2. Improper installation details and/or damage to the system can result in leakage. Any significantly elevated moisture readings are listed later in the report.

3. Background and Scope:

EIFS (Exterior Insulated Finish Systems) are face-sealed or barrier type claddings for buildings. Because they rely on a perfect seal at the exterior surfaces, they are susceptible to entrapment of moisture inside the system. Water can enter the system where seams and seals fail, where moisture migrates from inside the building and where punched openings (windows, doors, etc.) are present. Because of the low vapor permeability of the finish, water trapped behind the EIFS cannot dry out quickly toward the outside of the wall. Depending on the rest of the wall system design and installation, there may also be limited drying potential to the inside. Limited drying potential in combination with high leakage potential can lead to moisture buildup inside the wall, and eventually to mold growth and structural decay.

The primary goal of this inspection is to determine the overall condition of the cladding and the sheathing and framing inside. Additional goals of this inspection are to locate specific areas where the installation details may make the system prone to leakage, and to further investigate the actual moisture content of the wall system behind the EIFS.

Additional destructive investigations may be required to determine the actual amount of structural damage caused by high moisture levels detected during this inspection. This inspection cannot identify as defective any areas which are dry at the time of the inspection, nor where hidden damage may be present which has no visual clues. Please note that long periods of dry weather can allow trapped moisture to dry out, and that this is difficult to determine during the inspection.

Note:

The face seal approach attempts to eliminate all the openings in the wall through which water can pass. However, the materials used to seal all these openings are exposed to extremes of weather and to movements of the building. Even if the problems of job site inaccuracies and poor workmanship can be overcome and a perfect seal can be achieved, the in-service weather conditions may eventually cause the deterioration and failure of these seals, creating openings in the wall through which water can pass. Unfortunately, these openings can be extremely tiny and difficult to identify, so that even an extensive maintenance program may not keep the building free of openings. -From Sto Corp's patent #5,410,852 for its Rainscreen EIFS, dated May 2, 1995

Admittedly, one of the inherent flaws in EIFS wall systems is their lack of redundancy in being able to tolerate moisture penetration in the field of a system or at sealant joints and "weep" it to the exterior without damage to the system or substrate. Tom Remmele [Sto Technical Director] on October 17, 1991

4. Property Description:

The home is a wood framed, two story, single-family structure with a slab on grade foundation system. EIFS is installed on the front area of the home, with brick veneer on the remaining walls. The house is approximately 3 years old.

The weather conditions were as follows: Temperature, 75 degrees. Cloudy and warm. The surface of the EIFS was dry. The weather has been dry for several days prior to this inspection.

Grading and drainage are generally good around the property, except in the front in which there are some areas where the soil level is high in relationship top to the foundation.

5. Visual Inspection:

5.1. Observations

The exterior of the home was carefully inspected for general condition, deviations from manufacturer's installation requirements, and damage that may have occurred subsequent to the installation of the EIFS. We also viewed the interior walls for moisture.

The house exhibited few deviations from manufacturer's installation requirements. Some common areas of deviation include improper seam detailing at joints between dissimilar materials; lack of control joints at the floor levels; EIFS installed at grade. In the local climate, these minor installation defects occasionally cause moisture penetration of the EIFS and subsequent damage inside the walls.

The common components and installation details for EIFS are shown in Section 9. These details have been required for many years, and are critical for proper performance of the system.

5.2. 1-5. Window and Door Joints:

The first group of observations relate to the joints around windows and doors. These joints should be constructed by backwrapping the mesh and basecoat around the end of the EPS, and leaving a gap between the EIFS and the window or door. This gap is then filled with a foam backer rod and sealant. While verification of backwrapping is impossible during this primarily visual inspection, it appears that this detail is properly installed on the house. The stucco and caulk are cracked around some of the frames. Cracks can be points of water entry. We cannot determine what types of window flashings are installed behind the stucco, if any.



