Stucco in New Residential Construction

A Position Paper

Includes Updates to Original Information

City of Woodbury
Building Inspection Division

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8301 Valley Creek Drive
Woodbury, MN 55125
www.ci.woodbury.mn.us
(651) 714-3543

Stucco In Residential Construction
Updates

February, 2005

Introduction

This is an update to Stucco in Residential Construction, a position paper by the City of Woodbury Building Inspection Division, dated March 26, 2003.

The Situation

It became apparent in 1999 that many of the stucco homes built in Woodbury since 1990 were experiencing major durability problems, but there was no data available when these first problems began. The City of Woodbury Building Inspection Division initiated research to determine the scope of the problem and its causes, and became the leader in addressing the stucco problem in Minnesota, more by circumstance than by choice.

The division began an informal, from the street, observation of stucco homes in Woodbury and determined from these assessments that twenty six percent of the 670 stucco homes had visible signs of moisture damage. This observation was enough to convince the inspection division that the failures were not isolated incidents but the emergence of a wide spread problem with stucco homes. After only a few years, these houses were showing signs of leaks and major structural damage. It was evident that the structural deterioration and cost of repair would be well beyond any local historical precedent for construction defects.

The stucco problem is widely distributed throughout the state and nation. Woodbury has a high level of repairs due to the proactive stance the city has taken in addressing the situation and communicating the signs and symptoms of the problem to its residents. In addition, Woodbury stucco homeowners are proactive in making repairs.

Major Causes

It became very apparent that having knowledge of the problem is not enough, it was also important to have a better understanding of the causes of failure. This was achieved primarily through the thorough inspection of buildings under repair. The inspection division spent many hours in observation, evaluation, and review of repair efforts in its endeavor to understand the standard construction methods and why they failed. The inspectors looked for common factors of failure at each house and did not conduct a statistical review of the extent of problems within the building stock.

Window leaks, a lack of kickout flashing, improper deck flashing, and grade above the wood framing are the primary causes that account for the majority of the damage. All other causes are secondary. Generally, walls without windows or other openings sustained little or no damage. Unfortunately, even after five years of conducting thorough investigations there remains many "mystery areas" where the cause of damage is unknown.

There are claims that the damage is from interior moisture or excessively high humidity levels in the home. Interior moisture may be a secondary cause in some cases but these buildings are rotting from the outside, a clear indication of outside moisture. It is our position that if buildings do not have exterior moisture intrusion (leaks), most will tolerate minor amounts of moisture

from interior sources. However, if there is excessive exterior moisture intrusion, the building will fail and secondary and interior sources of moisture will accelerate the failure.

Current Situation
Stucco homes built in the critical time period continue to fail. To date, 276 of the 670 stucco homes in Woodbury in 1999 have failed and been repaired, a rate of 41 percent. The average time from new construction to repair is 8.7 years. Thirteen of the repaired homes have been repaired more than once. As moisture problems are something that take time to develop and present themselves, the number of failures continue to increase.

Any current discussion of stucco homes now is now clarified with reference to homes as either built "pre" or "post" 1999. This is essential to determine the method of construction used on each home. County records show an additional 74 stucco homes have been built since 1999 and as such were built and inspected to the current standard for stucco installation. Repair permits have been issued for 8 of those homes, an 11 percent failure rate for post-1999 stucco homes. Clearly the problem is not solved.

The city continues to question the viability of stucco on current wall systems. The failure rate of post 1999 homes using currently accepted practices reinforces this position. Meeting the minimum prescriptive standards of the state building code for stucco installation is not enough. The state building code is a minimum standard for construction and, although it is insufficient as it relates to stucco, can not be amended or modified by cities. It is up to the industry to discover and prove new methods are effective.

Other Sidings (Aluminum, Vinyl, Cedar, Hardboard, Plywood, etc)

Much has been made that this is not only a stucco problem. There are claims that all sidings are equally vulnerable and rotting appears at the same rate as stucco. Most of these claims were made by those involved in the stucco installation, moisture testers, or others with an interest in the construction industry, and were made without the benefit of factual information or data.

