

Report Prepared For:
Mary Sharkey

5410 Navarro
Houston, Texas 77056
September 12, 2017

For the Property Located At:

Stucco Inspection Report





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I. 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 the Delmhorst Moisture Meter 2100. 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:

1. A visual examination of the condition of the stucco, exterior sealants, flashing, windows, doors, root-to-stucco transitions, parapets, gutters, deck-to-building connections, stucco terminations and any penetrations through the stucco.
2. Conducting of *random* moisture readings of the building envelope.
3. Preparing a report of our observations of potential problem areas and recording any high readings found.
4. 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



OWNER INFORMATION		CLIENT INFORMATION	
Owners	Mary Sharkey	Client	Same
Property Address	5410 Navarro	Client Address	
City, State, ZIP	Houston, Texas 77056	City, State, ZIP	
Phone	Private	Phone	Private
PROPERTY INFORMATION		INSPECTION INFORMATION	
Type of Exterior	Conventional Stucco	Date of Inspection	September 12, 2017
Substrate (if known)	Wood	Inspector	T. George, TREC #21335
Age of Property	Approximately 7 years	Present at Inspection	Homeowner
Square Footage	3,800	Temperature/Humidity	78 degrees +/- 2 degrees
Stores	2	Weather Conditions	Clear
Type of Windows	Metal Frame	Last Rain	5+ Days

Inspection Test Equipment			
Test Equipment Description	Test Range	Setting	
A Tramec Exterior Wet Wall Detector	Low	High	
B Delmorst Moisture Probe Meter - BD-2100/BD-10	10 - 20	Medium	NOT USED
C	10-14	High	WOOD

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 good 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.



General Observations



Item Description	Yes	No	Improper	Comments
Sealants at window perimeters	X			Sealant installed at window perimeters but failing at some
Mitre joints (bottom corners) of windows	X			Sealant suggested
Alarm sensor penetrations at windows				Not observed
Fixed window units and mullion joints		X		N/A
Head flashing at top of windows	X			Head flashing observed at windows
Sealants around door perimeter	X			Missing or failing sealant conditions observed at door perimeters
Sealants at door threshold details		X		Sealant was missing at door thresholds
Penetrations thru door threshold / tracks	X			Wecps and fasteners
Head flashing at top of doors	X			Head flashing observed at doors
Penetrations through stucco sealed	X	X		Missing or failing sealant conditions were observed at system penetrations
General appearance				Good general appearance
Cracking evident	X		X	Cracks were observed on the right elevation, courtyard area
Expansion joints / Control joints	X			Control joints appeared installed per industry standard although some vertical joints were not continuous through horizontal joints
Exposed mesh	X		X	Observed at a left elevation, second story window trim band
Impact damage	X		X	Observed at a left elevation, second story window trim band
Rusting aggregates/accessories	X		X	Small rust spots observed at the front entry wall corners
Flat horizontal surfaces	X		X	Observed at the right elevation balcony wall
Delamination / Fasteners	X			Delamination of finish was observed at a left elevation, split control joint
Terminations at Roofline	X			Adequate clearance was observed between the stucco termination and roof deck
Transition joints (stucco to brick, etc.)	X		X	Mortar installed in lieu of sealant between stucco and cast stone
Termination at grade/hard surfaces	X			Adequate clearance was observed between stucco terminations and grade/hard surfaces
Algae/Mildew growth		X		None observed
Balcony flashing	X			Balcony flashing appears proper
Flashing at columns	X			Concrete pads were observed at column bases
Kick-out flashing	X		X	Missing or failing sealant conditions were observed at kick out/driver flashing. Some flashing folded back onto the face of stucco panels
Roof soffit terminations into stucco	X		X	No visible sealant was observed at soffit terminations at stucco panels
Roof flashing, sidewall and eave	X			Sidewall and roof flashing was visible
Sprinkler System	X			Sufficient clearance was observed at sprinkler heads to stucco walls and windows
Gutters	X		X	Gutters installed. See summary regarding downspout
Chimney cap and cricket		X		N/A
Foliage		X		No foliage was observed in contact with the stucco system
Other	X		X	See summary



Inspection Summary

This report was prepared for a buyer, client, or seller in accordance with the client's requirements. The report addresses a single system or component and is not intended as a substitute for a complete standard inspection of the property. Standard inspections performed by a Texas Real Estate Commission Licensee and reported on Texas Real Estate Commission promulgated report forms may contain additional information a buyer should consider in making a decision to purchase.

The stucco system on the subject property has been identified as a conventional stucco system with conventional and EIFS stucco trim as well as cast stone trim. The conventional stucco trim is constructed using casing bead nailed onto the stucco "brown-coat" wall panel in lieu of installing furring material and forming the trim using stucco corner beads. This method is widely used, but can result in the trim becoming loose and serving as a point of water intrusion. Sealant must be installed and diligently maintained to prevent water from entering between the trim and the stucco wall panel and/or into the structure. The EIFS trim is likely adhesively applied onto conventional stucco base-coat and is for decorative purposes only. The presence of EIFS trim does not pre-dispose the structure to water intrusion or moisture retention. Sealant was not observed between stucco panels and cast stone trim transitions. Due to the application method of cast stone trim, sealant must be diligently maintained at transitions.

Based on observations made by consultant for Exterior Inspections, Inc., the stucco and related construction components on the subject property appear to conform to industry standard guidelines with noted exceptions. For the purpose of this report, industry standard is defined by the 2006 International Residential Code Section R703 and guideline specifications and details published by the Texas Lathing and Plastering Contractors Association.

OBSERVATIONS:

- Missing, insufficient and/or failing sealant conditions were observed at window perimeters.
- Missing, insufficient and/or failing sealant conditions were observed at door perimeters.
- Missing, insufficient and/or failing sealant conditions were observed at miscellaneous penetrations such as hose bibs, electrical outlets, light fixture penetrations, etc.
- Missing sealant was observed between the stucco and dissimilar materials. Dissimilar materials include, but are not limited to soffits/fascia/frieze boards, wood, concrete and tile.
- Annual inspection of sealant conditions, with replacement as necessary, should be considered part of routine home maintenance.
- Expansion/control joint placement appear to conform with industry standard guidelines, although some vertical control joints were not continuous through horizontal control joints. A split vertical control joint was observed on the left elevation.
- Kick out/diverter flashing was installed at roof to wall/balcony to wall intersections that were visible. Missing, insufficient and/or failing sealant conditions were observed at some kick out/diverter flashings. Balcony flashings were turned back onto the face of stucco panels.





Inspection Summary

- No provisions for drainage were observed on the underside of balcony beams/overhangs. No provisions for drainage were observed between horizontal stucco overhangs and cast stone balcony trim bands.
- No 6:12 slope is present on horizontal stucco/EIFS surfaces such as decorative trim bands and balcony walls. Large flat horizontal surfaces were observed.
- Cracked stucco was observed on the right elevation in the courtyard area.
- Small areas of rust colored spots were observed at the corners of the entryway.
- Sufficient roofline clearance was observed. Industry standard is two inches between the stucco and the roof shingles. Roofline clearance should be such that water will not backwash up behind the system and that roofing can be repaired or replaced without damaging the stucco.
- A downspout was observed on the right elevation that sheds water from the second story roofline onto the first story roof. This downspout terminates near the base of a stucco wall and above a roof to wall intersection at the balcony. It is recommended that this configuration be modified to direct watershed away from the base of the stucco wall to decrease the possibility of water intrusion at the balcony wall.
- Sufficient grade clearance was observed. Industry standards dictate a minimum of at least 4" clearance between the bottom edge of the stucco and the finished grade. Six inches of grade clearance is appropriate for the Houston and Southeast Texas region.
- Sufficient clearance was observed between the stucco and hard surfaces. Industry standards dictate a minimum of at least 2" clearance.
- Plastic was detected wrapped along the OSB/plywood sheathing edges at randomly tested stucco wall terminations. The plastic can hinder drainage of incidental moisture and should be perforated or cut.
- Sheathing deterioration was not detected at the same locations.
- Foliage was not observed in contact with the stucco system. Foliage can contribute to the accelerated deterioration of construction materials as well as inhibit moisture evaporation and provide an environment conducive to algae and mildew growth. It is prudent to maintain 12" of clearance between foliage and the stucco.
- Algae/mildew growth was not observed on the stucco system.
- Sprinkler heads were not located in close proximity to exterior walls and window sills. It is necessary to periodically adjust the sprinkler heads to maintain the direction of water spray away from the stucco system.
- As of the date and time of this moisture analysis, elevated or high moisture readings were obtained. The indication of soft sheathing does not definitively indicate compromised sheathing or framing. It is noteworthy that wood rot can exist without a high moisture content (eg.-dry rot). Conversely, a high moisture reading in the presence of firm resistance may indicate a leak without deterioration of the wall components. Further destructive testing (core sampling) is recommended at all areas with moisture readings in excess of 25% as well as any area where no or soft resistance was noted.





Inspection Summary

NOTE: Exterior Inspections, Inc. was engaged to conduct a visual survey of the condition of the stucco cladding and (if requested) a moisture analysis of the exterior walls of the subject property. No opinions, observations or conclusions are offered or made unless specifically noted or addressed in the content of this report. Other possible deficiencies or building code compliance issues in the construction of the structure may exist. If necessary, a thorough inspection of all the house systems may be conducted by a qualified licensed professional real estate inspector engaged for that purpose.

This report submitted by:

T. George

T. George

TREC #21335

Exterior Inspections, Inc.



Front Elevation

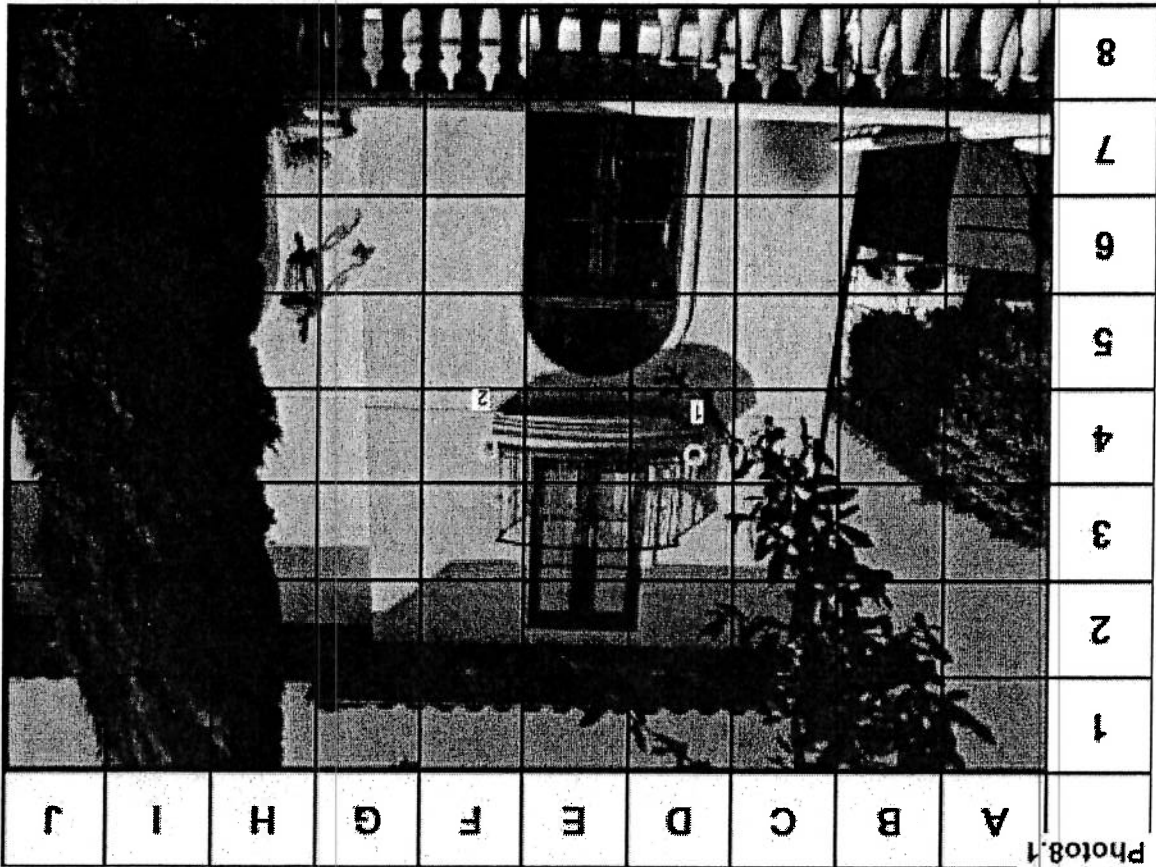
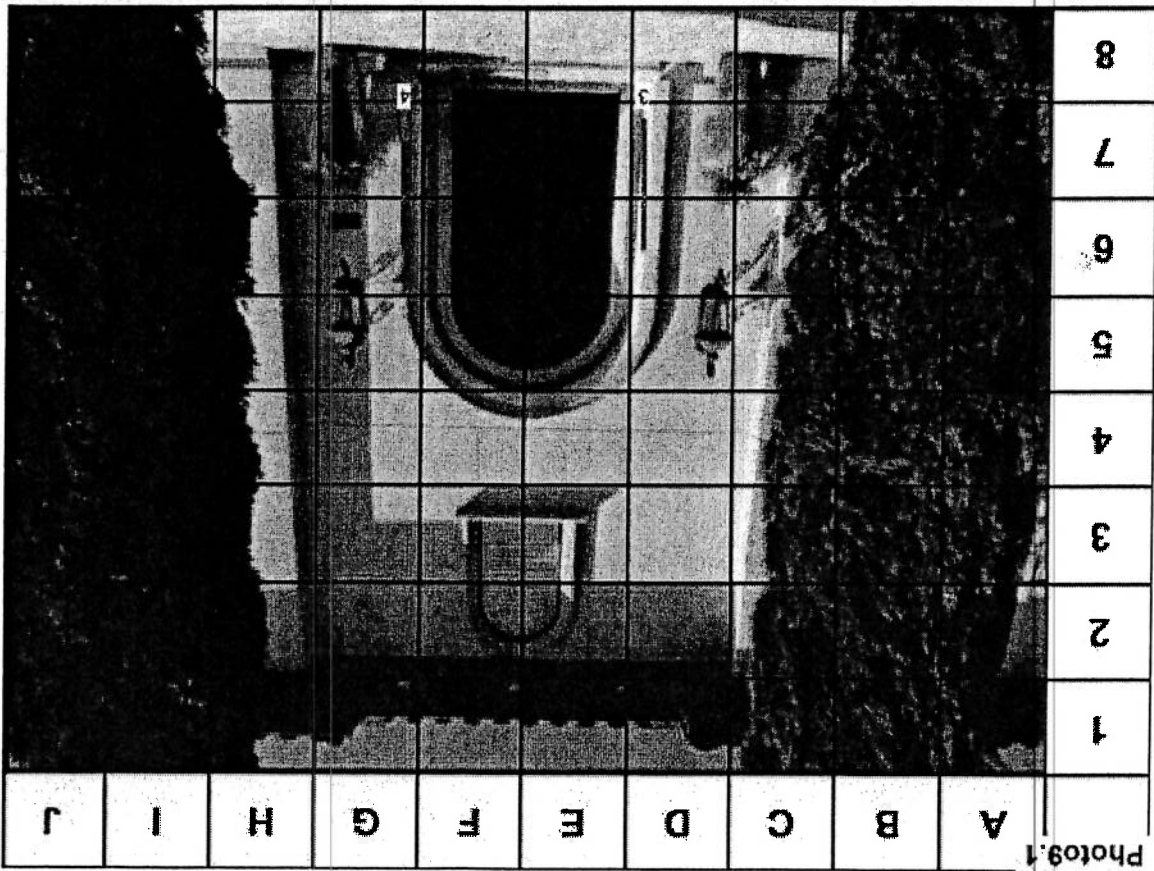


