March 6, 2007

EIFS Investigation

Property Address
123 Main Street
Anytown, USA

Report Ordered By:
Sam Sample
TABLE OF CONTENTS

1. Introduction
   1.1 Purpose of this inspection
   1.2 Scope of this inspection
   1.3 Limitations of Liability
   1.4 Further Testing
   1.5 Repair Follow-up and Annual Inspections

2. Your Moisture Inspection
   -North, South, East and West Elevation Grid-Style Photos with potential problem areas marked
   -Summary

3. Typical Moisture Problems in Stucco Homes & Remedial Methods
   3.1 Moisture Problems Related to Unsealed Stucco Penetrations
   3.2 Moisture Problems Related to Doors & Windows
   3.3 Moisture Problems Related to Improper Stucco Termination at Grade
   3.4 Moisture Problems Related to Improper Kickout and Other Roof Flashings
   3.5 Moisture Problems Related to Improper Deck, Balcony & Patio Terminations
   3.6 Moisture Problems Related to Cracks and Breaches in the Stucco
   3.7 Moisture Problems Related to Stucco Accents and Flat Stucco Surfaces
   3.8 Moisture Problems Related to Chimneys
   3.9 Moisture Problems Related to Gutters and Downspouts
   3.10 Moisture Problems Related to Improper Transitions (Brick to Stucco, etc.)

4. Stucco Information, Care and Maintenance
   4.1 Types of Stucco
      - Exterior Insulation Finish Systems (EIFS)
      - Traditional Hard Coat Stucco Systems
      - Water Management or Drainable EIFS Systems
   4.2 Is Stucco a Good Cladding System?
   4.3 Care and Maintenance

5. Information About Our Company

Dunsing Inspections
Jamie Dunsing
847-456-8432
1. INTRODUCTION

1.1 PURPOSE: Enclosed is your Stucco Moisture Inspection. The purpose of this moisture inspection is to help assess the condition of the stucco system by looking for visible installation flaws, inadequate water diversion and sealant failures and conduct random moisture readings using electronic moisture scan devices. Please note that the provision of a scope of work for remedial repairs is not the purpose of this inspection. Further investigation may be needed to determine the extent of water damage, if any, and how best to modify your home to address any moisture problems that may be indicated by this inspection.

1.2 SCOPE OF INSPECTION: This is a basic, stucco inspection limited to the following:

- A visual examination of the condition of the stucco, exterior sealants, flashing, windows, doors, roof-to-stucco transitions, parapets, gutters, deck-to-building connections, stucco terminations and any penetrations through the stucco.
- Conducting of random electronic moisture scanning of the building envelope.
- Preparing a report of our observations of potential problem areas and recording any high readings found.
- Providing detailed information on typical moisture-related problems in stucco homes to assist you in maintaining the value of your home.

1.3 LIMITATIONS OF LIABILITY: Because this is a limited inspection, we can make no guarantee, express or implied, that our observations and random moisture readings offer conclusive evidence that no installation or moisture problems exist, or that problems found are all-inclusive. This inspection company, its employees and any divisions shall not be liable for non-visual defects, unseen defects, unspecified defects or hidden damage and conditions existing on the subject property and hereby disclaims any liability or responsibility thereof. All parties concerned agree to hold harmless and indemnify this inspection company involving any liabilities that may result.

1.4 FURTHER TESTING / INVESTIGATION: Our policy is to rely on moisture meter readings as an indicator of relative moisture values between different test spots, not as an absolute value of water content in the substrate. It is difficult to determine if the structural wood of your home has been damaged in areas of high readings without 'probing' and/or removing a core sample of the stucco to allow for visual inspection. Should we feel that further investigation is needed this will be indicated in the summary section of the report.

1.5 REPAIR FOLLOW-UP AND ANNUAL INSPECTIONS: A repair follow-up inspection should be conducted within three months after completion of the repairs to assess the effectiveness of the moisture modifications. This is extremely important. Annual inspections should also be scheduled to ensure that your stucco system remains dry. This way any sealant failures, stucco cracks, etc. can be caught and repaired promptly. Testing and maintaining your home on a regular basis is the best way to prevent costly repairs associated with moisture damage. Also, should you decide to sell your home, annual inspections and maintenance documentation will be a valuable selling tool, providing evidence to show that your home has been inspected and maintained on a regular basis by a reputable and qualified firm.
### Project Information

<table>
<thead>
<tr>
<th>OWNER INFORMATION</th>
<th>BUYER INFORMATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Owners</td>
<td>Unknown Relocation Company</td>
</tr>
<tr>
<td>Property Address</td>
<td>123 Main Street</td>
</tr>
<tr>
<td>City, State, ZIP</td>
<td>123 Main Street</td>
</tr>
<tr>
<td>Buyers Address</td>
<td>No address</td>
</tr>
<tr>
<td>City, State, ZIP</td>
<td>Libertyville, IL</td>
</tr>
<tr>
<td>Buyers Real Estate</td>
<td>Buyer's Agent</td>
</tr>
<tr>
<td>Company</td>
<td>Buyers Realty</td>
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</table>

### PROPERTY INFORMATION

<table>
<thead>
<tr>
<th>Type of Exterior</th>
<th>EIFS and Brick</th>
</tr>
</thead>
<tbody>
<tr>
<td>Substrate (if known)</td>
<td>Unknown</td>
</tr>
<tr>
<td>Age of Property</td>
<td>5-6 years</td>
</tr>
<tr>
<td>Square Footage</td>
<td>&gt;1,000 of EIFS</td>
</tr>
<tr>
<td>Stories</td>
<td>3 storeys at rear (including</td>
</tr>
<tr>
<td>Type of Windows</td>
<td>Aluminium Clad Casement</td>
</tr>
</tbody>
</table>