In an effort to effectively gauge the extent of the problem for non-stucco sidings, in March 2001 Woodbury started to require sheathing inspections on all residing projects to verify the condition of walls and sheathing. The inspectors also have an opportunity to inspect wall conditions during the addition of rooms, porches and other remodeling projects. Since 2001, the city has issued 1,170 residing permits and performed several thousand wall and sheathing inspections on existing buildings with all types of siding. Inspections covered a wide variety of both age of construction and types of siding throughout the city. There are approximately 18,000 dwelling units in Woodbury with other sidings but less than $1/10^{th}$ of 1% with confirmed significant structural damage and the damage is normally localized in relatively small areas around the leaks. The percentage and extent of failure on these homes, compared to that of stucco, is statistically insignificant. This does not minimize the importance of failure in other sidings, as such failures can be equally devastating for the property owner. However, when looking at the moisture intrusion issue it is important to put other sidings in proper perspective. The stories that persist about widespread failure are greatly exaggerated.

Public Reaction
When the city first went public with the information about stucco there was backlash from homeowners who believed that since they couldn't see damage, there was truly nothing wrong with their home. Contractors believed that the information would create unnecessary concern among homeowners. Many who questioned the information and the city's position were in

disbelief. However, the detractors are now silent. The number and significance of the repairs has proven the city delivered a necessary message. The Woodbury Inspections Division continually receives positive feedback from homeowners in Woodbury, as well as other areas of Minnesota, who were able to discover the problem in time to have it repaired under warranty or before the problem got worse.

Summary

The stucco problem is the largest construction defect problem in local history. Installation methods changed in 1999, but as yet the new methods are unproven and show an unacceptable failure rate. The physical, emotional, and financial toll on owners of stucco homes can be devastating. Installations with drainage planes that show promise are seldom used. It is up to the industry to discover and prove the new methods are effective. Until the issues are resolved and proven to be effective, the city must question the viability of stucco on current wall systems.

UPDATES

Current statistics - February 2009

To date, 418 of the 670 stucco homes in Woodbury in 1999 have failed and been repaired, a rate of 62 percent. The average time from new construction to repair is 9.8 years. Forty-seven of the homes have been repaired more than once. Repair permits have been issued for 46 post-1999 stucco homes. We do not have statistics related to how many post-1999 stucco homes have been built, but it appears the post-1999 failure rate may become similar to the pre-1999 failure rate.

Current Statistics – October 2007

To date, 392 of the 670 stucco homes in Woodbury in 1999 have failed and been repaired, a rate of 58 percent. The average time from new construction to repair is 9.4 years. 43 of the homes have been repaired more than once. Repair permits have been issued for 30 post 1999 stucco homes. We do not have statistics related to how many post 1999 stucco homes have been built, but it appears the post 1999 failure rate may become similar to the pre 1999 failure rate.

The statistics indicate both pre and post 1999 stucco houses continue failing at an alarming rate. There are no new technical data, causes or cures to report.

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Introduction

Although stucco has been used as a building material for over a century, several failures, including mold, rot and structural deterioration of stucco homes in 1999 made the city aware of what has since become a widespread problem in homes built since the late 1980s. While the installation methods have changed, there are still questions about whether the stucco problem has been solved. The city questions the viability of stucco installations on current wall systems and recommends that prospective homeowners and builders consider carefully the pros and cons of stucco and alternate types of siding.