Photo 8.1

Item	Reading	Test Equipment	Observations / Comment
GENERAL			FOR COMMENTS REGARDING GENERAL CONDITIONS, REFER TO "OBSERVATION" AND "SUMMARY" PAGES
D/4, F/4			Insufficient diverter flashing at balcony to wall intersections
D/4-F/4			No provisions for drainage installed at stucco balcony overhang to cast stone balcony trim band
#1	7.5%; firm resistance	BD2100	Below left balcony to wall intersection
#2	8.7%; firm resistance	BD2100	Below right balcony to wall intersection



Front Elevation



Item	Reading	Test Equipment	Observations / Comment
GENERAL			FOR COMMENTS REGARDING GENERAL CONDITIONS, REFER TO "OBSERVATION" AND "SUMMARY" PAGES /
D/6-D/7, G/6-G/7			Rust colored spots at corner of entryway walls
#3	14.4%, film resistance	BD2100	Inside left entry
#4	12.9%, film resistance	BD2100	Inside right entry

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Item	Reading	Test Equipment	Observations / Comment
GENERAL			FOR COMMENTS REGARDING GENERAL CONDITIONS, REFER TO "OBSERVATION" AND "SUMMARY" PAGES
D/4, F/4			Insufficient diverter flashing at balcony to wall intersections
D/4-F/4			No provisions for drainage installed at stucco balcony overhang to cast stone balcony trim band
#5	6.2% firm resistance		Below left balcony to wall intersection
#6	9.4% firm resistance		Below right balcony to wall intersection

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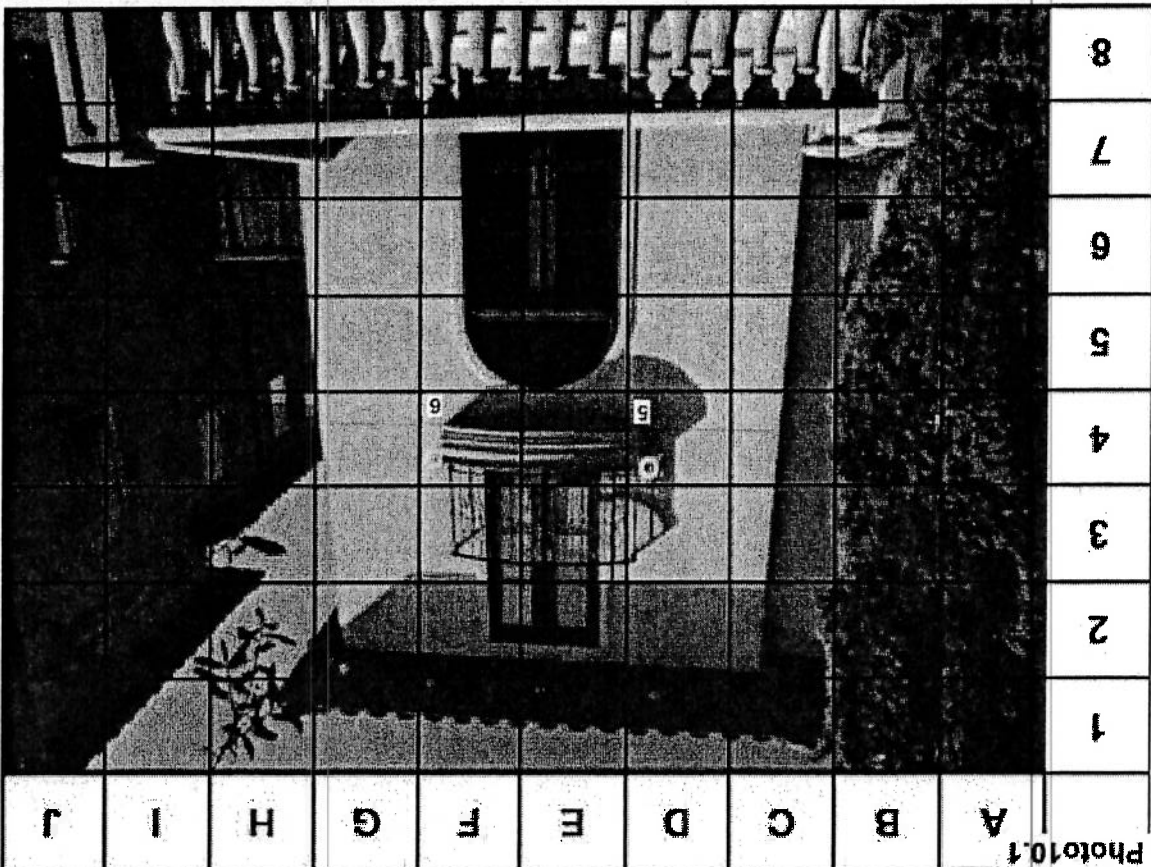


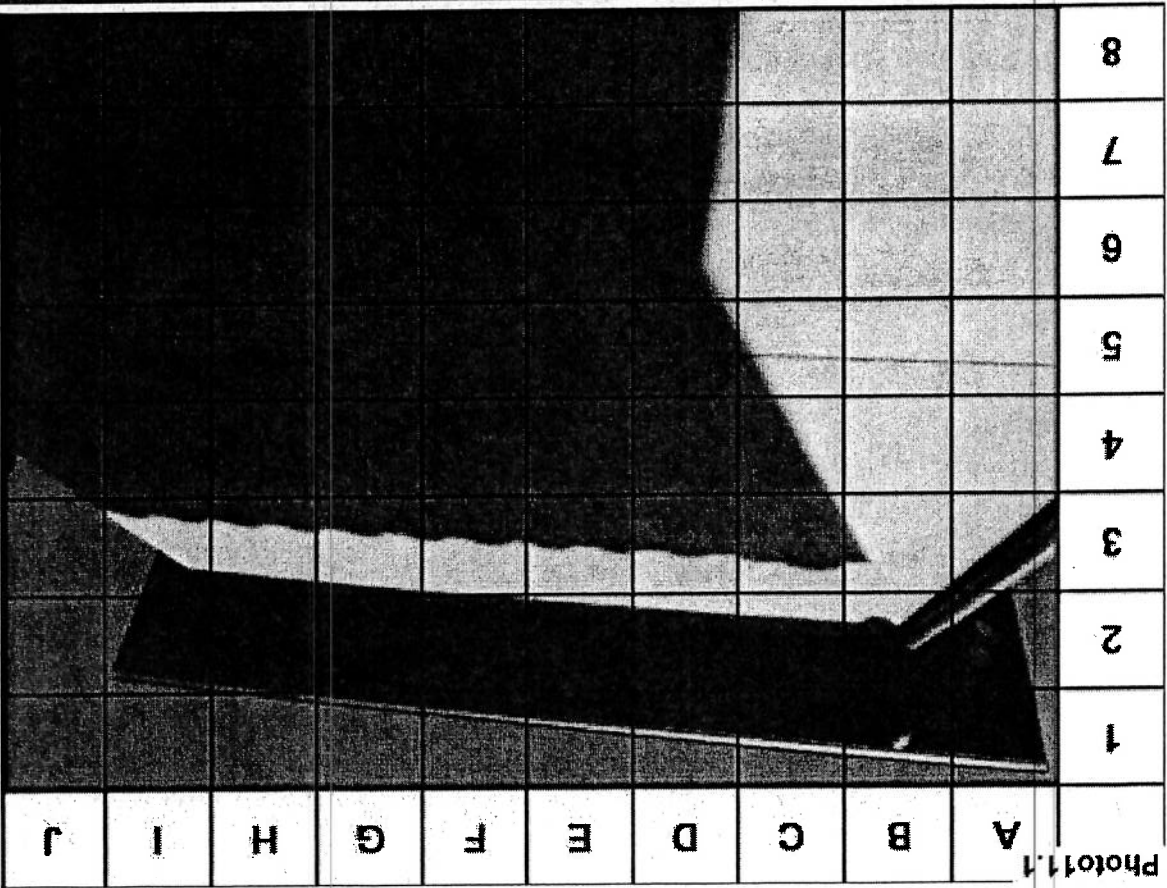
Photo 10.1

Front Elevation



Right Elevation

Photo 11.1



GENERAL

FOR COMMENTS REGARDING GENERAL CONDITIONS, REFER TO "OBSERVATION" AND "SUMMARY" PAGES

Observations / Comment

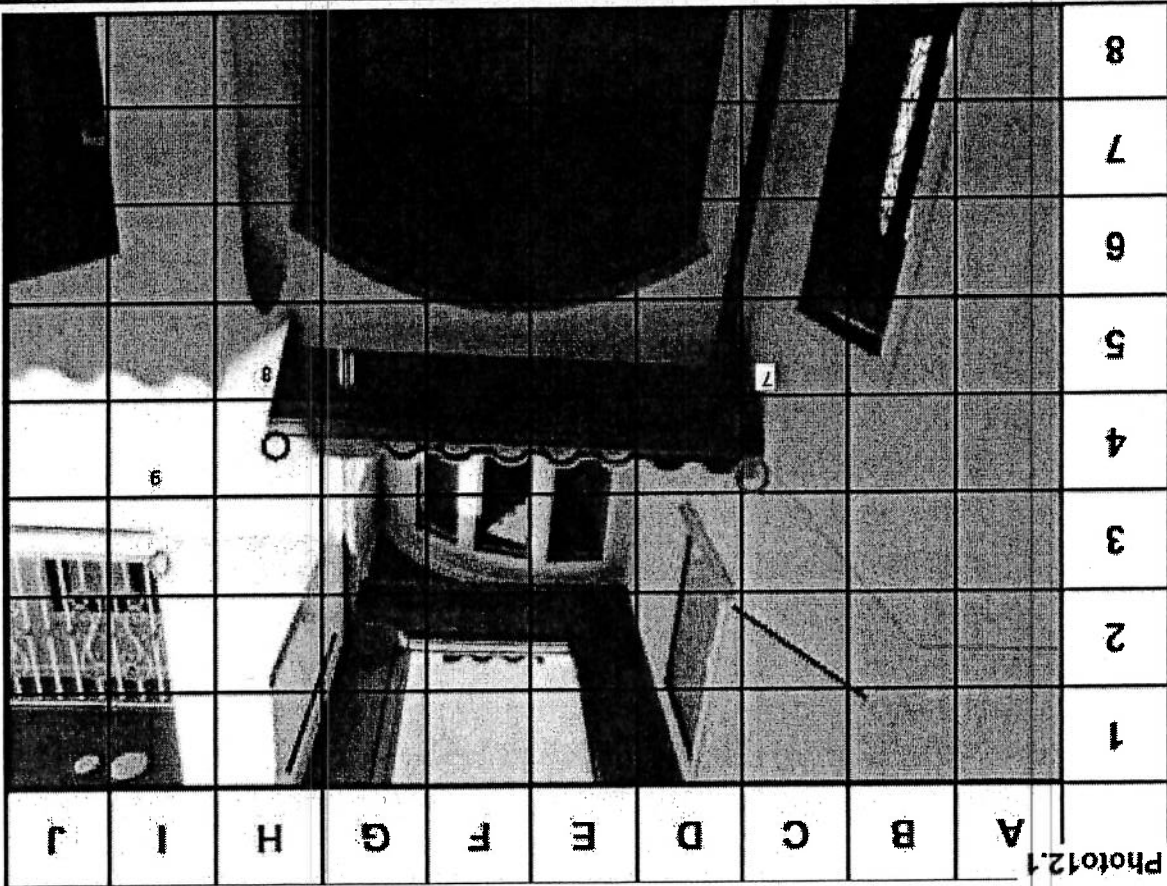
Test Equipment

Reading

Item



Item	Reading	Test Equipment	Observations / Comment
GENERAL			FOR COMMENTS REGARDING GENERAL CONDITIONS, REFER TO "OBSERVATION" AND "SUMMARY" PAGES
B/1-D/2			Diagonal crack in stucco panel
C/4,H/4			Kick out diverter flashing at roof to wall intersections
I/3			Insufficient diverter flashing at balcony to wall intersection
G/2-H/1			No provision for drainage at balcony beam
#7	8.5%; firm resistance	BD2100	Below roof to wall intersection
#8	10.2%; firm resistance	BD2100	Below roof to wall intersection
#9	11.6%; firm resistance	BD2100	Below balcony to wall intersection