5.3. 6-9. Roof & Gutter Details:

Where roof and gutters intersect with EIFS on a sidewall application, the EIFS should be held 1"-2" above the roof surface and backwrapped as at all other terminations. Step flashings should be used to prevent moisture entry into the wall. Finally, at the bottom edge of the roof (eaves), a "kickout" flashing should be installed to assure that water running down the seam exits the wall rather than running behind the EIFS.

In this application, it appears that the details are properly installed although we cannot verify backwrapping.



5.4. 10. Dissimilar Materials:

Expansion type joints are required where EIFS meets dissimilar materials, or where the substrate materials change (i.e. where the wood framing sits on the masonry foundation wall). On this house, there is no expansion joint detail at the foundation level or at transitions between the brick veneer and the EIFS, and between wood trim and the EIFS.



5.5. 11. Lower Edge Termination & Grading:

The EIFS is installed so that it is close to grade in several locations around the house. When the EIFS is installed at or below grade, it can wick water up from the ground behind the foam insulation, resulting in high moisture levels in the wood framing at the base of the walls. The moisture encourages infestation by termites and carpenter ants that use the EIFS as a shelter to gain access to the wood framing inside. The moisture also saturates the stucco layers and can cause damage to the stucco as well.



5.6. 12. Deck Ledgers:

The house has no attached decks.

5.7. 13. Control Joints:

Expansion joints at each floor level are a requirement for most manufacturers and the EIMA. Without the expansion joints, as the house shrinks and settles, it could detach and crack the EIFS over time, leading to moisture intrusion. These control joints should be installed at the first floor/foundation line, and at the attic level. These control joints are less important when the EIFS is installed during a rehab of an existing house. We observed no significant cracking or detachment caused by the lack of control joints.



5.8. 14-15. Utilities & Fixtures:

All other penetrations of the EIFS should be sealed with caulk. Such as utility penetrations, gutter downspouts, hose bibs, lighting fixtures, etc. The black iron railing and light fixture are not sealed.



5.9. 16. Architectural Accents:

The architectural accents should have required beveled tops, which allow moisture to run off rather than stand on the EIFS facing.



5.10. 17-21. Damage and Loose Material:

There has been minor mechanical damage to the system from impact with small objects in several locations around the house.

5.11. 22. Trapped Moisture and Damage Detected

No indications of trapped moisture were found at the time of inspection.

5.12. Other:

6. Moisture Testing Results:

The weather recently has been average to wet for the area in terms of rainfall. Depending on exposure and wind conditions, not all areas that experience leakage will do so in all weather. Areas inside the walls where we locate high moisture levels or damage, or both, are listed in our report. Scanning and probing for moisture cannot identify all areas that have been wet in the past, or all areas where damage exists that may be dry at this time.

We initially search for high levels of moisture using infrared color imaging equipment and remote moisture scanner if necessary. Where excessive levels of moisture are indicated, the cladding is punctured and the sheathing behind the cladding is probed to directly measure the moisture levels. Any readings that indicated moisture levels in excess of 20%, or where damage was noted are listed below.

With the recent weather conditions and the drying potentials available in general in this house, acclimated moisture levels in areas not exposed to leakage are in the 6%-8% range. Any moisture readings above 10% indicate that the areas have experienced at least some leakage and moisture accumulation.

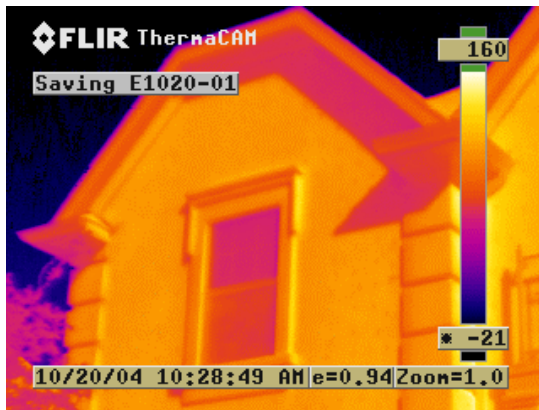
When moisture levels exceed 20%, mold begins to grow and the wood starts to decay. Above 30%, mold growth and decay occur rapidly. We found no moisture levels ranging from 20% to over 30% on the house.