### INSPECTION INFORMATION

<table>
<thead>
<tr>
<th>Date of Inspection</th>
<th>March 6, 2007</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inspector</td>
<td>Jamie Dunsing EDI #IL-12</td>
</tr>
<tr>
<td>Present at Inspection</td>
<td>James Dunsing</td>
</tr>
<tr>
<td>Temperature / Humidity</td>
<td>30F, 40% RH</td>
</tr>
<tr>
<td>Weather Conditions</td>
<td>Clouds, cold</td>
</tr>
<tr>
<td>Last Rain</td>
<td>1 week</td>
</tr>
</tbody>
</table>

### Inspection Test Equipment

<table>
<thead>
<tr>
<th>Test Equipment Description</th>
<th>Test Range</th>
<th>Setting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tramex Exterior Wet Wall Detector</td>
<td>10-20</td>
<td>51-100</td>
</tr>
<tr>
<td>Tramex Professional Moisture</td>
<td>10-15</td>
<td>26-99</td>
</tr>
</tbody>
</table>

**Important Note:**

The test equipment is used to help locate problem areas. It must be understood that the test equipment is not an exact science but rather tools used as indicators of possible problems. At times, because of hidden construction within the wall cavity, the meters get false readings or no readings at all. Some meters will pick up on metals, wiring, unique wall finishes, etc. Positive readings do not always mean there is a problem, nor do negative readings necessarily mean there is not a problem. We do not use the equipment to obtain exact moisture content, but rather to obtain relative readings between suspected problem areas and non problem areas. This information is then used to help determine potential problem areas which may warrant more investigation.
<table>
<thead>
<tr>
<th>Item Description</th>
<th>Yes</th>
<th>No</th>
<th>Improper</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sealants at window perimeters</td>
<td>☐</td>
<td>☐</td>
<td>☑</td>
<td>Existing sealants have failed and need replacing</td>
</tr>
<tr>
<td>Mitre joints (bottom corners) of windows</td>
<td>☐</td>
<td>☐</td>
<td>☑</td>
<td>Some window mitres have opened up large gaps. Repair and sealing is needed.</td>
</tr>
<tr>
<td>Alarm sensor penetrations at windows</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>NA</td>
</tr>
<tr>
<td>Fixed window units and mullion joints</td>
<td>☐</td>
<td>☐</td>
<td>☑</td>
<td>Suggest to wet-glaze fixed units and mullion joints</td>
</tr>
<tr>
<td>Head flashing at top of windows</td>
<td>☐</td>
<td>☐</td>
<td>☑</td>
<td>Some windows have head flashing, some do not</td>
</tr>
<tr>
<td>Sealants around door perimeter</td>
<td>☐</td>
<td>☐</td>
<td>☑</td>
<td>Inadequate, failed, or missing sealants--suggest resealing</td>
</tr>
<tr>
<td>Sealants at door threshold details</td>
<td>☐</td>
<td>☐</td>
<td>☑</td>
<td>Suggest scaling thresholds to casing where not present</td>
</tr>
<tr>
<td>Penetrations thru door threshold / tracks</td>
<td>☐</td>
<td>☐</td>
<td>☑</td>
<td>Seal all penetrations through threshold/tracks ex: screws</td>
</tr>
<tr>
<td>Head flashing at top of doors</td>
<td>☐</td>
<td>☑</td>
<td>☐</td>
<td>Head flashing not installed</td>
</tr>
<tr>
<td>Penetrations through stucco sealed</td>
<td>☐</td>
<td>☐</td>
<td>☑</td>
<td>All penetrations through EIFS should be properly sealed</td>
</tr>
<tr>
<td>General appearance</td>
<td>☑</td>
<td>☐</td>
<td>☐</td>
<td>Good general appearance</td>
</tr>
<tr>
<td>Cracking evident</td>
<td>☑</td>
<td>☐</td>
<td>☐</td>
<td>Some cracking evident</td>
</tr>
<tr>
<td>Expansion joints / Control joints</td>
<td>☑</td>
<td>☐</td>
<td>☐</td>
<td></td>
</tr>
<tr>
<td>Exposed mesh</td>
<td>☐</td>
<td>☐</td>
<td>☑</td>
<td></td>
</tr>
<tr>
<td>Impact damage</td>
<td>☑</td>
<td>☐</td>
<td>☐</td>
<td>Few areas of small impact damage noted</td>
</tr>
<tr>
<td>Rusting aggregates</td>
<td>☑</td>
<td>☐</td>
<td>☐</td>
<td></td>
</tr>
<tr>
<td>Flat horizontal surfaces</td>
<td>☑</td>
<td>☐</td>
<td>☐</td>
<td></td>
</tr>
<tr>
<td>Delamination / Fasteners</td>
<td>☑</td>
<td>☐</td>
<td>☐</td>
<td></td>
</tr>
<tr>
<td>Termination and accessories</td>
<td>☑</td>
<td>☐</td>
<td>☐</td>
<td></td>
</tr>
<tr>
<td>Transition joints (stucco to brick, etc.)</td>
<td>☐</td>
<td>☐</td>
<td>☑</td>
<td>Transition joints between brick and stucco need re-sealing</td>
</tr>
<tr>
<td>Termination below grade (ground level)</td>
<td>☑</td>
<td>☐</td>
<td>☐</td>
<td></td>
</tr>
<tr>
<td>Termination below or at slab levels</td>
<td>☑</td>
<td>☐</td>
<td>☐</td>
<td></td>
</tr>
<tr>
<td>Deck flashing</td>
<td>☐</td>
<td>☐</td>
<td>☑</td>
<td>Some deck flashing improper</td>
</tr>
<tr>
<td>Flashing at columns</td>
<td>☑</td>
<td>☐</td>
<td>☐</td>
<td>NA</td>
</tr>
<tr>
<td>Kick-out flashing</td>
<td>☑</td>
<td>☐</td>
<td>☐</td>
<td>Improper or inadequate kick-out detail (high readings)</td>
</tr>
<tr>
<td>Roof soffit terminations into stucco</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>NA</td>
</tr>
<tr>
<td>Sprinkler System</td>
<td>✔</td>
<td>☐</td>
<td>☐</td>
<td></td>
</tr>
<tr>
<td>------------------</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td></td>
</tr>
<tr>
<td>Gutters</td>
<td>☐</td>
<td>☐</td>
<td>✔</td>
<td></td>
</tr>
<tr>
<td></td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Downspouts should be sealed where they attach to the house.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Front Bay Window