Right Elevation



Stucco - crack above window

Item	Reading	Test Equipment	Observations / Comment
GENERAL			FOR COMMENTS REGARDING GENERAL CONDITIONS, REFER TO "OBSERVATION" AND "SUMMARY" PAGES
E/1-G/2			No provisions for drainage at balcony beam
H/4			Insufficient diverter flashing at balcony to wall intersections (yellow circle)
H/4			Crack below balcony drip edge (blue line)
H/4			Kick out diverter flashing at roof to wall intersection (green circle)
H/4			Downspout discharges from upper level roof to lower level roof (blue box)
#10	36.5%, no resistance	BD2100	Below roof to wall intersection, taken from firm/soft framing

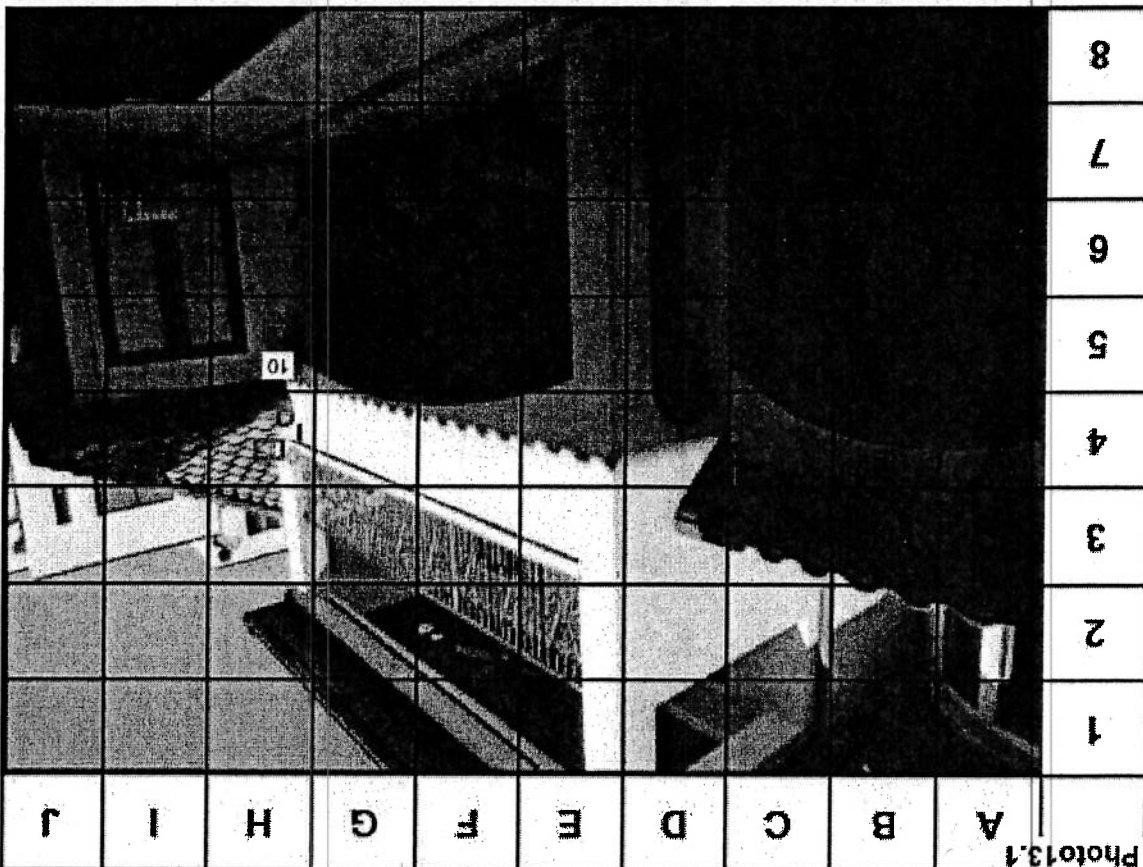


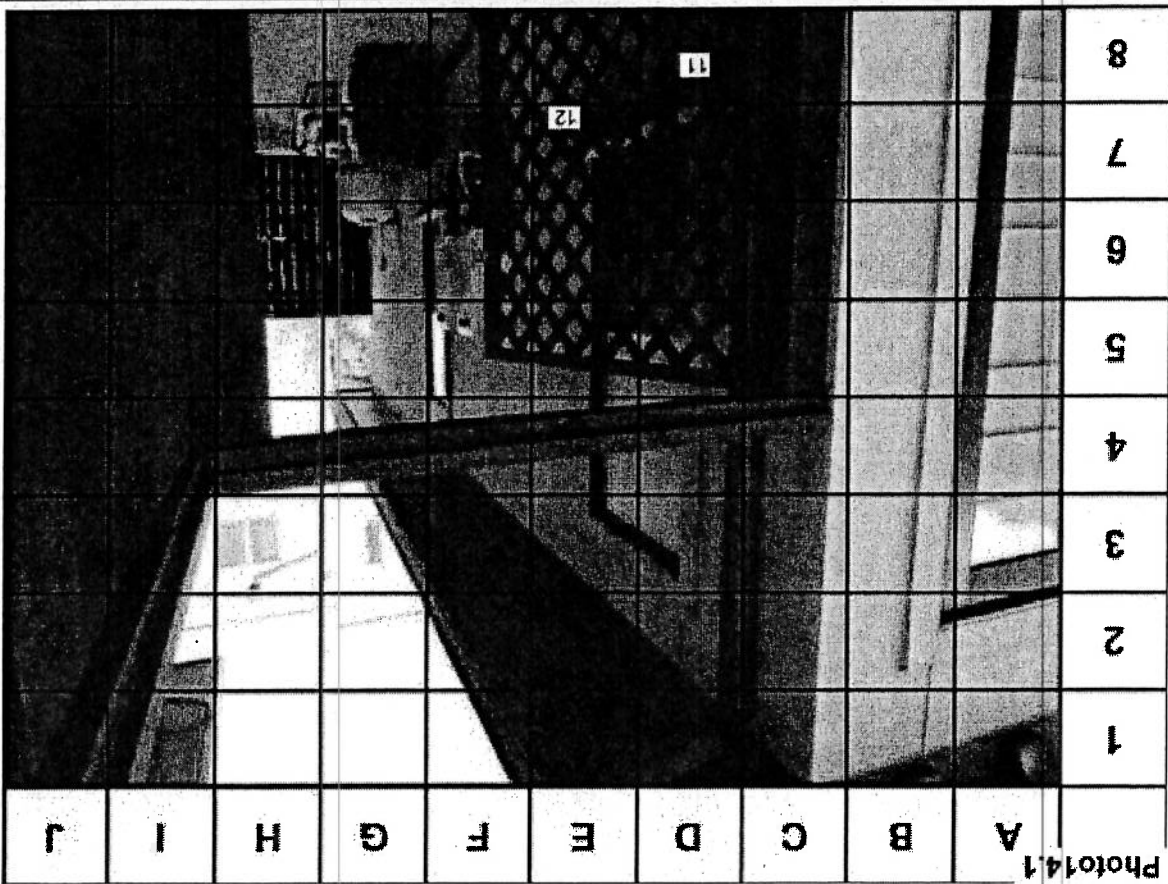
Photo 13.1

Right Elevation

Handwritten notes:
 Call & ask for...
 ask about...
 ask about...
 ask about...



Item	Reading	Test Equipment	Observations / Comment
GENERAL			FOR COMMENTS REGARDING GENERAL CONDITIONS, REFER TO "OBSERVATION" AND "SUMMARY" PAGES
#11	7.9%: firm resistance	BD2100	Below left window jamb
#12	8.1%: firm resistance	BD2100	Below right window jamb