No moisture problems were found during the inspection.

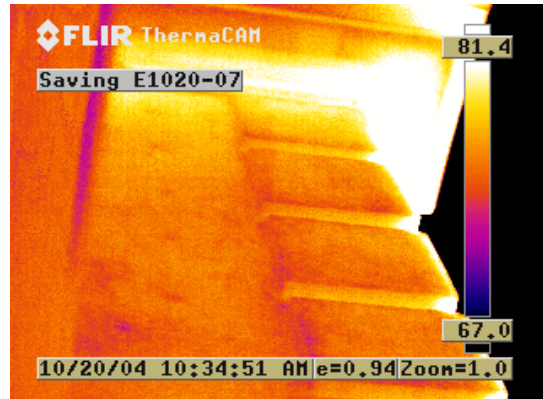
7. Recommendations:

- Where the EIFS has been physically damaged, it should be repaired in accordance with the manufacturer's instructions. These repairs should be made where there is any mechanical damage to the system.
- For this house simple caulking and sealing should provide adequate long-term protection to the house. Continuing maintenance of the system and the seals should provide adequate performance at a reasonable cost.
- Understand that this recommendation is based on our experience and a balance of risk against repair and remediation costs and the approximate 15-year remaining life of the stucco. The very best performance would require removal of the system and replacement with a drainable system or a different cladding system altogether.
- As with the selection of any building product or repair approach, you must decide for yourself where your comfort level of risk versus cost lies.

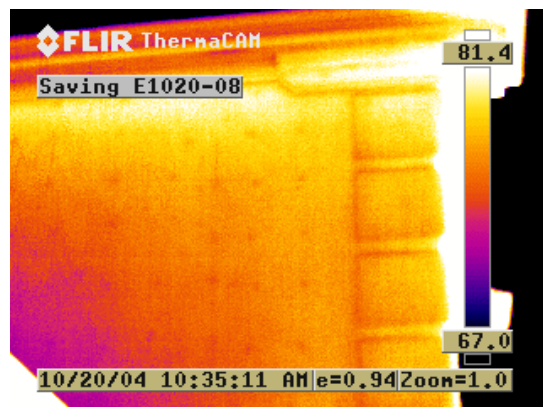
8. Infrared Photo's:



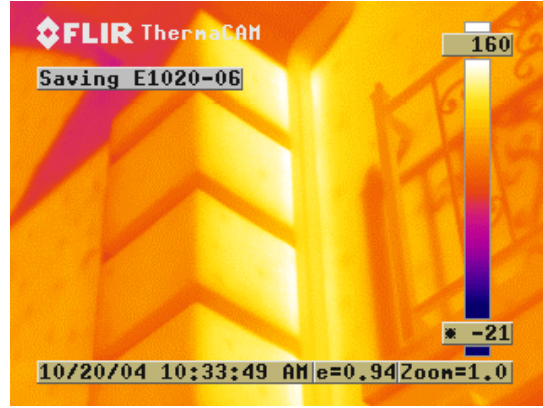
Front view of the upper areas of the home. Note no thermal difference.



Font view of the window and architectural front entry. No thermal difference.



Font view of the upper architectural front entry. No thermal difference.



Front view of the window and architectural front entry. No thermal difference.