Background

In 1999, the Building Inspection Division initiated extensive research into the cause of the stucco failures and the standard installation methods being used at the time. The research indicated standard installation practices that had been used for years were no longer effective. A meeting was held with stucco contractors, builders, industry representatives, building inspectors from other communities and other interested parties to introduce a newly-created Woodbury stucco inspection program and requirements. Standard installation practices that were implemented in May 1999 include:

Old Method	**New Method**
One layer of type 15 felt was the most common. Less than 10 percent used 2 layers of type 15 felt. Grade D paper was not available.	Two layers grade D felt are required by the State Building Code.
Flanged windows were considered to be self-flashed.	Flashing is required over all windows and doors.
Paper was installed over the window flanges.	Paper is required to be under the sides and bottom window flange.
Paper was not sealed at the windows.	Paper must be sealed at the windows with tape or caulk.
Paper stopped at the soffit line.	Paper is required to the top of the wall.
Kickout flashing was mostly an unknown term.	Kickout flashing is required at wall intersections where the roofline does not extend past the wall.
Weep screeds were not used.	Weep screeds are required.

Extent of the Problem

In 1999, an informal observation from the street of stucco homes indicated 26 percent of the 670 stucco exterior homes in Woodbury had visible signs of moisture problems. As of this writing, 140 permits have been issued since May 1999 for stucco repair. Because moisture problems take time to develop, this number continues to increase as newer houses age and have time to develop symptoms.

Discussions with other municipalities and state personnel verify the stucco problem is widely distributed throughout the state and nation. Woodbury has more repairs than other locations because more stucco homes were built during the critical time frame, information about the problem is readily available here, and Woodbury stucco homeowners are proactive in making repairs.

Current Debate

Not all stucco homes have experienced problems. Also, homes with other types of siding may have moisture intrusion problems. However, stucco is much more likely than other types of exterior claddings to have catastrophic failure. Permits issued for stucco repair since 1999 represent 20 percent of the 670 homes with stucco exterior. Most of the stucco repairs included structural damage and mold remediation, with many costing $150,000 or more. Of the 17,000 dwelling units with other types of exterior cladding, the city has seen a small number with significant structural damage caused by other types of siding.

There is currently a national debate on the cause of these stucco problems. Some say the stucco failures are not the fault of the stucco, but that interior moisture or wall systems being built too tight are to blame. While there are other factors, this is certainly part of the problem. Unfortunately, this indicates that stucco may not be compatible with the wall systems being built today.

Data Analysis of Building Permits in the City of Woodbury

In January 2004, the city received the results of a statistical study of building permits issued in Woodbury. This study was performed by an independent statistician. The study concluded that:

- The repair rate is significantly higher for stucco homes (109 of 555 stucco homes required repairs while 147 of 4,867 non-stucco homes have been repaired).
- The repair rate is higher for some builders than for others. There are large differences among the builders that are statistically significant.
- While not all stucco homes will have problems, there is no time after construction that a homeowner can feel "safe" or unlikely to have problems. According to the statistician, "One interpretation … is that about half of all stucco homes will require repair within ten years of construction".

While the data clearly indicate that stucco homes are more prone to failure, and staff experience indicates the extent of failure is much greater in stucco, it should not be interpreted as a clean bill of health for homes with other sidings. There are a growing number of reports of failures in these homes as well. The city continues to urge all homeowners to be aware of the signs of moisture intrusion and take appropriate action at the first sign of a potential problem.

Conclusions

There is no doubt that stucco installed from the late 1980s until 1999 has an unacceptable failure rate. The installation methods have since changed, but there is no proof that any current installation method will prevent similar catastrophic failures. Contractor guarantees are good only if the contractor is still in business and financially capable of honoring the guarantee. Until installation methods are proven to work, the City of Woodbury Building Inspection Division questions the viability of stucco installations on current wall systems and recommends people consider carefully the pros and cons of stucco and alternate types of siding. We will continue to investigate this issue and will update our information as new information becomes available.

Frequently Asked Questions

Q. We have heard there are some stucco problems but not much more. What exactly are the problems?

A. The problems we have seen are associated with moisture either from the interior or exterior being trapped in the wall cavity creating mold and rotting the sheathing and framing members. Sometimes the mold is so extensive it creates indoor air quality problems with potential health problems. These problems are mostly on stucco houses built in the late 1980s and later.