Right Elevation



GENERAL

FOR COMMENTS REGARDING GENERAL CONDITIONS, REFER TO "OBSERVATION" AND "SUMMARY" PAGES

Observations / Comment

Test Equipment

Reading

Item

8

7

6

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1

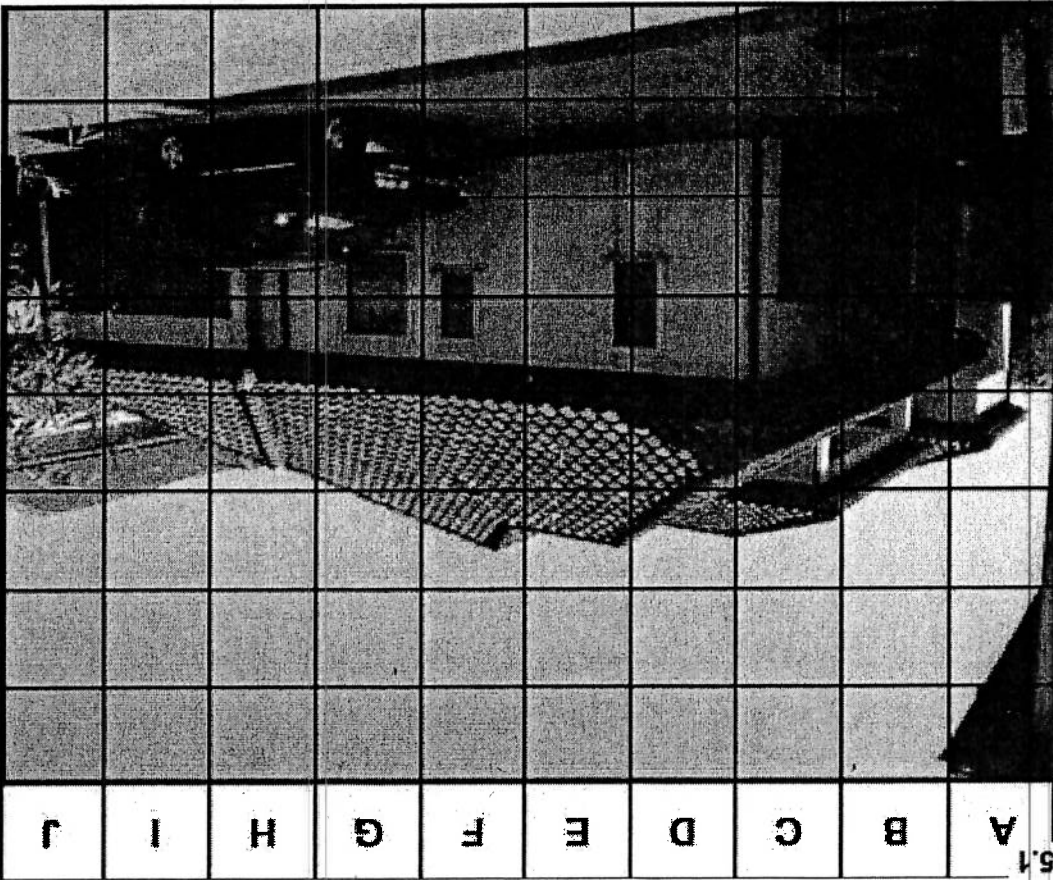


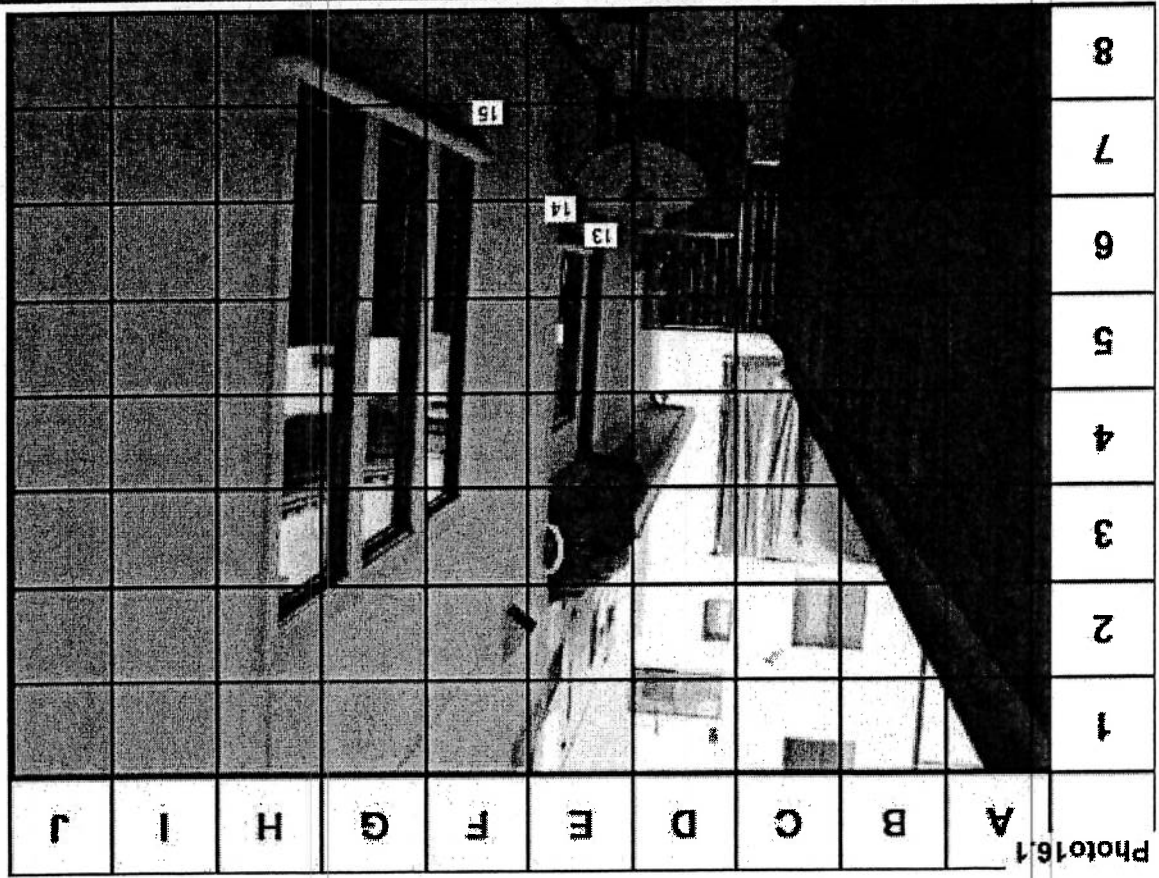
Photo 15.1

Rear Elevation



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Item	Reading	Test Equipment	Observations / Comment
GENERAL			FOR COMMENTS REGARDING GENERAL CONDITIONS, REFER TO "OBSERVATION" AND "SUMMARY" PAGES
E/3			Kick out diverter flashing at roof to wall intersection, failed sealant with void below
#13	7.9%, firm resistance	BD2100	Left window jamb below trim
#14	7.7%, firm resistance	BD2100	Right window jamb below trim
#15	9.7%, firm resistance	BD2100	Left window jamb below trim

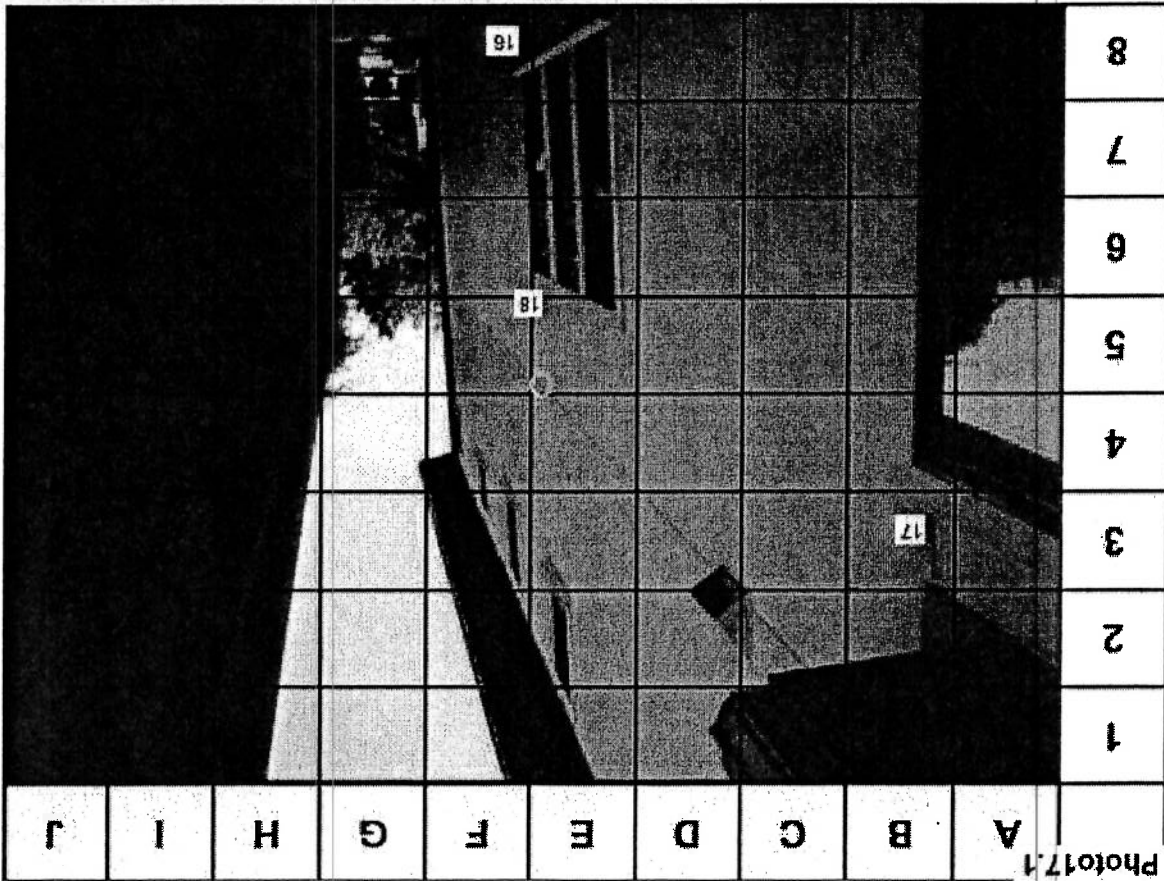


Left Elevation

*Caution
 no work keep*



Item	Reading	Test Equipment	Observations / Comment
GENERAL			FOR COMMENTS REGARDING GENERAL CONDITIONS, REFER TO "OBSERVATION" AND "SUMMARY" PAGES
E/5			Split control joint
#16	11.5%: firm resistance		Right window jamb below trim
#17	7.2%: no resistance		Below roof to wall intersection, from firm framing
#18	8.0%: firm resistance		Above right window head, below split control joint

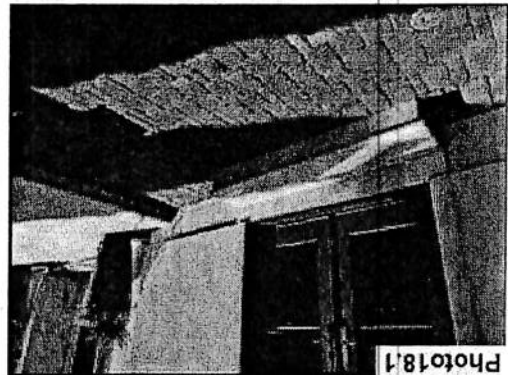


Left Elevation

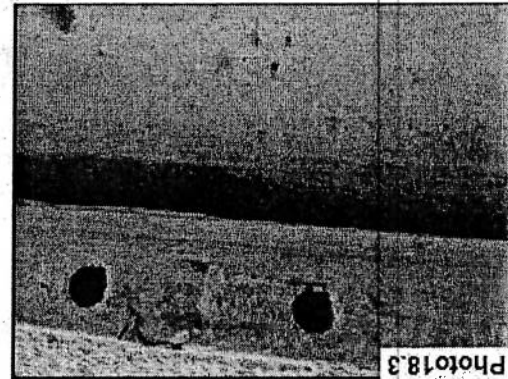




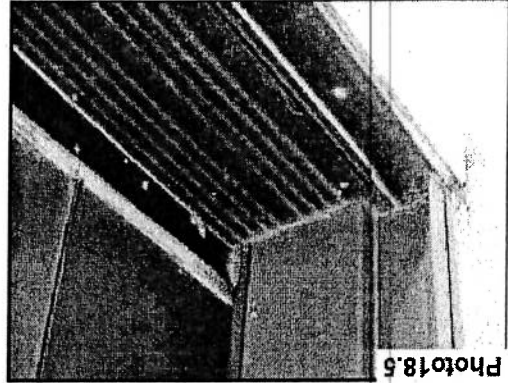
Detail Photo Observations



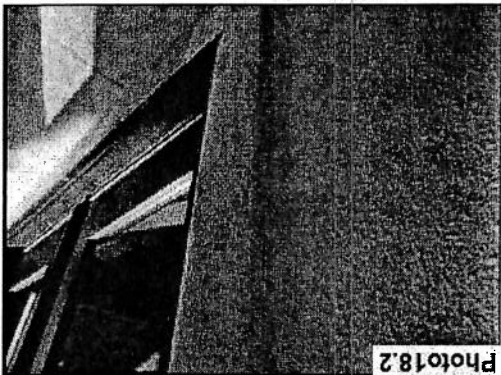
Sufficient clearance to hard surfaces, front elevation



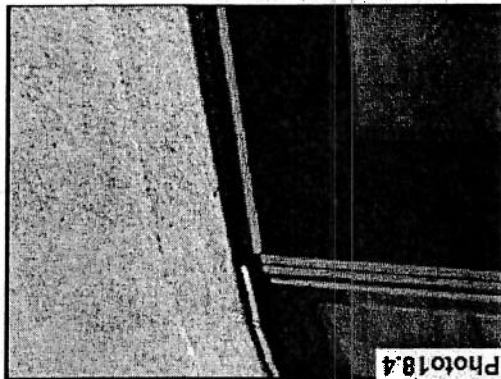
System terminates to weep screed, front elevation



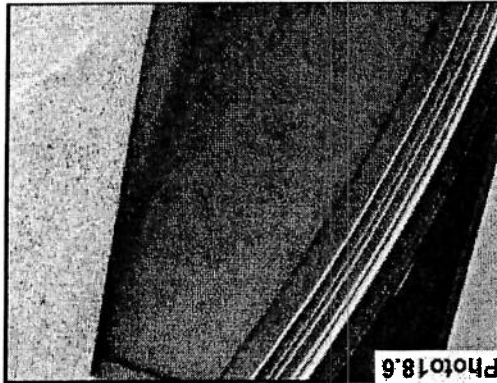
Door threshold, front elevation, no visible sealant



Casing bead trim, front elevation, sealant present but falling



Door head and jamb, front elevation, sealant present but falling

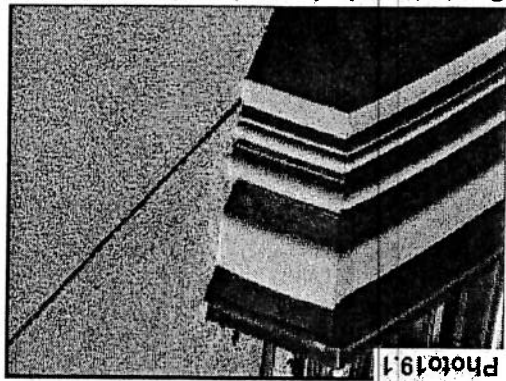


No provisions for drainage, cast stone band to stucco overhang, front elevation

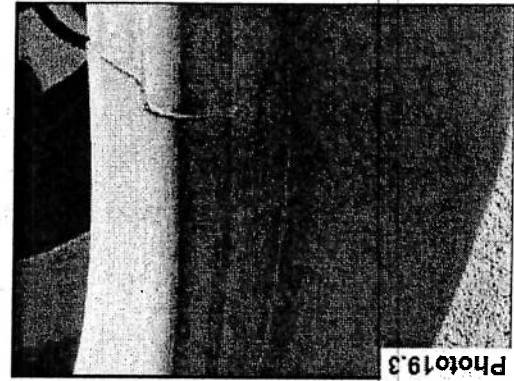




Detail Photo Observations



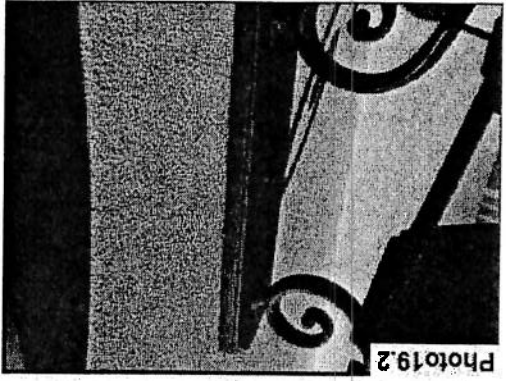
Cast stone balcony band to stucco wall transition, front elevation, no visible sealant



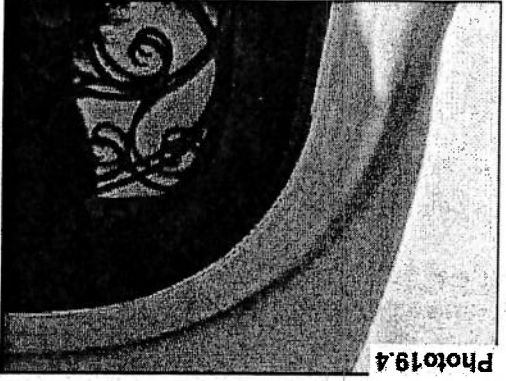
Cast stone trim to stucco wall transition, front elevation, no visible sealant



