REPORT OF THE
BOARD OF HOUSING AND COMMUNITY DEVELOPMENT ON

THE USE OF SYNTHETIC STUCCO IN VIRGINIA

TO THE GOVERNOR AND
THE GENERAL ASSEMBLY OF VIRGINIA

HOUSE DOCUMENT NO. 29

COMMONWEALTH OF VIRGINIA
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COMMONWEALTH of VIRGINIA

George Allen
Governor

DEPARTMENT OF
HOUSING AND COMMUNITY DEVELOPMENT

Robert J. Stolle
Secretary of
Commerce and Trade

Warren C. Smith
Director

December 8, 1997

To: The Honorable George F. Allen, Governor of Virginia

and

Members of the Virginia General Assembly

The 1997 General Assembly, through House Joint Resolution 466, requested the Board of Housing and Community Development to study the use of synthetic stucco (known as Exterior Insulation and Finish Systems or EIFS) in Virginia. As a result of this study, the Board will consider amendments to the Uniform Statewide Building Code and special training needs for contractors.

Enclosed for your review and consideration is the report which has been prepared in response to this request. The Board received assistance from citizens with special interests or expertise in this issue, including home builders, Realtors and local government representatives. These citizens served on an Ad Hoc Committee of the Board to study EIFS issues. The Board expresses appreciation for their assistance in this study and acknowledges their input into this report.

Respectfully submitted,

Leonard S. Mitchel
Chairman
Board of Housing and Community Development

Preface

House Joint Resolution Number 466, passed by the 1997 General Assembly, requested the Board of Housing and Community Development to study the use of synthetic stucco (known as Exterior Insulation and Finish Systems or EIFS) in Virginia. Specific tasks included making recommendations as to necessary changes to the Uniform Statewide Building Code to protect the public and examining whether special training is necessary for licensed contractors in Virginia.

In response to House Joint Resolution Number 466, the Board directed staff of the Department of Housing and Community Development to organize an Ad Hoc Committee to study the issues regarding EIFS and submit recommendations to the Board. Staff solicited volunteers for the committee from various interest groups and received requests to have members serve on the committee from other groups and from interested individuals.

The Ad Hoc Committee met once in Richmond and once in Chesapeake to develop recommendations for the Board as directed by House Joint Resolution Number 466. After the meetings, the committee members received additional information and documents for review and response. Staff within the Department prepared drafts of the committee's findings and recommendations and distributed them to the committee members. After reaching a consensus, the committee submitted the recommendations contained in this report to the Board of Housing and Community Development for its review and approval. The Board has taken these recommendations under advisement and in January 1998 will consider initiating the process for amending appropriate provisions of the Uniform Statewide Building Code to address problems associated with the use of EIFS in Virginia.

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Executive Summary:

House Joint Resolution Number 466, passed by the 1997 General Assembly, requested the Board of Housing and Community Development to study the use of synthetic stucco (known as Exterior Insulation and Finish Systems or EIFS) in Virginia. Exterior Insulation and Finish Systems (EIFS) are multi-layered exterior wall systems used on both commercial and residential buildings. Since 1985, several locations around the country, including Missouri, Illinois, Massachusetts, Georgia, South Carolina, and other states have reported various problems associated with EIFS.

The predominant problem with the EIFS has been water infiltrating the system and then being trapped against the substrate and studs. Excessive moisture causes the wood or gypsum substrates and the metal or wood studs to deteriorate to the point of structural damage. Often, the damage to the structural members is invisible as it is occurring. Extensive damage can occur before it is visible.

An Ad Hoc Committee formed at the direction of the Board of Housing and Community Development identified various problems associated with the EIFS during its the study. These problems covered everything from the provisions of Virginia's Uniform Statewide Building Code (USBC), to the materials and use of the EIFS, and to other materials and components of a finished building that may be incompatible with the EIFS.

The 1996 Building Officials and Code Administrators (BOCA) National Building Code, as referenced in the USBC, includes a section on EIFS and requires special inspections under certain conditions. The BOCA membership recently amended the model code to change significantly its requirements for EIFS; however, those amendments would not ordinarily be adopted as part of the USBC until the next code change cycle for the next edition of the BOCA code.

Rather than wait for further developments on the national scene, the committee recommended the following actions to the Board of Housing and Community Development:

- The USBC should require that all EIFS projects meet the new BOCA requirements, regardless of the Use Group of the building or the amount of EIFS present, thereby assuring that single family dwellings built under the CABO standards would be covered.