Q. How widespread is the problem?

A. This is an industry-wide problem. It is not just in the Midwest, Minnesota or Woodbury. It has come to our attention in Woodbury because there were many homes built here in the past 10 years.

Q. What are the signs to look for to determine if my home has a problem?

A. On the interior, if the bottoms of windows are discolored or the base trim is warped or carpet is wet, these are indications of a leak. If there is a moldy smell in the house, there may be leaks into the wall cavities that may not show other signs of leakage. On the exterior, if there are brown streaks below the corners of windows or where window units are joined, it is likely there is a leak at that location. Intersections of walls and roofs are also susceptible to leaks, which will be indicated by brown streaks.

Q. What causes the problems?

A. Window leaks are the cause of the majority of the damage but the causes may be many, including:

- The paper around windows and other openings was installed incorrectly.
- Head flashing was not used on windows (windows with flanges were thought to be self-flashed).
- One layer of paper was used. Water may be leaking through the paper.
- The windows themselves leak.
- Kickout flashing was not installed at the wall/roof intersections where the roofline does not extend below the wall.
- The deck ledger board was not flashed.
- Moisture from rain during construction or wet building materials remain in the wall (construction moisture).
- Interior moisture is permeating into the wall.
- Lack of drying capacity. All walls will likely leak sometime during their life. In addition condensation and construction moisture will be in the walls. Stucco walls are very tight and cannot withstand much moisture without creating mold and rot.
- Solar drive may be pushing moisture from a wet stucco wall into the wall cavity.
- Type 15 felt may be acting as a vapor retarder trapping moisture in the wall.

- Oriented strand board (OSB) sheathing has a low perm rating and it may be acting as a vapor retarder creating a double vapor retarder situation. In addition OSB absorbs and retains moisture making it vulnerable to mold and rot.
- The staples that stick through the sheathing are collecting frost or condensation and dripping within the wall cavity.
- The high number of staples used to fasten the lath creates many penetrations that could both leak and condense moisture.
- The staples were driven into the lath with excessive force causing the lath to cut the paper creating a leak.
- Wind driven water is getting on the wall through the soffit vents and running down the wall between the sheathing and the paper.
- Weep screeds were not used at the bottom of the stucco. This may prevent trapped water from draining.
- Stucco was installed below ground. This may prevent trapped water from draining or may wick water up to the framing. In addition, when stucco is applied below grade there is no clear definition of where grade should be and often the grade is placed against the wood framing causing a guaranteed rot situation.
- Stucco is installed directly on the foundation without paper or a weep screed. This prevents trapped water from draining.
- Landscape trees or bushes that contact the stucco create an area that introduces and holds moisture in the stucco. The moisture permeates into the wall.

Q. Stucco historically has been used for more than 100 years without problems. Why are we having problems now?

A. This is perhaps the most important question and one that we can only speculate on the possible causes, but cannot give a definitive answer. We do know that houses are being built with tighter wall cavities and when the cavity gets wet it dries out very slowly. Older houses had more air circulation in the wall that allowed the cavities to dry out. There is also speculation that wood windows in the older houses swelled when they were wet creating a seal between the stucco and the wood, effectively sealing out the water. New windows are typically vinyl or steel and do not swell and create a seal.

Q. My house doesn't have stucco but I have heard some concerns that sidings other than stucco also have problems but that the problems aren't as visible. Do I have to worry?

A. Woodbury has documented the conditions found in over 300 non-stucco homes resided in the last two years. Serious failures were found in less than one percent of the cases. We do not feel we can draw any conclusions so far based on these limited data. We would suggest that homeowners regularly maintain the caulking around windows and other openings in the walls. You may also want to consider moisture testing, especially if your home is nearing the end of its warranty period.