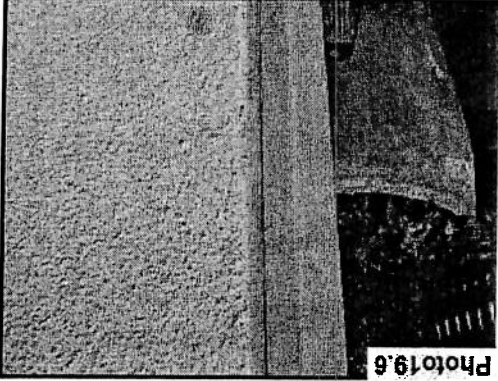
Door threshold, front elevation, no visible sealant



Light fixture penetration, front elevation, no visible sealant



Door head and jamb, front elevation, no visible sealant

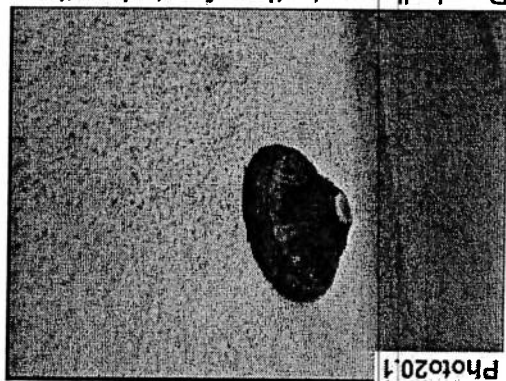


Left entry, front elevation, rust spots at corner (visible on both sides)

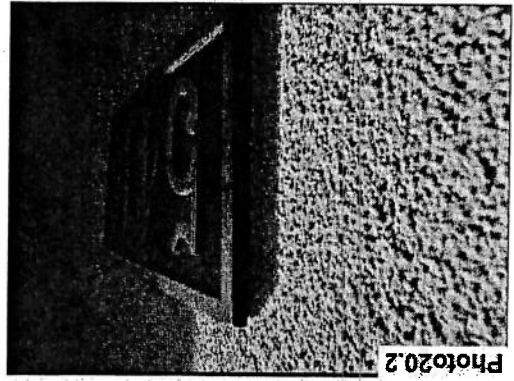




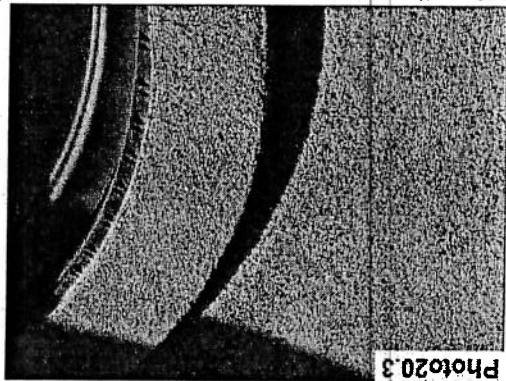
Detail Photo Observations



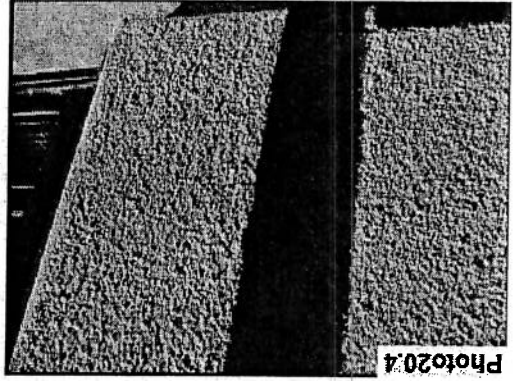
Doorbell penetration, front elevation, no visible sealant



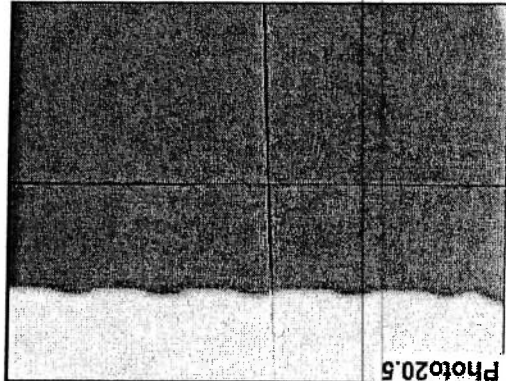
Miscellaneous penetration, front elevation, no visible sealant



Miscellaneous penetration, front elevation, sealant present



Casing bead trim to stucco panel transition, front elevation, sealant present but failing



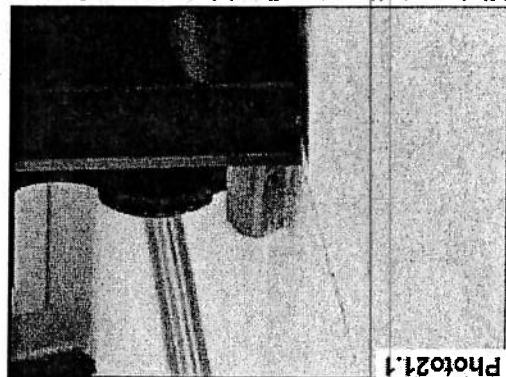
Control joint intersection, right elevation, vertical control joint not continuous through horizontal control joint



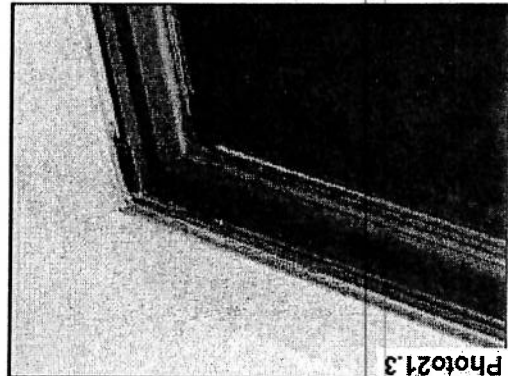
Hose bib, right elevation, sealant present but failing



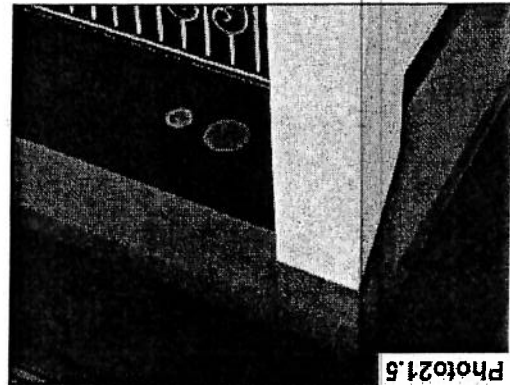
Detail Photo Observations



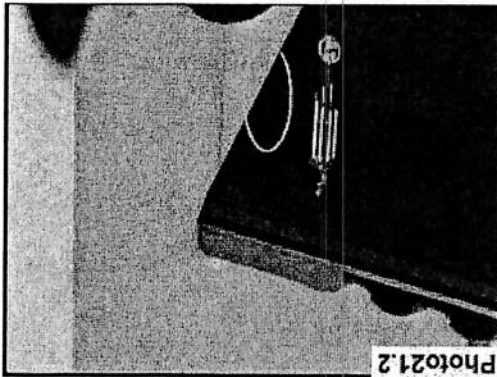
Kick out diverter flashing at roof to wall intersection, right elevation, sealant present



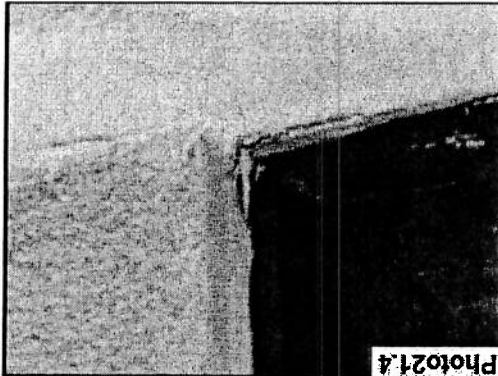
Window head and jamb, right elevation, sealant present but falling



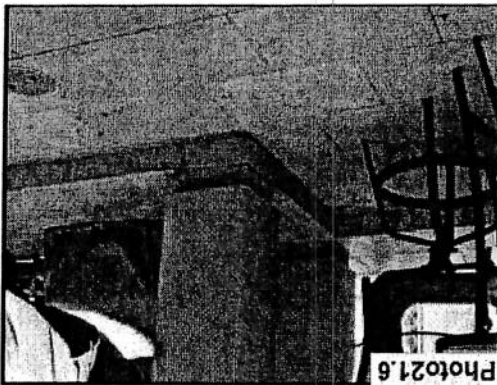
Balcony beams, right elevation, no provisions for drainage



Drip marks below roof to wall intersection, right elevation



Window sill and jamb, right elevation, sealant present but falling



Concrete pads at column bases, right elevation. Sufficient clearance to hard surfaces.



Detail Photo Observations

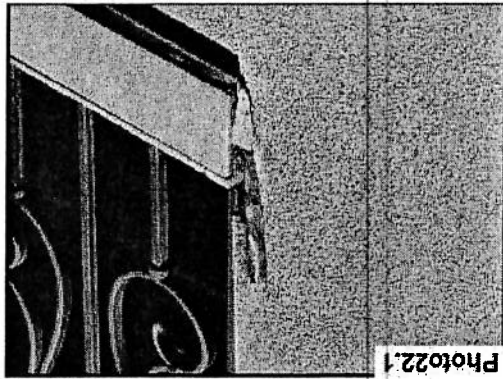


Photo 22.1
Balcony to wall diverter flashing turned back onto face of stucco, right elevation. No visible sealant.

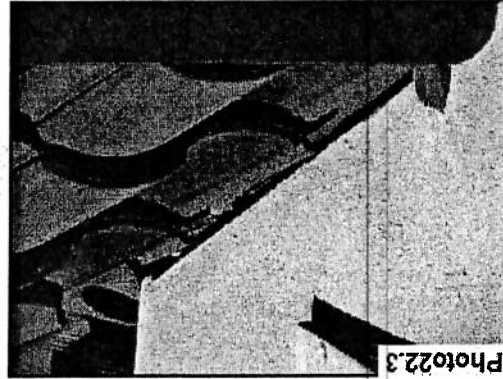


Photo 22.3
Kick out diverter flashing present at roof to wall intersection, right elevation, sealant present. Sufficient clearance from casing bead stucco termination to roof deck.

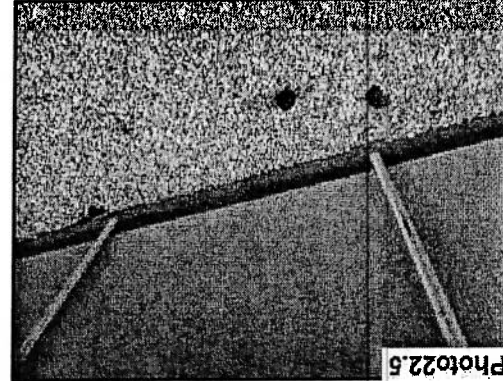


Photo 22.5
Sufficient clearance for sprinkler head to stucco wall, right elevation

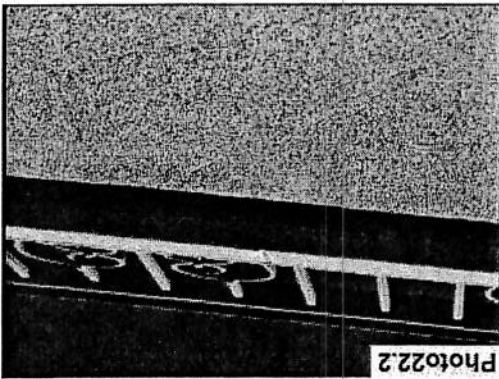


Photo 22.2
Balcony drip edge flashing, right elevation

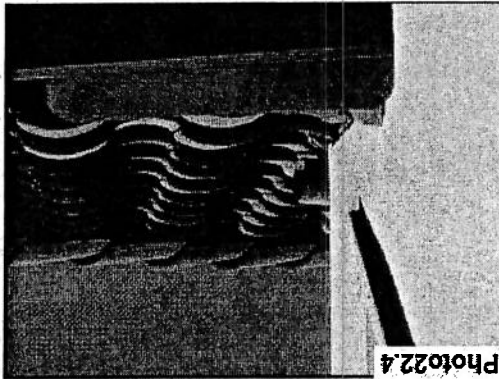


Photo 22.4
Upper roof downspout discharges onto lower roof at base of stucco wall, right elevation

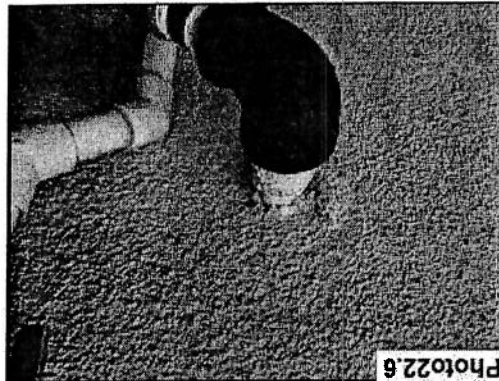
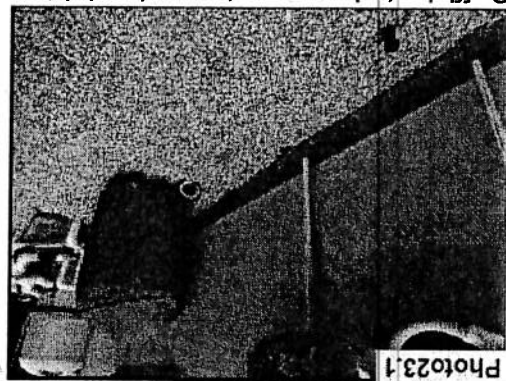