9. EFIS Application Drawings:

Sectional View Of A Typical EIFS Application

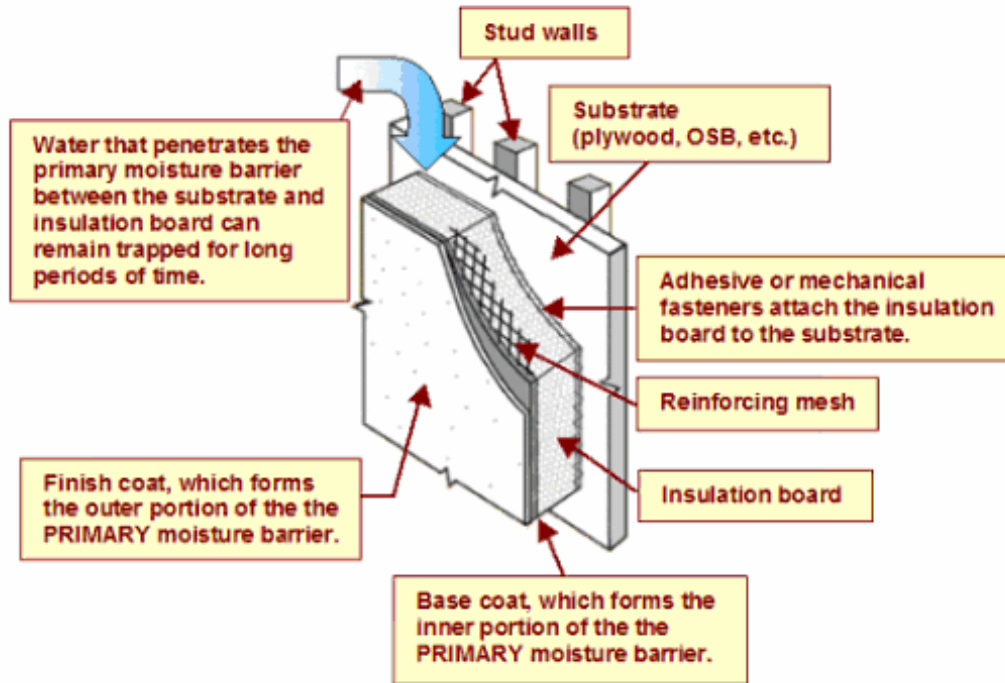
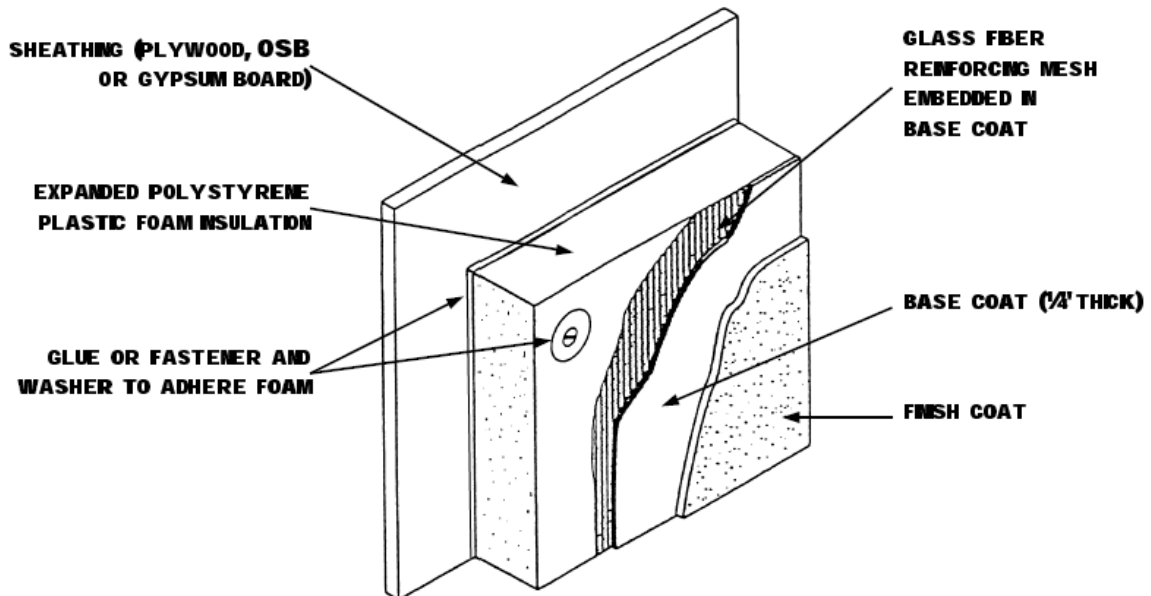
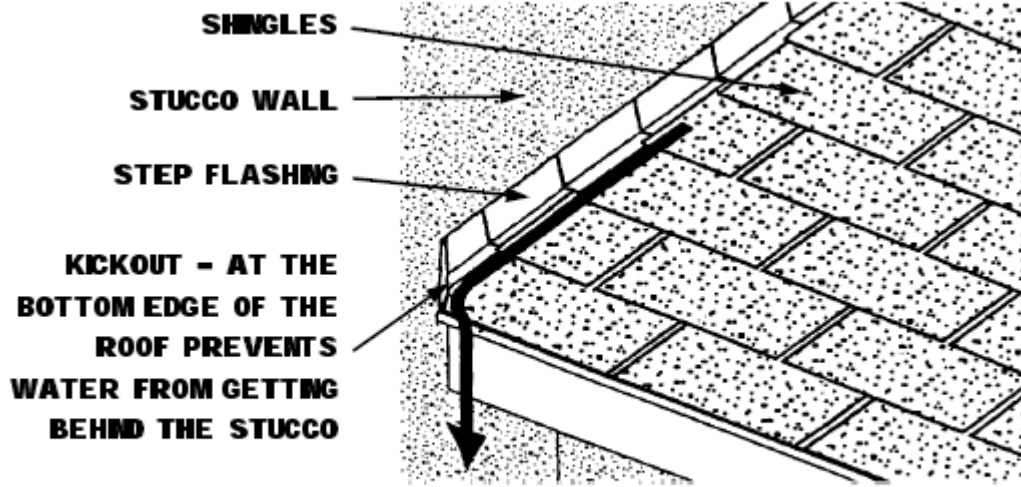