Q. What is Woodbury doing about this problem?

A. The Woodbury Building Inspection Division has been very proactive since discovering the problem in the spring of 1999. Research was done to identify the problems and possible causes. In May 1999, the City of Woodbury hosted a fact-finding meeting with stucco contractors, general contractors, municipal building inspectors, industry representatives and other interested parties. Ron Glubka, Chief Building Official, attended a similar meeting hosted by the State of Minnesota Building Codes and Standards Division. The city identified possible causes and solutions. A stucco inspection checklist was created and a mandatory stucco inspection became part of the inspection process for all houses with stucco. The May 1999 City of Woodbury Building Inspection Newsletter, sent out to almost 1,000 contractors, detailed the new inspection requirements and code requirements. Now each new house built with stucco undergoes an inspection of the critical areas of stucco application. The City of Woodbury continues to gather information. If further research indicates additional changes need to be made in construction techniques or inspections, the City of Woodbury will take whatever action is appropriate.

Q. What should be done if there are signs of leaks on our house?

A. There are a number of steps that can be taken or places to call for help. Be sure to keep detailed, written records of your contacts with contractors, insurance companies, and inspectors.

- Arrange for a moisture test with a private home inspector. Information on moisture testing is detailed below.
- If a moisture problem is found, contact your builder to make a claim for repairs. The contractor shall warranty the house for one year against defects and ten years against structural defects. Some builders may provide additional warranties.
- Contact your builder's insurance company to make a claim.
- The State Commerce Department, (651) 296-2488, may provide assistance with contractors or provide information on the availability of the state builder's recovery fund. They can also provide the builder's insurance and contact information.
- The State of Minnesota Building Codes and Standards Division has been helpful to several homeowners with stucco problems. Contact (651) 296-4639.
- Contact your insurance company to see if it covers moisture damage.
- Licensed Contractors can make necessary repairs.
- The City of Woodbury has a Warranty Information Brochure that explains various methods available to have warranty work completed. Contact the Building Inspection Division at (651) 714-3543. The brochure is also available on the City of Woodbury Web site at www.ci.woodbury.mn.us.

Q. I own a stucco home, and I don't see any symptoms of leaks right now. Is there any preventative action I can take that will keep problems from occurring?

A. Most of the problems we have seen are caused from leaks around windows. Caulking the sides and bottom of the window will help prevent water infiltration. There are different schools of thought on caulking the top of the windows. One is to caulk the top of the window to prevent water from getting in and the other is to not caulk the top so water that is behind the stucco but on the tarpaper can get out. A moderate position is to caulk the top of the window but leave some small openings in the caulk to let any water that may be on the tarpaper out. Additional openings and penetrations such as doors and vents should also be caulked.

Q. How can I arrange for a moisture test?

A. There are a variety of tests that private inspectors may use. They range from passive tests that use instruments to take relative moisture readings in non-conductive solid materials such as wood and masonry, to intrusive tests where openings are made to allow a probe inside the wall cavity to measure moisture. These tests may be helpful in providing information that may indicate whether there is a moisture problem. The only way to be certain, however, is to remove either the sheetrock on the interior or the stucco on the exterior of the home. Private home inspectors that specialize in moisture detection can be found in the yellow pages under "Home & Building Inspection" and "Inspection Service." Inspectors who have worked in Woodbury in the recent past on stucco issues include:

Acuity Engineers, Inc. (651) 222-7975
Air Tamarack, Inc (651) 696-0267
CMT-Certified Moisture Testing (651) 257-7310
Guy Engineering Corp. (952) 933-6161
Built Environments, Inc (651) 330-9329
Klemmensen, Dave (651-731-8750
Klossner, Steve (651) 436-5120
Private Eye Home Eval Svc (651) 639-0184
Prof. Engineering Consultants (651) 490-9266

The City provides this list of inspectors solely as a service to aid interested citizens. In listing these inspectors that have recently worked in the city the City is not making a recommendation in favor of these individuals and in no way warrants or endorses the quality of their work. In choosing any contractor, it is always helpful to ask for and check references from recent work that is similar to what you need done. You can also check with organizations that may provide information on the contractor's business practices (i.e., the Better Business Bureau or any licensing authority the contractor works under). Always maintain a complete paper file of all transactions, conversations and reports, including dates and names.