Photo 22.6
Gas line, right elevation, sealant present but falling

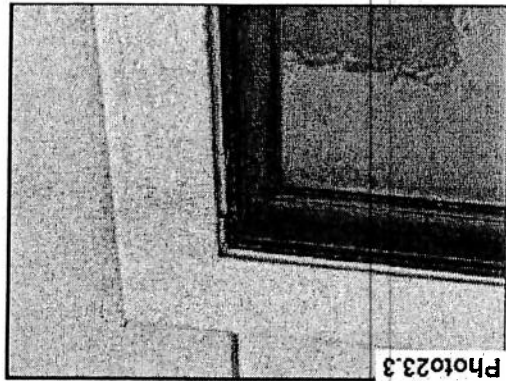




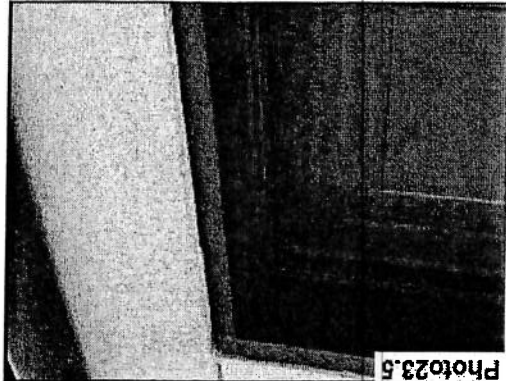
Detail Photo Observations



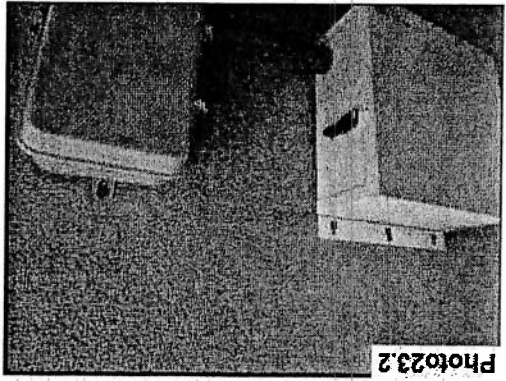
Sufficient clearance to grade, right elevation



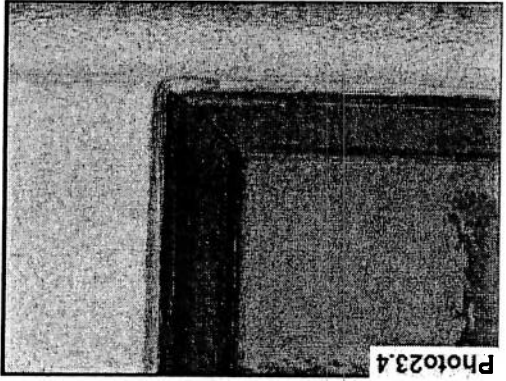
Window head and jamb, rear elevation, sealant present



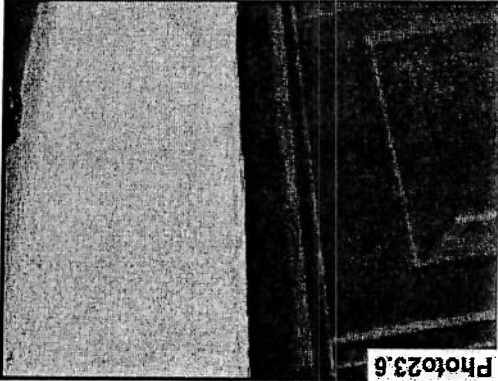
Garage door head and jamb, rear elevation, no visible head flashing with sealant present



Miscellaneous penetrations at utility boxes, right elevation, no visible sealant



Window sill and jamb, rear elevation, sealant present

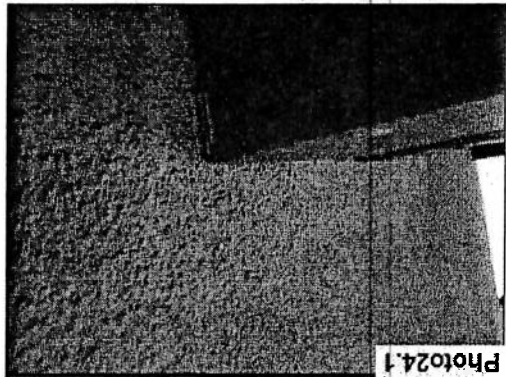


Garage jamb, rear elevation, sealant present but falling

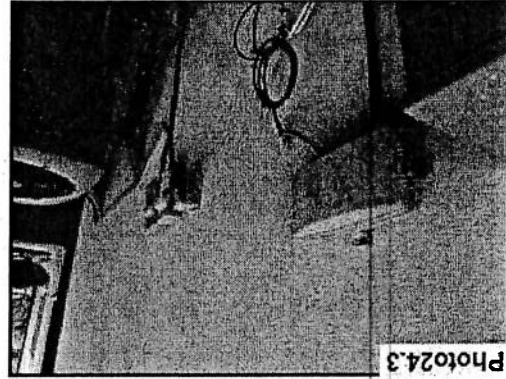




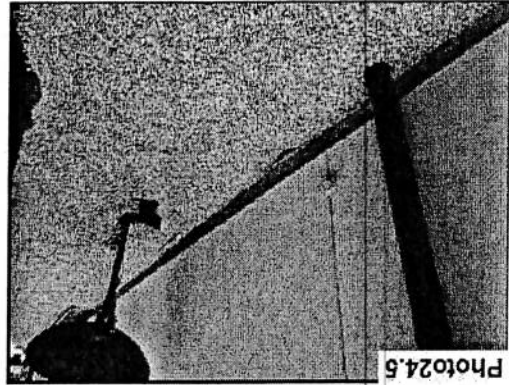
Detail Photo Observations



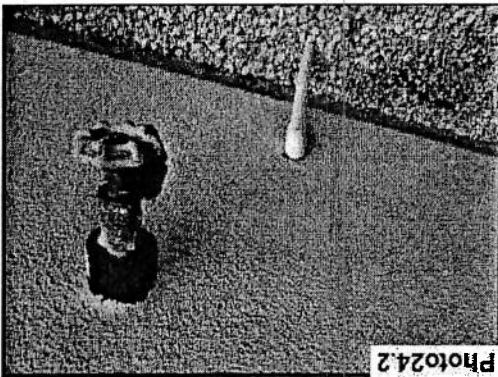
Electrical meter, left elevation, no visible sealant at top and sides



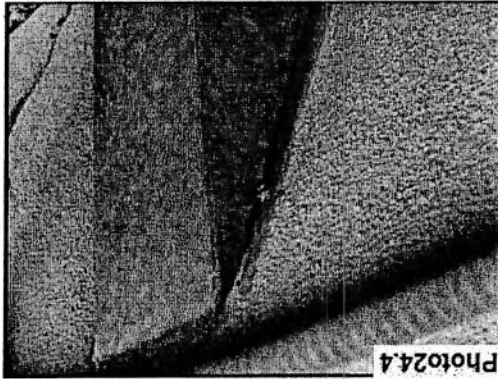
Miscellaneous penetrations, left elevation, no visible sealant



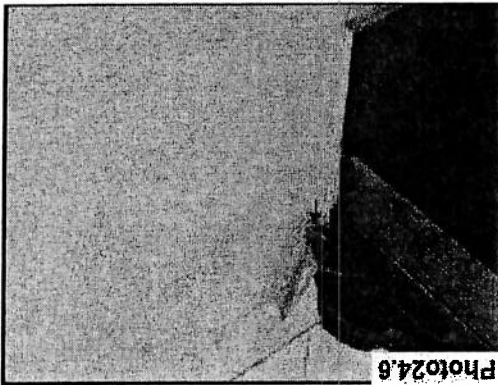
Sufficient clearance to grade, left elevation



Penetration at PVC, left elevation, no visible sealant



Air conditioning refrigerant line cover, left elevation, sealant present but falling



Kick out diverter flashing, left elevation, sealant present but falling. Void below flashing.



Detail Photo Observations

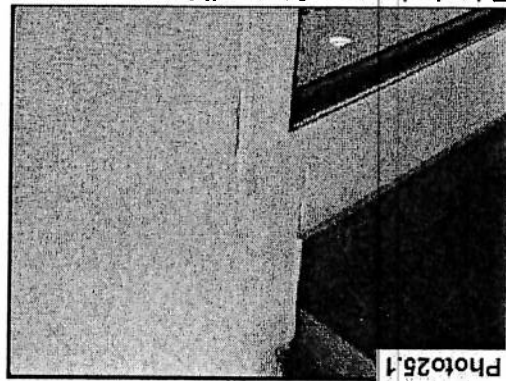


Photo 25.1
Trim below roof to wall intersection, left elevation, trim separated; sealant present but falling

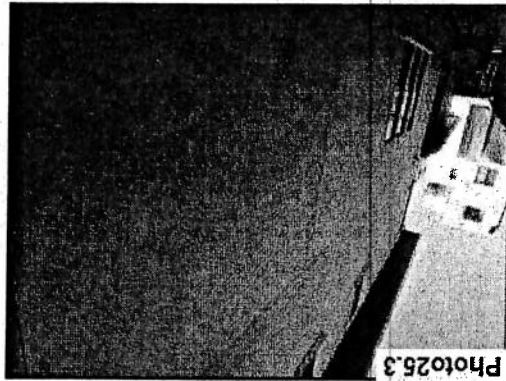


Photo 25.3
Color differences in stucco. Appears to be a variation in paint color.

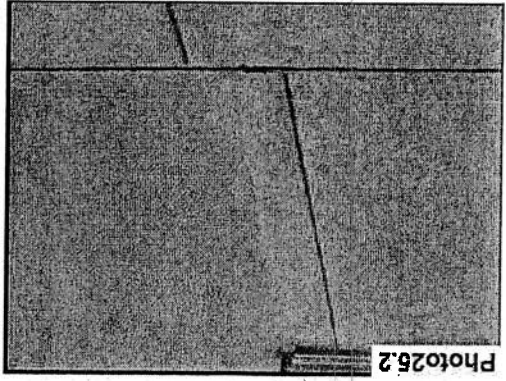


Photo 25.2
Loose/broken stucco finish and tear in control joint, left elevation

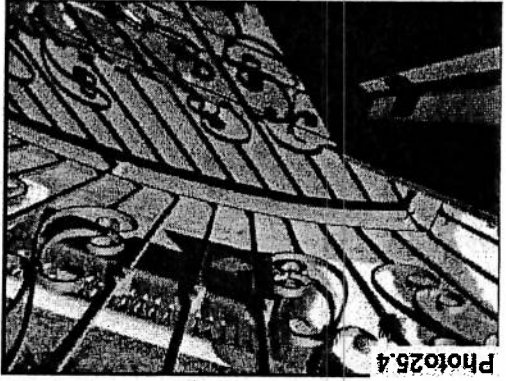


Photo 25.4
Metal cap flashing on Juliet balcony deck, front elevation

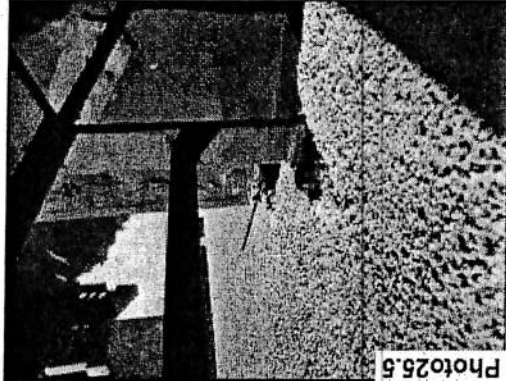


Photo 25.5
Balcony railing penetrations, front elevation, no visible sealant. Balcony diverter flashing turns back onto face of sealant, no visible sealant.