- The USBC should require that the person responsible for "signing off" that the EIFS project was completed correctly, shall be appropriately trained and/or certified. However, the committee does not recommend that every worker on an EIFS project would have to go through the required training/certification and "sign off" on the project.

- The USBC should require that only water managed or drainable type EIFS products with valid and current BOCA, National Evaluations Services (NES), or other equivalent research and evaluation reports will be considered for approval on wood frame

construction or with other types of construction where the substrate under the EIFS is susceptible to moisture damage. Barrier types of EIFS would be prohibited from use on those types of construction and substrates.

- There should be provisions for identifying the specific manufacturer's products used on or in an EIFS project so that owners, inspectors, builders, insurers, or others would be able to identify those products at a later date.

- The USBC should be amended to require special inspections for all EIFS applications except those where the EIFS is not relied upon to provide the water resistance barrier for the building wall.

Chapter 1: Introduction and Background

Exterior Insulation and Finish Systems (EIFS) are multi-layered exterior wall systems used on both commercial and residential buildings. EIFS typically consist of an insulation board, usually of polystyrene or polyisocyanurate foam, a base coat applied over the insulation board and reinforced with a fiber mesh, and a finish coat. These components are applied to various substrates, such as gypsum board, plywood, oriented strand board (OSB), and masonry. The substrates may be attached to wood studs or to metal studs, depending on the design. Adhesives or mechanical fasteners attach the EIFS to the substrate. Joints between EIFS and other materials, around window and door frames, and other penetrations must be properly sealed to prevent infiltration of water.

Two (2) general types of EIFS are in use. The "barrier" type of EIFS forms a weather resistant barrier, or envelope, around the building to prevent the infiltration of water behind the EIFS or into the building. This type of EIFS does not have a secondary, or backup, water-resistant barrier behind the EIFS to divert any moisture that infiltrates into the EIFS away from the substrate and back to the exterior. The second type is referred to as a "water managed" or drainable system. This type of EIFS provides a drainage system for any water penetrating the EIFS cladding and includes a secondary, or backup, weather resistant barrier such as building paper, house wrap, or similar materials to prevent any infiltrating moisture from damaging substrates such as gypsum board, OSB, or plywood and the metal or wood studs.

Since 1985, several locations around the country, including Missouri, Illinois, Massachusetts, Georgia, South Carolina, and other states have reported various problems associated with EIFS. The most publicized problems, and likely the first to be addressed as class action lawsuits in the courts in early 1998, were in New Hanover County and Wilmington, North Carolina. Problems have also been found in the Northern Virginia and Tidewater areas of Virginia with buildings using the EIFS.

The predominant problem with the EIFS has been water first infiltrating the system and then being trapped against the substrate and studs. This excessive moisture caused the wood or gypsum substrates and the metal or wood studs to deteriorate to the point of structural damage. Often, the water damage to the structural members is not readily visible from the exterior or interior of the building as it is occurring. Extensive structural damage can occur before the damage becomes visible.

Generally, the field of the EIFS wall has not been the source of the water infiltration problems, unless the wall was cracked or damaged. Most water seems to have infiltrated around or under windows, doors, decks, roof terminations, dormers, or other joints between the EIFS components and other building materials. In many cases, those joints and various penetrations of the EIFS by wiring, pipes, or fasteners were not sealed, not properly flashed and sealed, or the seal had failed, allowing the water to penetrate behind the EIFS. With barrier type EIFS, the

water that penetrated behind the EIFS cladding was trapped with no drainage provisions or methods to direct the water back to the exterior.

Chapter 2: Problems

The committee identified various problems associated with the EIFS during its the study. These problems covered all aspects, from the provisions of the Uniform Statewide Building Code itself to the materials and application of the EIFS and to other materials and components of a finished building that may not be compatible with the EIFS. The committee identified and discussed various issues or problems explained below.

There are different provisions for regulating EIFS under the current edition of the Uniform Statewide Building Code (USBC). The 1996 BOCA National Building Code, as referenced in the USBC, includes a section on EIFS and requires special inspections under certain conditions. The BOCA membership adopted changes to the model code at the BOCA annual meeting in Norfolk, Virginia on September 30, 1997. Those amendments significantly change the requirements for EIFS in the BOCA code; however, those amendments would not ordinarily be adopted as part of the USBC until the next code change cycle for the next edition of the BOCA code. The 1995 CABO One and Two Family Dwelling Code, also referenced in the USBC, has no specific provisions for EIFS. It is questionable or doubtful that the EIFS requirement from BOCA can be applied to single family dwellings constructed under the CABO standards as allowed under the USBC provisions.