<table>
<thead>
<tr>
<th>Grid Location</th>
<th>Item Description</th>
<th>Moisture Readings</th>
<th>Detail Photo</th>
<th>Observations</th>
<th>Chapter Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>C6,7</td>
<td>Windows</td>
<td>16,13</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DE6,7</td>
<td>Windows</td>
<td>27,17</td>
<td></td>
<td>High readings below windows - not properly sealed</td>
<td>Cpt 3.2</td>
</tr>
<tr>
<td>F6</td>
<td>Windows</td>
<td>20</td>
<td></td>
<td>High readings below windows - not properly sealed</td>
<td>Cpt 3.2</td>
</tr>
<tr>
<td>H6,7</td>
<td>Windows</td>
<td>10,16</td>
<td></td>
<td></td>
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</table>
# Driveway Area

<table>
<thead>
<tr>
<th>Grid Location</th>
<th>Item Description</th>
<th>Moisture Readings</th>
<th>Detail Photo</th>
<th>Observations</th>
<th>Chapter Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>F5</td>
<td>crack</td>
<td></td>
<td></td>
<td>Crack in EIFS needs repair</td>
<td></td>
</tr>
<tr>
<td>G6</td>
<td>Windows</td>
<td>14,20</td>
<td></td>
<td>High readings below windows - not properly sealed</td>
<td>Cpt 3.2</td>
</tr>
</tbody>
</table>
### Rear

<table>
<thead>
<tr>
<th>Grid Location</th>
<th>Item Description</th>
<th>Moisture Readings</th>
<th>Detail Photo</th>
<th>Observations</th>
<th>Chapter Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>B5</td>
<td>Windows</td>
<td>12</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C5</td>
<td>Windows</td>
<td>19</td>
<td>High readings below windows - not properly sealed</td>
<td>Cpt 3.2</td>
<td></td>
</tr>
<tr>
<td>D5</td>
<td>Windows</td>
<td>22</td>
<td>High readings below windows - not properly sealed</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## Under Deck

<table>
<thead>
<tr>
<th>Grid Location</th>
<th>Item Description</th>
<th>Moisture Readings</th>
<th>Detail Photo</th>
<th>Observations</th>
<th>Chapter Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>C3</td>
<td>Decks</td>
<td>12</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>E3</td>
<td>Decks</td>
<td>13</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>F3</td>
<td>Decks</td>
<td>26.8</td>
<td></td>
<td>Decks not properly flashed - High readings below</td>
<td>Cpt 3.5</td>
</tr>
<tr>
<td>H3</td>
<td>Decks</td>
<td>19</td>
<td></td>
<td>Decks not properly flashed - High readings below</td>
<td></td>
</tr>
</tbody>
</table>

- Missing Flashing at red line
- Moisture reading below deck
- Flashing installed at top of ledger board, but not at bottom.
# Rear deck

<table>
<thead>
<tr>
<th>Grid Location</th>
<th>Item Description</th>
<th>Moisture Readings</th>
<th>Detail Photo</th>
<th>Observations</th>
<th>Chapter Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>B3,B8</td>
<td>Light, outlet</td>
<td></td>
<td></td>
<td>Seal exterior wall penetrations</td>
<td></td>
</tr>
<tr>
<td>DEFG8</td>
<td>Doors</td>
<td></td>
<td></td>
<td>Door threshold should be sealed.</td>
<td></td>
</tr>
</tbody>
</table>

- Seal all wall penetrations
- Seal wall outlets
- Seal door jambs
# Rear Deck

<table>
<thead>
<tr>
<th>Grid Location</th>
<th>Item Description</th>
<th>Moisture Readings</th>
<th>Detail Photo</th>
<th>Observations</th>
<th>Chapter Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>D5</td>
<td>Kickout</td>
<td>14,26</td>
<td></td>
<td>Elevated moisture readings below kickout flashing</td>
<td></td>
</tr>
<tr>
<td>DEF8</td>
<td>Windows</td>
<td>26, 28, 24</td>
<td>yes</td>
<td>High readings below windows - not properly sealed</td>
<td>Cpt 3.2</td>
</tr>
</tbody>
</table>