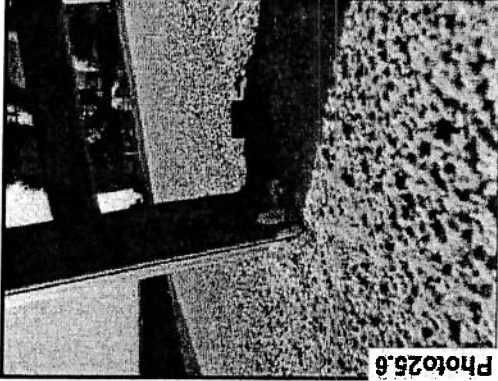
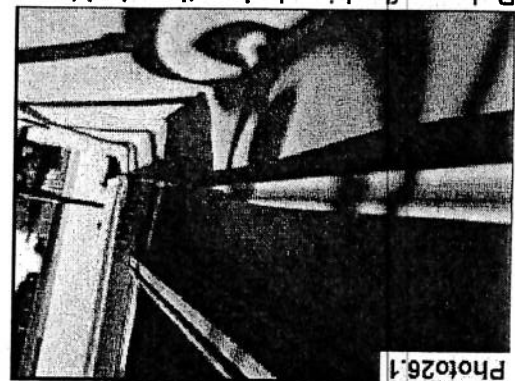


Photo 25.6
Balcony railing penetration, front elevation, no visible sealant

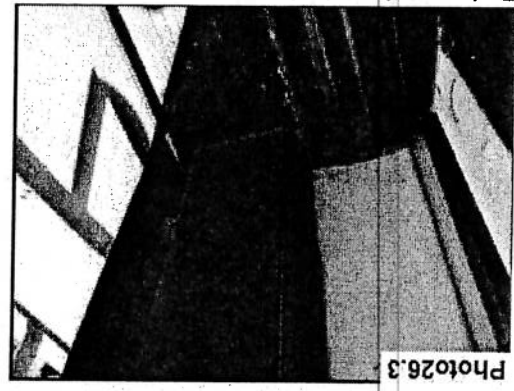




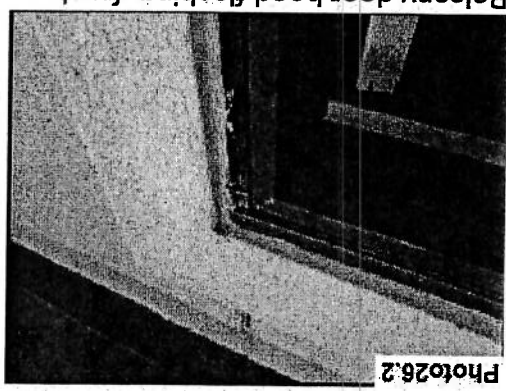
Detail Photo Observations



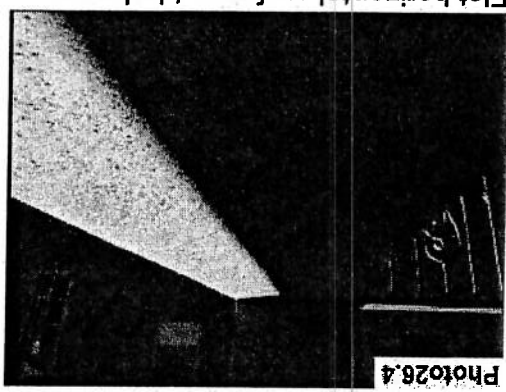
Balcony flashing below threshold, front elevation



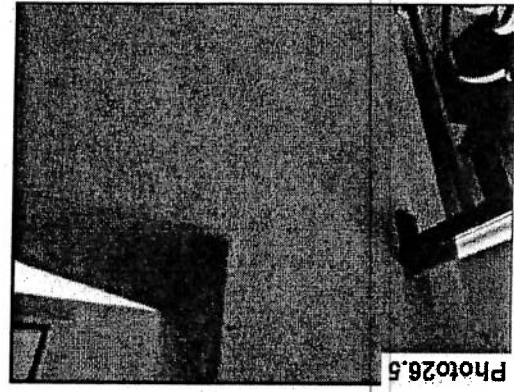
Balcony threshold, front elevation, no visible sealant



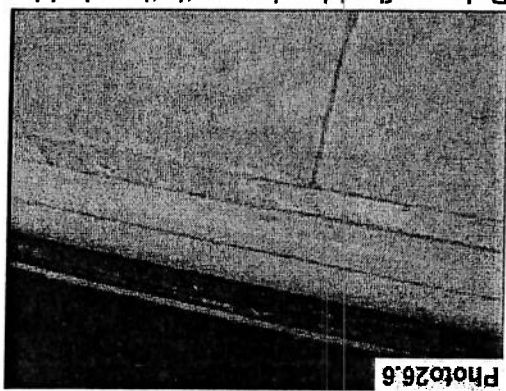
Balcony door head flashing, front elevation, sealant present



Flat horizontal surface at balcony wall, right elevation



Hairline crack visible at balcony wall, right elevation



Balcony flashing beneath threshold, right elevation

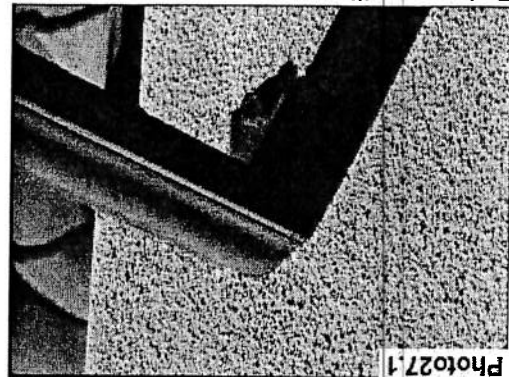
PO Box 9914 The Woodlands, TX 77387 info@exteriorinspections.com

PH: 281-353-8686 • FAX: 281-353-8604

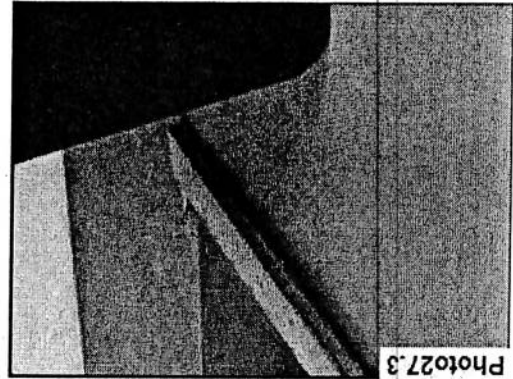




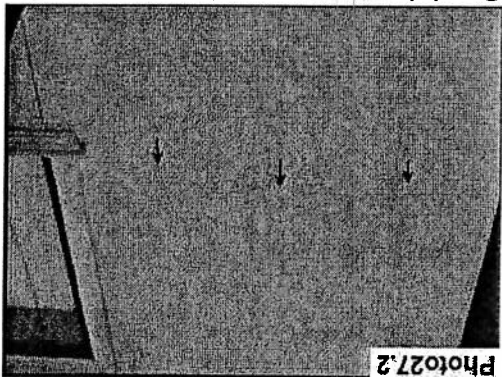
Detail Photo Observations



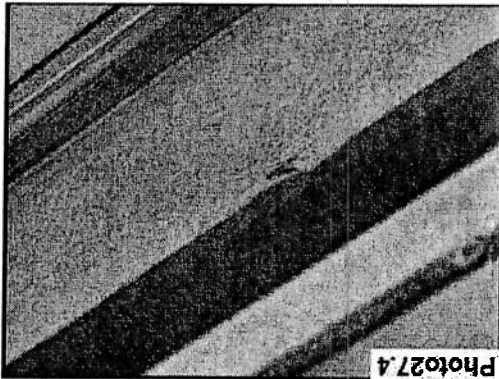
Balcony railing penetration, right elevation, no visible sealant



Crack below window and above roof to wall, right elevation



Crack in stucco panel at window, right elevation



Exposed mesh at trim band, second level window, right elevation



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.

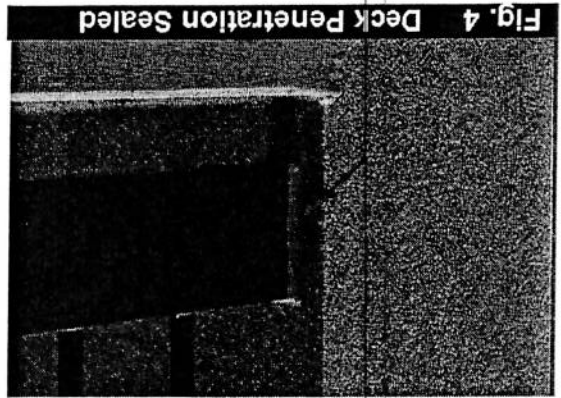


Fig. 4 Deck Penetration Sealed

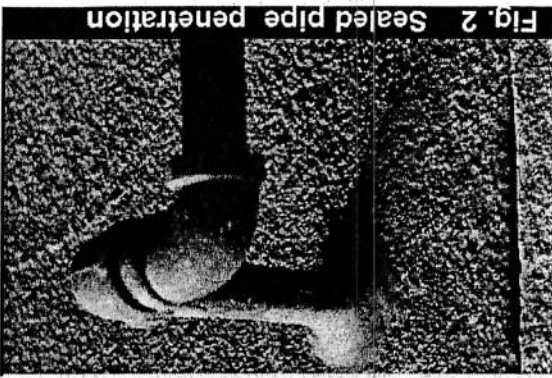


Fig. 2 Sealed pipe penetration

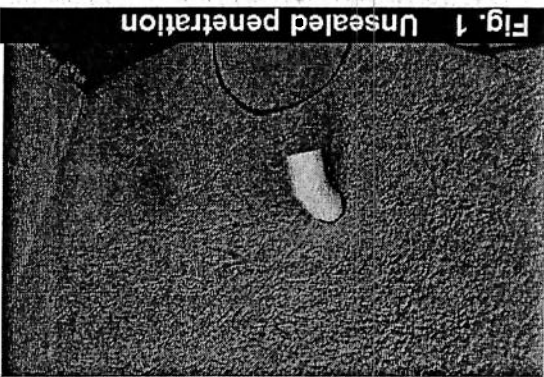


Fig. 1 Unsealed penetration

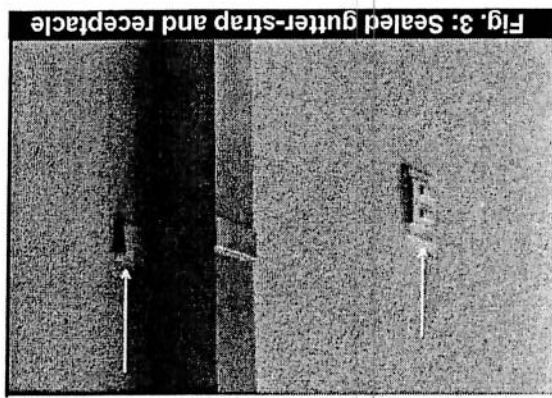


Fig. 3 Sealed gutter-strap and receptacle

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.



Fig. 4: Damage caused by Alarm sensor



Fig. 1: Damage caused by No sealants



Fig. 2: Example of unsealed window perimeter



Fig. 3: Serious damage caused by no sealants

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 than out-swing doors. 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 tightness.

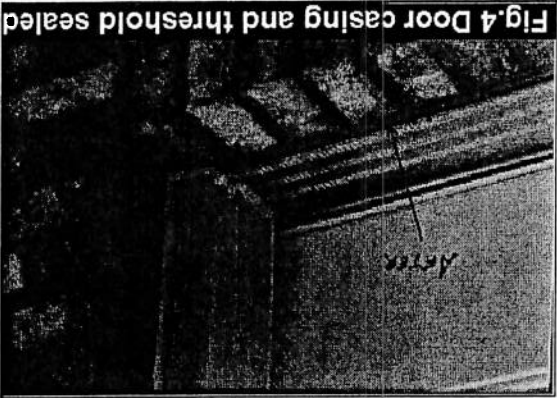


Fig.4 Door casing and threshold sealed



Fig. 5 Unsealed security sensor

3.2 Typical Window Detail (cont'd)



Figure 1: Typical inset window detail (sealed)

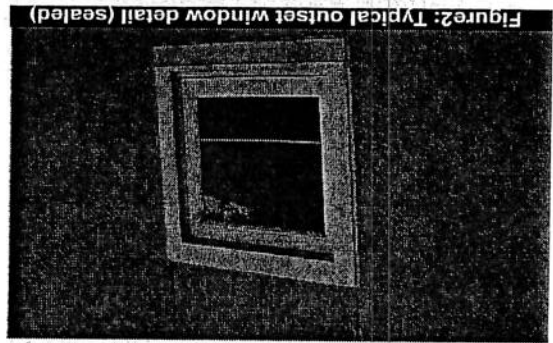


Figure 2: Typical outset window detail (sealed)

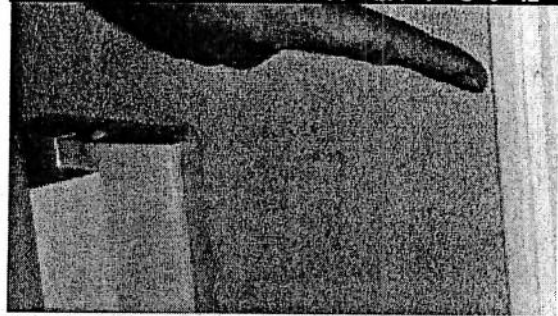


Fig. 3: Sealed 'flush' window detail (band-aid join)