Q. If there is a problem with the stucco on my home, what will be required to correct it?

A. A building permit is required for stucco repairs. The building code requires that all wood with mold or rot be removed and repaired. Areas that do not show signs of leaks, mold, rot or deterioration may remain.

Q. Who do I contact to repair my stucco?

A. Your insurance company may recommend a contractor to perform the repair work on your stucco home
In choosing any contractor, it is always helpful to ask for and check references from recent work that is similar to what you need done. You can also check with organizations that may provide information on the contractor's business practices (i.e., the Better Business Bureau or any licensing authority the contractor works under). Always maintain a complete paper file of all transactions, conversations and reports, including dates and names.

Q. Does all the stucco on my home need to be removed if there is a moisture problem present?

A. The building code only requires that all wood with mold or rot be removed and repaired. Areas that do not show signs of leaks, mold, rot or deterioration may remain. You may choose to pay to have it all removed, but it is not required by code.

Q. Once my stucco has been repaired, it is safe to put stucco back on the exterior of my home?

A. The exterior you choose for your home is up to you. Because of the reasons cited above, we cannot recommend stucco exteriors at this time. Many homeowners repairing their stucco homes are choosing an alternate siding. The most popular choice seems to be one of several fiber cement board siding products. Manufacturers include James Hardie Building Products, Certainteed Corporation, and Cemplank. Information about these products are available from building supply stores, siding contractors and the manufacturers' web sites.

Q. Will my homeowner warranty cover damage due to moisture?

A. Minnesota Statute §327A.02 requires new homebuilders to provide certain warranties: that the home will be free from defects caused by faulty workmanship and defective materials due to noncompliance with building standards during the one (1) year period following completion of the home; that the home will be free of defects caused by faulty installation of plumbing, electrical, heating and cooling systems during the two (2) year period following completion of the home; and that the home will be free from major construction defects during the ten (10) year period following completion of the home. If moisture is caused by any of theses defects, the moisture damage will be covered by the warranty if you timely notify your homebuilder in writing and if you timely file a claim. You should also check to see if the homebuilder has provided a warranty program that is broader that the statutory warranties, as this may embody additional protections or impose additional requirements on you.

Q. Will I need to involve an attorney?

A. If your builder fails to make repairs and honor the warranty, it way be necessary to involve an attorney. Furthermore, the time limits for notifying your homebuilder or for commencing a claim against your homebuilder must be strictly complied with or your warranty claim can be barred. Minnesota Statute §327A.03 (a) requires you to notify your homebuilder in writing of any loss or damage within six (6) months after you discovered or should have discovered any loss or damage. Furthermore, Minnesota Statute §541.051 requires you to bring suit on a claim of a construction defect within two (2) years of discovery of the defect and within ten (10) years of substantial completion of the house. In addition, a recent case (*Westin v. McWilliams & Associates, Inc.*, 694 N.W.2d 558|Minn.Ct.Apps. 2005|), held that the statute of repose is stated as ten-year time period when an action can "accrue" and further states that a suit can be brought within two years after the tenth year. More practically, when a contribution and indemnity claim accrues *in fact* after the specified ten-year period, the statute deems the accrual to occur at the tenth anniversary, and suit can be brought on such a claim in years eleven and twelve. Also, many homebuilders require homeowners to sign arbitration agreements. If so, those agreements must be compiled with in submitting a claim. An attorney can advise you about your rights regarding warranty items, inform you of legal limitations of warranties, the deadlines for commencement of any legal action regarding the damages, and represent you in reaching a settlement in any legal action you may need to take. You should consult with an attorney if you have questions about your need for legal representation.

Q. Where can I go to get more information on this subject?

A. Contact the building inspection department in your city. Internet searches using keywords and strings such as "stucco," "moisture damage," "stucco and moisture problems," "moisture in buildings " and "mold in home" can also provide more background information on the subject.