*Seal wall speaker*
<table>
<thead>
<tr>
<th>Grid Location</th>
<th>Item Description</th>
<th>Moisture Readings</th>
<th>Detail Photo</th>
<th>Observations</th>
<th>Chapter Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>DF3</td>
<td>Windows</td>
<td>22,17</td>
<td></td>
<td>High readings below windows - not properly sealed</td>
<td>Cpt 3.2</td>
</tr>
<tr>
<td>DF5</td>
<td>Windows</td>
<td>23,21</td>
<td></td>
<td>High readings below windows - not properly sealed</td>
<td></td>
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</tbody>
</table>
### Grid Location

<table>
<thead>
<tr>
<th>Grid Location</th>
<th>Item Description</th>
<th>Moisture Readings</th>
<th>Detail Photo</th>
<th>Observations</th>
<th>Chapter Reference</th>
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</thead>
<tbody>
<tr>
<td>DE3</td>
<td>Windows</td>
<td>25,20</td>
<td></td>
<td>High readings below windows - not properly sealed</td>
<td>Cpt 3.2</td>
</tr>
<tr>
<td>DEF8</td>
<td>Windows</td>
<td>21,16,18</td>
<td></td>
<td>High readings below windows - not properly sealed</td>
<td></td>
</tr>
<tr>
<td>CEF5</td>
<td>Windows</td>
<td>23,32,24</td>
<td></td>
<td>High readings below windows - not properly sealed. Soft substrate noted at center moisture reading.</td>
<td></td>
</tr>
<tr>
<td>D5</td>
<td>Windows</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- **Large gap at window mitre. (this window may require replacement)**
- **Note large gap at window mitre**
<table>
<thead>
<tr>
<th>Grid Location</th>
<th>Item Description</th>
<th>Moisture Readings</th>
<th>Detail Photo</th>
<th>Observations</th>
<th>Chapter Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>EF5</td>
<td>Windows</td>
<td>14, 17, 11</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EF3</td>
<td>Windows</td>
<td>0, 10</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>D7</td>
<td>Downspout</td>
<td></td>
<td>Seal all wall penetrations, including downspout fasteners.</td>
<td>Window mitre has opened up. Window may require replacement.</td>
<td></td>
</tr>
</tbody>
</table>
Typical Areas

- Failed sealant at window (typical many places)
- Typical window mitre has been sealed
- Window head *with* flashing
- Window head with flashing
- Failed sealant at expansion/control joint (potential water entry point)
- Failed sealant at brick to EIFS connection
Typical Areas

Failed sealant at window

Sealant is thin and has failed

Failed sealant at window needs repair.
Summary of Findings

The system was inspected both visually as well as with moisture meters. The purpose of the inspection was to find elevated moisture readings as well as improper installation of the EIFS. This is not an all-encompassing assessment of every area of the system. That is, we may identify common defect rather than every instance of every defect.

If areas of "soft" substrate were noted, we recommend removal of the system to determine the extent of the system. In areas where elevated moisture readings were found, but substrate was firm, surface repairs (typically sealing) may be acceptable to prevent further moisture infiltration and damage to occur.

Moisture readings of less than 19% are generally considered to be at ambient levels and are not likely to be of long term concern. Moisture reading between 20% and 30% are elevated readings and an investigation should be conducted to determine the source of moisture penetration and this source be properly sealed. These areas will likely dry out after the moisture penetration has stopped. Moisture readings >30% are considered saturated and will not generally dry out unless opened up and exposed to external drying conditions. The source of moisture penetration into these areas must be determined and corrected and the affected areas opened up to determine the extent of underlying damage. Once the damage areas are repaired, the siding materials can be replaced and properly finished.

Background
You should be aware that barrier EIFS have come under significant scrutiny. Specifically, there is has been a great deal of discussion about whether or not barrier systems can adequately dry out to prevent future damage. There are many people in the industry that feel that since the system does not take into account the possibility of moisture entry, that barrier EIFS are inherently flawed. They further feel that repairs to an existing barrier system are not worthwhile. In these cases, the recommended method to remediate a moisture problem is to install some sort of a water managed, or drainage system in case moisture enters behind the wall cladding in the future. This may entail wholesale removal of the barrier system below the windows, doors, decks, kickout flashings and other affected areas to provide for installation of a drainage system. As we have found some moisture problems that require attention, this may be the most cautious way to proceed at the areas with elevated moisture readings. This is obviously an expensive solution to the problems on this home. Below is a less expensive solution to the problem.

It is recommended that the areas at which deficiencies were found, be repaired in accordance with the specific details which are included as a part of this report. Please review both the manufacturer’s drawings (if available), as well as the various supplemental information accompanying this report. These drawings show how various areas should be constructed. Some areas may simply require installation of proper sealant (including backer rod or bond breaker), while other areas (particularly those noted with moisture readings over 30%, or where soft insulation board and/or soft substrate was noted) will probably require removal of the wall cladding. You can expect repair costs to vary widely.
The following items were found to be a problem. These problems were found at at least one area. They may be present at other areas.