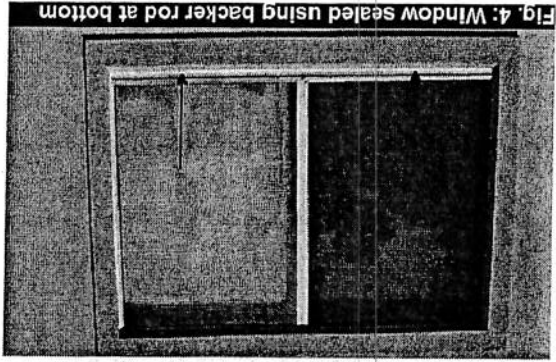
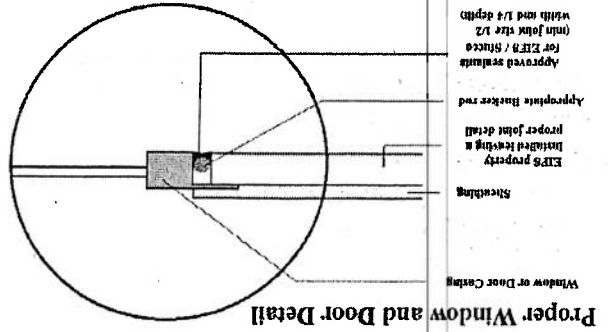
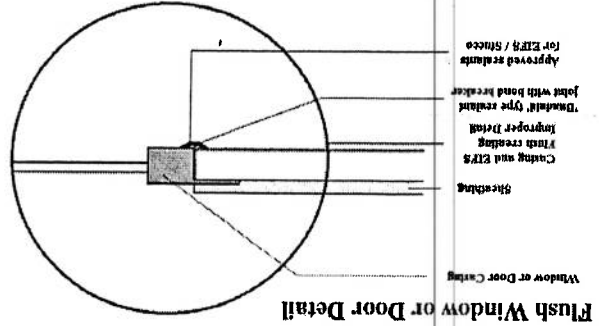
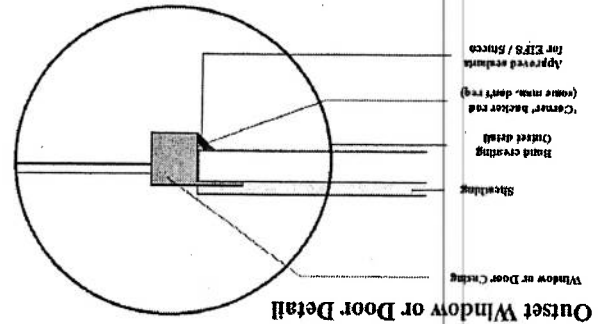
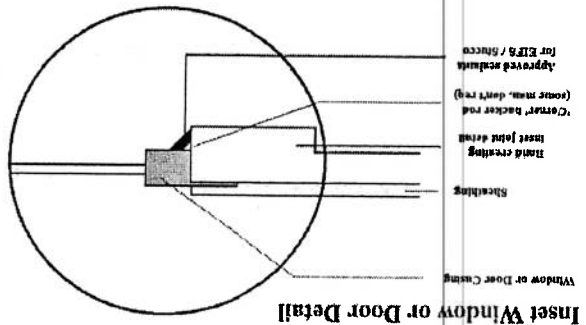


Fig. 4: Window sealed using backer rod at bottom



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).



Fig. 1 Moisture caused by the wicking process



Fig. 2 Cutback finished using PVC trim



Fig. 3 Cutback complete with landscaping



Fig. 4 Moisture at improper termination

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

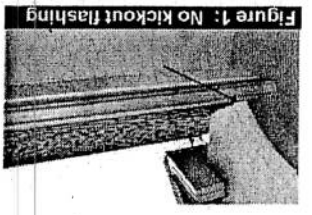
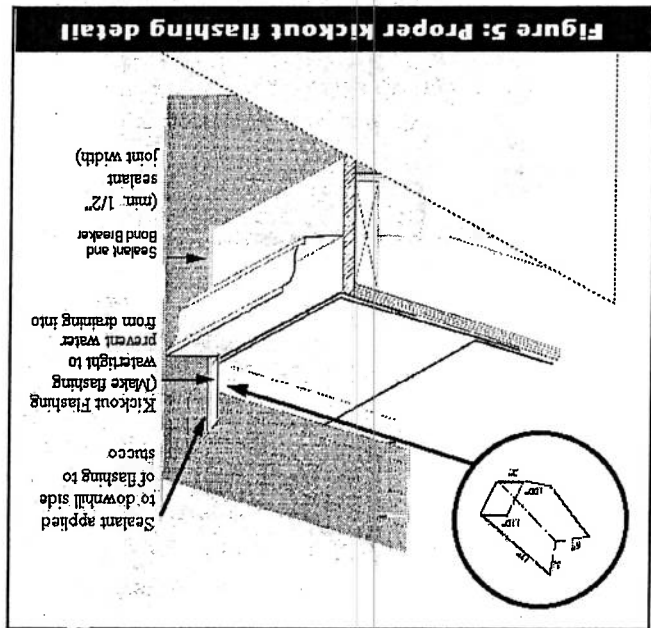
Kickout Flashing: Many water intrusion problems in stucco or EIFS homes are the result of improper kickout flashing installation or the lack of kickout flashing. Kickout flashing should be installed where a roof line terminates or intersects with a vertical wall. The word kickout means exactly that; 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 details, other critical flashing areas may also be improperly detailed. Any roofline that terminates into stucco may pose a problem.



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).

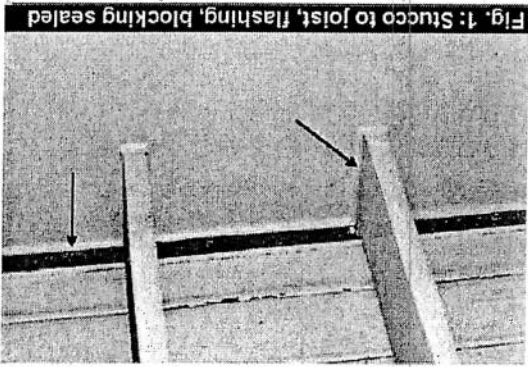


Fig. 1: Stucco to joist, flashing, blocking sealed

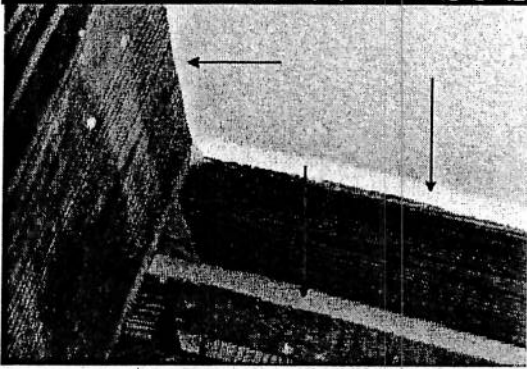
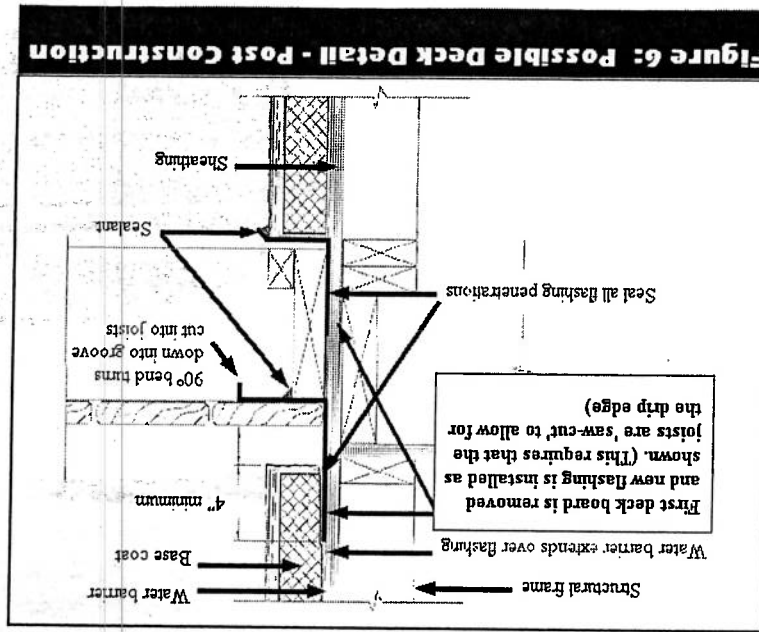
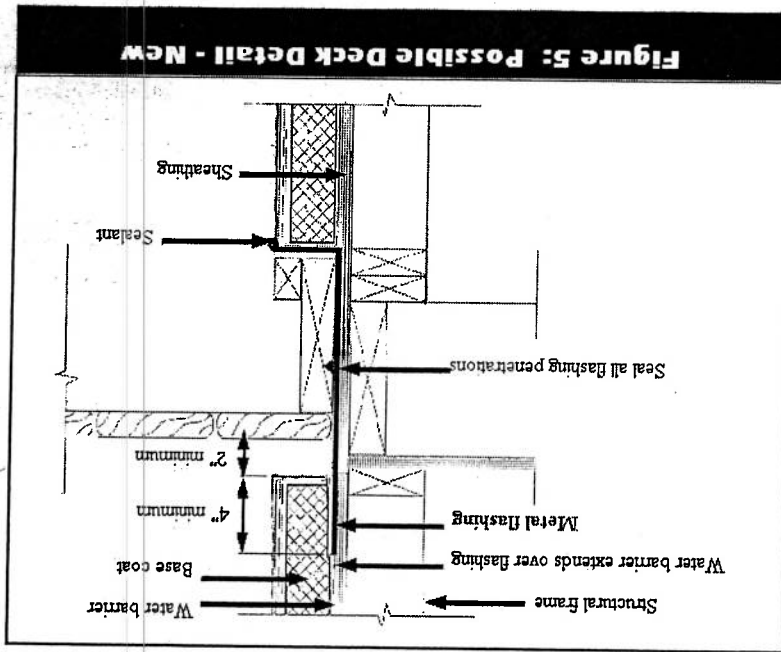


Fig. 2: Stucco sealed to joist, flashing, blocking



Fig. 4: Sealants needed at stucco terminations

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



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



Fig. 1: Example of cracks at floorlines



Fig. 2: Example of crack at window corner



Fig. 3: Cracks at roof and stucco terminations

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 sq. ft. 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 the 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 crossgrain 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 than "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.



Fig. 1: Flat surfaces at tops of quoins

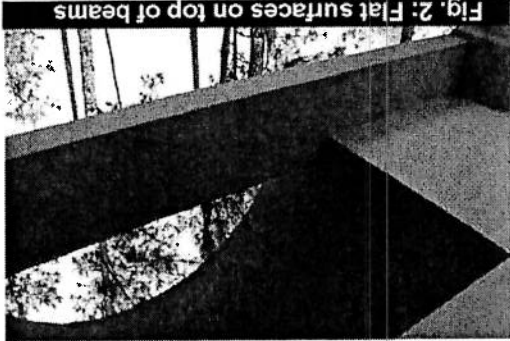


Fig. 2: Flat surfaces on top of beams



Fig. 3: Flat surfaces collect water

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 kickoff 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.



Fig. 1: Example of improperly flashed chimney



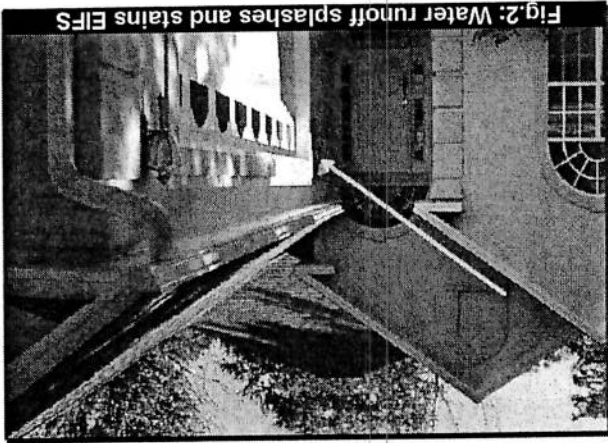
Fig. 2: Chimney cap to stucco should be sealed

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 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.

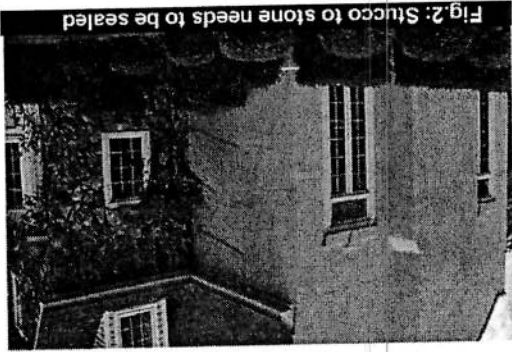


3.10 Water Intrusion Problems Related to Improper Transitions

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.



inch.

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

B. Traditional Hard Coat Systems:

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

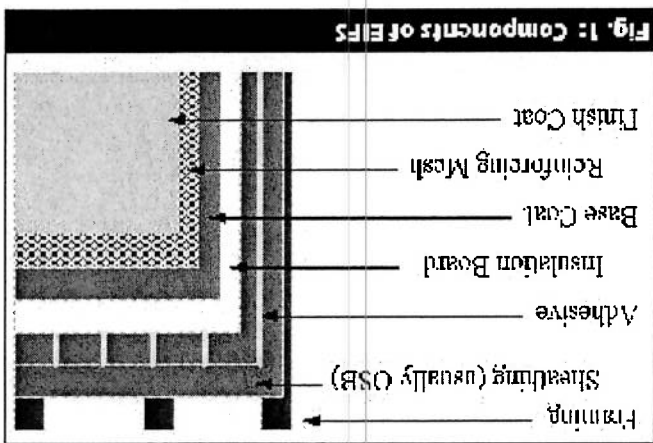


Fig. 1: Components of EIFS

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.

A. Exterior Insulation and Finish Systems

4.1 TYPES OF STUCCO

4. Stucco Information, Care and Maintenance

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 through 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 (low) to prevent damage to your stucco. Select a firm with experience in cleaning these EIFS systems.