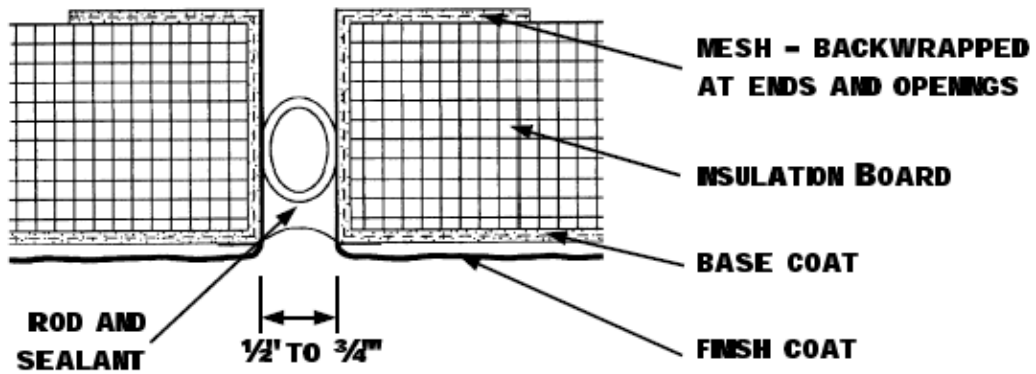
Figure 1





Kickout (flashing) Detail.

Components of an EIFS wall system.



10. Testing Protocol:

10.1. EIMA Guidelines for the Inspection of EIFS-Clad Houses

The primary objective of inspecting the exterior of any existing house is to determine whether or not it is functioning properly. Simply comparing the home's existing details to current published guidelines fails to accomplish this objective. An inspection should identify repairs that are necessary, effective and economical. Strict conformance to a manufacturer's published details does not answer the question: "Is a repair necessary, and will it be effective?"

Inspection reports that identify existing details and conditions as "defective" because they deviate from current published manufacturers' guidelines can mislead the homeowner, real estate agent, or other parties into initiating unnecessary remedial work. This is especially true if there is positive evidence that the existing details are functioning properly.