**Specific areas of concern:**

- The bottom of the wall is not finished properly. Barrier systems require that the bottom portion of the EIFS be sealed where it meets the foundation. In addition, exposed reinforcing mesh should be properly embedded in base coat and covered by a finish coat of EIFS.
- Cracks in the system should be repaired. These are an indicator of possible problems related to insulation board layout and/or poor reinforcing mesh layout. See the detail drawings attached to this report for an example of how the system should have been installed and could be repaired.
- The deck flashing at the exterior walls is not adequate in several areas the worst being the 3rd floor deck on the north elevation and the 2nd floor door area on the west elevation. These flashings need to be modified or replaced to prevent water intrusion below.
- There is a lack of a proper sealant joint where the EIFS meets other building materials. These areas should be sealed to prevent water entry.
- Sealant has failed at some areas. Both adhesive (failure of the sealant to bond to the material) and cohesive failure (internal failure, or ripping) were noted.
- A flashing is missing above the windows at some, but not all areas. These flashings should have been installed to shed water away from doors or windows. See Section 3.2 for more information.
- There is one small area of impact damage noted. These areas should be properly repaired as per EIFS manufacturer's instructions.
- All existing kick-out flashings where the roof terminates into the stucco should have the 'down-hill' side sealed to the stucco along with any seams in the kickout flashing metal along with sealing all the soffit termination into the stucco as shown in Cpt 3.4. This will help to prevent water intrusion through the underside of the flashing.
- Light fixtures should be sealed to prevent water entry.
- Surprisingly, this home has a barrier EIF system on it. Barrier EIFS is considered "old technology' and has been found in many cases to trap water. This results in wood rot, structural damage, and the possibility of mold. As a result, most newer homes have drainage systems. These systems have a provision for drainage of moisture should it get past the exterior wall cladding. This is a much preferred method of EIFS installation. Since this is a barrier system, it will require a higher level of maintenance and stricter adherence to the installation instructions. See the attached illustrations and details for more information about how the system should be installed and maintained.
- Door and window bottoms are a potential water entry point. There is a special flashing configuration that is required for this area. It would be difficult to add this at this time. Other options include adding "sill vent" material that could provide a method of drainage at the windows.
- There are several factors that generally contribute to higher moisture readings below windows which can include:
  
  1) The perimeter sealants around the windows are missing or existing sealants are inadequate or have failed. This typically is the primary cause of the higher readings.
2) The window units themselves could be leaking whether through the mitre joints (the joint between the vertical and horizontal casing pieces) or through some other element of the windows themselves such as mullion joints between multiple units or through alarm sensor penetrations - further testing may be required. The rear family room window is \textit{MOST DEFINITELY} one of these types of windows. The miter has opened up 3/8” or more and is allowing water entry at this area.

3) The decorative bands around the windows may allow water intrusion through small cracks and flat surfaces on the bottom edge of the bands and cracks below the windows. This can be prevented by simply patching or repairing any cracks and coating the bands with quality elastomeric coating.

\textbf{Repairs}

There are no ‘exact’ \textit{industry level} standards for EIFS repairs as yet. The above suggestions are based on our experience with the systems and emerging repair practices. Dunsing Inspections makes no warranty whatsoever for the suggested repair methods. We recognize that there may be more than one way to effectively correct the reported problems. Repair contractors should specify their proposed methods and any applicable warranty.

\textbf{James Dunsing}

Submitted By James C. Dunsing EDI#- IL12
3.1 Water Intrusion Problems Related to Unsealed Stucco Penetrations

Any penetration through the stucco that is left unsealed will allow entry of moisture. Even an average size home can have an extreme number of penetrations, including:

- electrical boxes
- exterior receptacles
- light fixtures
- plumbing lines and faucets
- cable TV lines
- satellite dish mounts
- security systems
- gutter straps
- shutter brackets
- deck rail penetrations
- gas lines
- dryer vents
- telephone lines
- damaged or punctured areas of stucco

All penetrations must be sealed with a compatible sealant as recommended by the stucco system manufacturer and required by Model Codes. Damaged areas of stucco must be properly repaired to prevent water intrusion.

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3.2 Water Intrusion Problems Related to Doors and Windows

Doors and windows are one of the most common leak areas in stucco buildings. Leaks can occur in these areas for a variety of reasons, including:

**No caulking around perimeter of window or doorframes and thresholds.** Stucco applicators are supposed to leave a 1/2” gap between the stucco and the frame to allow for a proper joint consisting of backer rod and manufacturer’s recommended sealant. If no sealant is installed, a crack will eventually result, due to expansion and contraction, through which moisture or water can enter behind the stucco system. If the stucco installer did not leave the required 1/2” joint, the situation will have to be reviewed to determine the best repair method. Some possible post construction details are shown in the following pages.

**Improper or failed joints.** Some common reasons for joint failure include improper cleaning or joint preparation, lack of backer rod when needed to control joint depth, improper joint width (should be at least 1/2”), use of inappropriate sealant, or failure to tool the joints. Tooling the joint to a concave surface presses the caulk up against the joint sides to help ensure good adhesion and provides a consistent and neat appearance (Figure 3). Even if joints are properly installed, the life of the sealant is 5 to 20 years depending on the type and quality of sealant used. Sealants should be inspected annually and repairs made promptly.

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3.2 Water Intrusion Problems Related to Doors and Windows (cont’d)

Inadequate or missing flashing. Many windows/doors are installed without the head or sill flashing which is required for EIFS installations by many manufacturers and by Model codes for protection of veneered wall openings). If the leakage cannot be corrected with caulking, corrective repairs may be required to properly install flashing. There are also post construction systems on the market that sometimes can be installed without requiring measures such as removal of the EIFS at the perimeter of the window/door or the removal of the units themselves for repairs/replacement.

Improper house wrap application around windows and doors. If house wrap is not properly lapped and wrapped in the correct sequence around window and door penetrations, any water that intrudes through these areas will be funneled behind the house wrap and saturate the wall cavity causing damage.

Obstructed weep holes. Many windows have tracks with weep holes that are designed to catch any incidental water and weep the water to the outside of the window frame. However, situations are sometimes encountered where the stucco applicator has brought the stucco up past the weep holes causing the water to “dam” up and eventually leak into the walls. These weep holes must be kept clear of stucco, caulk, etc. to allow them to fully and freely function.

Punctured window tracks or frames from security system installation. This may also void your window warranty. Sealing these penetrations will many times correct the leakage.

Many window and door units themselves leak through gaps in the door or window frame, sills, tracks and/or at the center mullion where two double hung windows join. This can sometimes be corrected by wet glazing (sealing the frame to glass) or by caulking the gaps in the frames or by making minor modifications to the window. If these measures are not effective, the windows or doors will have to be repaired or replaced with a higher quality window.

Doors: In areas that are prone to strong, gusting winds, in-swing doors seem to be more prone to leakage. Door thresholds should be raised a minimum of two inches and should be sealed to prevent water intrusion. Second floor doors should incorporate "pan flashing" to prevent leakage and potential damage to the areas below. Weather stripping can be used to help ensure water.
3.2 Typical Window Detail (cont’d)

Inset Window or Door Detail

Window or Door Casing

Sheathing

Band creating inset joint detail

‘Correct’ barrier red (use mum. don’t req)

Approved sealants for EIFS / Stucco

Flush Window or Door Detail

Window or Door Casing

Sheathing

Casing and EIFS

Flush creating improper detail

‘Bandaids’ type sealant joint with bond breaker

Approved sealants for EIFS / Stucco

Proper Window and Door Detail

Window or Door Casing

Sheathing

EIFS property installed leaving a proper joint detail

Appropriate barrier red

Approved sealants for EIFS / Stucco

Figures:

Figure 1: Typical inset window detail (sealed)

Figure 2: Typical outset window detail (sealed)

Figure 3: Sealed ‘flush’ window detail (band-aid join)

Figure 4: Window sealed using backer rod at bottom

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3.3 Water Intrusion Problems Related to Stucco Termination at Grade Level

According to the Model Codes, as well as many state and county codes, all synthetic stucco homes with foam board insulation must be terminated eight inches above the ground. The reasons for this requirement are:

1) To prevent wicking, a process in which standing water is absorbed by the EPS foam board, which leads to mold and mildew behind EIFS. Figure 1 shows an example of a home where the stucco system was not backwrapped and extended below grade. Water wicked up behind the stucco, causing mold, mildew and decay of the underlying sheathing. Wicking can also occur when stucco is terminated at grade level as seen in Figure 4.

2) To eliminate a direct path for termites through the EPS board as well as establish easy access for termite inspectors.

Termite problems associated with stucco systems that extended below grade were recognized in 1996 and various code bodies began to change code requirements. Because of the increased risk of termite infestation, many pest control companies won't issue termite warranties for buildings with below grade stucco terminations including 'hard coat' stucco systems in many cases.

One way this problem can be resolved by cutting the stucco eight inches above grade and adding a PVC accessory trim to “lock” the EPS board in place (Figure 2). The PVC accessory trim is an optional item that looks nice and eliminates the need for backwrapping the EIFS. The trim is then sealed with a high-quality sealant. Finally, a textured coat is applied to the bare foundation wall and colored to match the existing EIFS. The pictures below show a cutback with accessory trim. Once landscaping is in place, the modification is hardly noticeable (Figure 3).

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3.4 Water Intrusion Problems Related to Improper Kickout and Other Roof Flashing

**Kickout Flashing:** Many water intrusion problems in stucco or EIFS homes are the result of improper kickout flashing installation or the lack of kickout flashing. Kickout flashing should be installed where a roof line terminates or intersects with a vertical wall. The word kickout means exactly that; it kicks the water out and away from the stucco system.

If no kickout is installed Figure 1) or if it is improperly installed/sealed (Figure 2), the water can run down the edge of the roof next to the stucco wall and enter behind the stucco at the point where the roof terminates into the stucco. This will allow substantial moisture accumulation that will eventually cause decay as seen in Figure 3.

Properly installed kickout flashing is absolutely essential. An example of a proper installation can be seen in Figure 4.

Installation of a kickout flashing in an existing stucco system involves cutting out the stucco to reveal the step flashing, inserting the kickout flashing under and behind the step flashing. New stucco base, mesh and finish coat is then applied to blend in with the adjacent stucco as closely as possible. Application of bond breaker and sealant is then required as shown in Figure 5. If stucco color cannot be closely matched, it may be necessary to coat the area to a corner if possible.

**Other Roof Flashing:** Since many stucco homes have complex roofing designs, other critical flashing areas may also be improperly detailed. Any roofline that terminates into stucco may pose a problem.

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3.5 Water Intrusion Problems Related to Improper Deck and Balcony Terminations

Wooden Decks:

1) Sealants: Everywhere the deck penetrates the stucco must be sealed. This includes the joists (Figure 1 & 2), joist hanger, railing attachments, etc.

2) Flashing: This includes a lack of flashing, improper installation of flashing, flashing that lacks a drip edge, and unsealed flashing. Proper flashing, as per Model Codes, is critical to prevent water from entering behind the stucco system. A possible flashing method for new construction can be seen on the following page in Figure 5. If there is no flashing present in an existing deck or the flashing is inadequate, a possible post-construction solution can be seen in Figure 6.