The following guidelines may be helpful in determining if there is a need for remedial work on single-family, EIFS-clad houses.

10.2. Overall Description: *EIMA-Published Details.*

The information in this document is intended to serve only as a guide for inspecting and determining what remedial work may be necessary if EIFS are not installed in accordance with EIMA's published application instructions, guideline specifications and typical details. EIMA assumes no responsibility for architecture, engineering, or design, or its members' products, or for the success of jobs on which EIFS products are used, or any remedial work. For this document's purpose, it is assumed that a qualified builder built the house, and qualified personnel according to local building code requirements perform all remedial work. For new construction, as opposed to EIFS remediation work, EIFS manufacturers' recommendations, details and specifications should always be followed.

Function: For general information and guidance only.

Guidelines: For new construction, EIMA details provide a helpful guide in designing the critical interfaces between various exterior building components. Alternate detailing is acceptable, as long as it provides the desired performance characteristics.

Item Description: Horizontal Joint at Floor Lines

Function: Address cross-grain shrinkage in dimensional lumber that could result in wrinkling or cracking of coatings, or bulging of the system.

Guidelines: This type of shrinkage occurs when lumber experiences its initial loss of moisture. This happens only once in the life of a house, typically in the first two years.

For houses two or more years old, a joint or other remedial work is unnecessary if there is no evidence of bulging, wrinkling or cracking at the floor line.

(The American Institute of Timber Construction can provide information on wood properties.)

Item Description: Sealant Joints around Openings and Penetrations

Function: Prevent water entry where EIFS meet other materials. Sealant is installed to provide a weatherseal and to accommodate movement between materials.

Guidelines: Sealant must be utilized at all terminations, including where EIFS terminate or meet other materials. Filet beads with bond breaker (such as triangular backer rod, or bond breaker tape) are appropriate for weatherseal joints around windows, doors and other minor penetrations in single-family houses.

Item Description: Projecting Surfaces

Function: Provides architectural features (i.e. trim around windows and doors, quoins, and other decorative features).

Guidelines: Location and climate will influence the performance of a projecting surface. Residential trim protruding horizontally is acceptable if no damage has occurred to the EIFS surface.

Item Description: Termination above Roof or Deck

Function: A gap allows for appropriate system edge termination, ease of roof or deck replacement or repair. It also allows for the system and flashing to be inspected for proper installation.

Guidelines: On an existing project, the termination can occur closer to the roof or deck surfaces than indicated in published details, as long as the bottom edge of the EIF system satisfies the manufacturer's specifications.

Item Description: Termination Above Finished Grade

Function: A gap should be maintained between EIFS and the finished grade. The gap must be wide enough to allow access for visual inspection and treatment of the foundation for pest control.

Guidelines: Where access to the foundation is not required for visual inspection or treatment for pest control, the EIFS can remain in place.

Item Description: Kickout/Diverter at Roof/ Wall Intersection

Function: Accumulating water runoff should be directed out and away from the structure. Roof-to-wall flashing requires a kickout/ diverter at its termination to insure that water is directed to the outside.

Guidelines: The diverter can vary in its dimensions to accommodate local exposure conditions and specific detailing requirements, as long as it directs water completely away from wall surfaces.

11. EIFS Maintenance Advice:

11.1. *Maintenance for EIFS:*

- Ensure that window/door framing have been caulked to abutting cladding
- Ensure that there is no separation of window/door frames at the corners
- Ensure that expansion joints are flexible and watertight (should be ½” to ¾” wide)
- Ensure penetrations, attachments and terminations have proper sealant joints and flashing
- Ensure that all flashings are functional for proper drainage away from and off the roof gutters and downspouts should be properly sloped and cleaned regularly
- Ensure that the foam does not terminate below grade (it should be 6-8 inches above grade)
- Ensure that window/door weeps are functional and clean
- Ensure that exposed wood edges have been painted