Concrete Balconies:

1) Cant joints are required (SBCCI 1403.1.4) where the floorline meets the vertical wall.
2) Railing attachments to the stucco wall must be sealed, as well as the stanchions where they attach to the concrete floor per SBCCI 1403.1.4.
4) If the concrete floor is tiled, a sealant joint is needed at the outer edge of the balcony where the tile meets the stucco (Figure 3).

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3.5 Water Intrusion Problems Related to Improper Deck and Balcony Terminations (Cont’d)

Figure 5: Possible Deck Detail - New

Figure 6: Possible Deck Detail - Post Construction

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3.6 Water Intrusion Problems Related to Cracks and Breaches in the Stucco

It does not take a very big crack to allow water intrusion. In fact, a crack as small as 1/16” of an inch wide can permit water to enter behind the stucco, especially with a stucco system that has no moisture barrier. All cracks 1/16” wide or larger and all damaged areas of stucco should be properly repaired as per manufacturers guidelines. Many times the patched areas will still be slightly noticeable even with a good repair application. Extreme cracking will sometimes require the reapplication of EIFS base, mesh, and finish to prevent more cracking and provide a consistent appearance. Cracking is common in hard coat stucco systems, therefore expansion joints are called for every 144 sf, as well as between floorlines and extending vertically from window and door corners to help control cracking. One reason EIFS is so popular, is that these expansion joints, which many feel are unsightly, are not usually necessary with EIFS. The exception to this is that they are needed between floorlines to compensate for the cross-grain shrinkage of wood. As seen in Figure 1, the lack of an expansion joint between floorlines will result in a compression crack in this area. Again, consult with manufacturer for specific requirements of expansion joints.

The most common areas that experience cracking in EIFS are at the corners of windows or roof terminations as seen in Figures 2 and 3. To prevent cracking in this area, most manufacturer and EIMA details specify that an additional layer of reinforcement mesh be applied diagonally at the corners of all windows, doors and other openings. This is called "butterfly" mesh.

Another common cause for cracking in EIFS is the failure of the stucco applicator to stagger the insulation boards or filling gaps in the EPS boards with basecoat rather that "slivers" of foam as required by manufacturers.
3.7 Water Intrusion Problems Related to Stucco Accents and Flat Stucco Surfaces

Flat stucco surfaces, whether conventional hard coat stucco or EIFS, collect and hold water in its rough texture, softening the finish coat, damaging the system and promoting leaks, mildew and discoloration. A good EIFS design will call for bands, quoins, and other accents to have a slope to prevent water accumulation.

The easiest corrective measure would be to coat all flat surfaces with an elastomeric waterproofing coating tinted to match the existing stucco color as closely as possible. Large flat areas, such as a parapet wall, can be capped with metal and sealed.

The joint area where quoins, bands and accents meet the vertical wall surface should be checked for cracks and separation. Cracks and gaps are most likely to occur in this area if these accents have not been properly backwrapped. Backwrapping is bringing the mesh and basecoat around the back of the EPS foam accent. Cracks and gaps should be sealed with an appropriate sealant.

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3.8 Water Intrusion Problems Related to Stucco Chimneys

No matter whether the exterior cladding is brick, stucco, or vinyl siding, chimneys are a prime area for water intrusion since 1) they intersect with the roof and 2) they’re subjected to extreme expansion and contraction due to the hot and cold temperature fluctuations when the chimney is used during the winter. This extreme expansion and contraction can fatigue the sealant joints around the chimney and cause cracks or gaps to form around the edge of the stucco where the stucco terminates into the chimney structure, allowing water to enter. Therefore, water diversion through the use of flashing and properly sealed chimney caps are very important.

A properly designed chimney cap (coping) will shed water away from the stucco to metal joint (Figure 2) and help prevent leaks in this area. The flue should be properly sealed to the "storm flashing" and the chimney cap (coping) sealed to the stucco.

Figure 1 shows a chimney that was not properly flashed (sidewall and kickout flashing see section 3.4) which resulted in wood rot and termite infestation. Figure 2 shows a chimney coping that was not sealed to the stucco which has now separated and will allow water into the chimney chase.

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3.9 Water Intrusion Problems Related to Gutters and Downspouts on Stucco Buildings

Problems related to gutters are primarily due to:

1) Poor drainage of existing gutters due to improper slope, undersized gutters, or leaf/debris accumulation. Gutters should be maintained free of debris. Leaf guards can also be clogged, causing overflow onto and sometimes into the stucco wall. Downspouts should be checked to ensure that water doesn’t splash onto the wall. All downspout connections to the stucco must be properly sealed.

2) The lack of gutters. Although gutters are not always necessary, there are some instances where the building design is such that gutters are really needed for good water diversion. One example of this would be when the building has no eaves. Another example can be seen in Figure 1. Water from the two small roofs flow onto and down the adjacent wall. In Figure 2, the water runoff splashes onto the opposite wall, which resulted in staining and damages to the stucco and also caused guests to get wet.

Good water diversion is a very important part of waterproofing.

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3.10 Water Intrusion Problems Related to Improper Transitions

Many buildings incorporate two or more exterior finishes in their design, such as stucco and brick, stucco and stone, stucco and tile, stucco and wood, stucco and vinyl or aluminum siding, etc.

Different materials expand and contract at different rates. This expansion and contraction causes a crack or gap to form where the two materials join.

If left unsealed, or if sealed improperly, this area will allow water to enter the wall cavity. Examples of this would include stucco to wood trim, stucco to brick (Figure 1), stucco to stone (see Figure 2), stucco to concrete, etc. All areas such as these should be sealed with quality sealants and appropriate bond breakers.

Fig. 1: Stucco to brick transition needs sealing

Fig. 2: Stucco to stone needs to be sealed

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4. Stucco Information, Care and Maintenance

4.1 TYPES OF STUCCO

A. **Exterior Insulation and Finish Systems**

Sometimes referred to as synthetic stucco, the materials used to form EIFS vary from manufacturer to manufacturer. EIFS is broken down into two classes, Class PB (polymer based) and Class PM (polymer modified). Class PB is the most commonly used of the two, especially on residential. Figure 1 shows the typical makeup of an EIFS system, although this can vary. The EIFS can be adhered directly to the substrate or mechanically fastened.

An adhered EIFS is typically considered a "barrier" type cladding system. These systems do not have any built-in drainage capabilities for incidental moisture. Rather, the design intent was that no moisture should ever get behind the stucco. If water does leak behind the stucco, it can become trapped. The only way out many times is through evaporation—a slow process for an enclosed wall cavity with EPS foam. In a wet climate, it may never have a chance to dry out between rains as long as the leaks continue. Mold, mildew, wallboard damage, rotten sheathing and studs, carpenter ants, and termites can all result depending upon how long it has been leaking. When these systems utilize oriented strand board (OSB) as the substrate for the stucco, which is common in the residential market, the potential for more serious water damage increases. EIFS that are mechanically fastened can have some 'drainage' capability if a properly installed moisture barrier system is present and adequately tied into critical details such as windows, doors, flashings, penetrations, etc. (this is difficult to verify after EIFS installation is complete). However, structures with improperly installed barrier systems tend to experience the same damages of a structure without any barrier system. Some EIFS have been found to leak from construction onward due to improper installation stucco, flashings and sealants and/or leaky windows and doors. Not all EIFS buildings leak, but they do all require that critical details be properly maintained for continued protection from water intrusion. Even small amounts of leakage over time can cause significant damage to the structure, many times hidden until the damage is severe. Each manufacturer publishes details to guide the stucco applicator, sealant contractor, builder and architect. These details may vary slightly from manufacturer to manufacturer. EIMA, the EIFS Industry Manufacturers Association, publishes a detail guide for the entire EIFS industry.

**B. Traditional Hard Coat Systems:**

Although these systems have been in use for many decades, in recent years it has become popular to place these systems over wood sheathing and studs. The systems makeup is generally studs, sheathing, felt paper or other moisture barrier, reinforcing lath, scratch, brown and finish coat. The scratch, brown and finish coat are usually cementitious (many use acrylic finishes), mixed in the field, and applied to a thickness of about one inch.

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Hardcoat systems are also susceptible to moisture damage if not properly applied, caulked and flashed. In this respect, it is no different than EIFS. Again systems with OSB (oriented strand board) sheathing tend to experience more severe damage when leakage occurs. One disadvantage of traditional hard coat stucco is that it is more susceptible to cracking than synthetic stucco due to expansion and contraction. For this reason, ASTM calls for expansion joints every 144 square feet, as well as between floor lines and at the corners of windows.

C. Water Management or Drainable EIF Systems:

Water management systems typically use a drainage plane behind the stucco coupled with perforated starter strips at the bottom of the walls and under windows to allow any incidental moisture to weep to the outside of the wall. Once the moisture drainage system is properly installed the installation of the EIFS is less critical. Problems can still occur however, if the drainage system is not properly installed (difficult to verify after completion of EIFS application).

4.2 IS STUCCO A GOOD CLADDING SYSTEM?   Yes, as long as any construction defects, if any, are properly repaired and the system is well maintained, it should provide good long-term performance. There is no such thing as a permanently maintenance free cladding system. Leak problems occur in all types of cladding systems, including brick and vinyl siding. The only difference is that with stucco, the maintenance is more critical. The sealant joints are your first line of defense against water intrusion, and sometimes it’s the only line of defense. Water intrusion must be prevented at all costs due to its destructive nature.

4.3 CARE AND MAINTENANCE:  The beautiful architectural designs made possible by synthetic stucco systems make these homes very desirable and marketable. It is critical, however, to carefully maintain these systems to prevent water intrusion and deterioration. With the proper care and maintenance, your stucco system should give you many years of beauty and function. It is very important that the five following steps be followed to protect your investment.

(1) Semi-annually (at least annually) inspect all sealant around windows, doors, penetrations through the stucco, stucco transitions (such as stucco to brick, stucco to stone), and stucco terminations (at roof, at grade, at patios or walkways). Arrange for prompt repair of any areas of caulk that is split, cracking, crazing or is losing adhesion. Also, promptly repair any cracks in the stucco.

(2) Any leaks, cracks, areas of discoloration, mold or mildew should be promptly investigated by a certified EIFS inspector. Repairs should be proper and prompt.

(3) Anytime you make a penetration though the stucco such as to mount a satellite dish, add shutters, new wiring, cables, plumbing, security systems, etc., the perimeters must be sealed with a quality sealant approved for EIFS.

(4) Modifications, additions or renovations (including roof replacement) to the structure of any kind should be inspected by a qualified EIFS inspector to ensure waterproofing of critical details is properly performed.

(5) Periodic cleaning of the stucco is necessary to maintain its appearance and prevent permanent staining. Pressure cleaning equipment must be calibrated to the stucco manufacturer's recommended pressure level.

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