Responsibility for the installation of the EIFS components and other portions of the finished building that penetrate or join the EIFS is usually divided . One crew may install the insulation board and/or the base and finish coats. Someone else installs the windows and doors. Another crew may do the caulking and sealing. Other trades, such as electrical, plumbing, HVAC, or carpenters, may create penetrations of, or joints with, the EIFS and may leave those areas subject to water infiltration unless they have been properly sealed. The number of people and the various trades involved with the installation of the components of a completed building also present a potential problem when considering special training on EIFS for licensed contractors. Which workers should be required to be trained and/or certified? Should every individual worker installing the EIFS components be required to be trained and/or certified in the application of the product? If so, what about the electricians, plumbers, or other tradesmen who may have to cut or penetrate the EIFS to run their wiring or pipes? Should they then be trained in the proper methods of sealing the penetrations they have made to avoid water infiltration behind the EIFS?

Several problems were identified with sealing joints and penetrations of EIFS, both with workmanship and with the materials used to seal the joints and penetrations. In the buildings that have exhibited water infiltration problems, some were found with the joints and penetrations not sealed properly. In some cases, backer rods were omitted or the wrong backer materials used. There were joints or penetrations found without sealant or with the wrong sealant used for that application. There are various types of backer materials and sealants available with different elastic properties, different shelf life, and varying times of degradation and replacement

requirements. Workers were not always trained to understand how to apply the right kind of backer and sealant in the correct manner. Overly stiff sealants, applied to the finish coat of the EIFS and not to the base coat, can result in the sealant pulling apart the base coat and the finish coat, especially as the finish coat may re-emulsify when moisture is prolonged.

Some of the problems with water infiltration have been shown to have been caused by other building components instead of the EIFS. Some windows themselves leak in the frames or jambs, allowing water to penetrate behind the EIFS. Tests of many windows, even expensive, high-quality, "name brand" windows, have shown water leakage through the window frame. Certain types of windows are not compatible with EIFS walls which do not provide proper flashing and water drainage methods. Some window manufacturers will not warranty their windows if used in EIFS walls.

Barrier type EIFS do not have a secondary weather resistant barrier such as building paper or house wrap to protect the substrate and structure from any water which gets through the EIFS. This is compared to brick or masonry veneers and other types of cladding or siding which have a secondary weather or water barrier to handle any water which manages to get into or behind the veneer or cladding. The problems with this lack of secondary protection may be magnified once water penetrates a barrier type EIFS since there are no controlled methods to drain the water back to the exterior. Some EIFS manufacturers have ceased producing barrier type EIFS because of these problems and will now produce only water managed or drainable EIFS products.

Sometimes, the EIFS manufacturers' installation instructions and details are not applicable to the specific project nor sufficiently clear to provide the necessary installation details. Other manufacturers place so many disclaimers on their details and instructions, or accept no liability for their use, that the details and instructions are not warranted for inclusion or citation in the construction documents for a specific project.

Local building inspection departments do not have now, nor are they likely to have in the future, sufficient staff to completely inspect all components of each EIFS project as the materials are being applied. Some inspections of completed installation can be made during the final inspection of the building; however, the inspectors have a problem identifying the type or brand of EIFS products used on that project. There are no manufacturer's identifying marks on the finished materials. Even though the color of the reinforcing mesh is usually specific to a particular manufacturer, the inspectors cannot see the mesh on a completed project. This is especially troublesome on a call back for a problem after the building has been completed. Unless someone has maintained records of the product used on that specific project, the inspector has no way of identifying the manufacturer of the product. Without manufacturer's marks, inspectors may also have problems determining whether an applicator or installer is mixing products from different manufacturers, using "leftover" material from previous projects.

Due to the myriad of problems experienced with various EIFS products and projects, some insurance companies have stopped or are phasing out coverage for builders utilizing EIFS in

their projects. The building contractors may find that when their policies are renewed by the insurance companies, there is an exclusion written in for EIFS projects in their coverage. Also, according to the National Association of Home Builders, at least one bank will no longer provide mortgages on EIFS homes and some real estate agents are refusing to show EIFS homes or will clearly disclose the presence of the EIFS on the homes when they are shown.

Chapter 3: Recommendations from the Committee

Several efforts are presently underway to address and correct the problems noted with EIFS products and their application. As indicated in this report, amendments to the BOCA National Building Code, and the subsequent International Building Code, were adopted by the BOCA membership on September 30, 1997. Those amendments require that where the EIFS functions as the weather barrier, drainage systems, backup water barriers, proper flashing, compliance with the manufacturer's installation instructions, and special inspections to verify that compliance are now addressed in the BOCA National Building Code. The manufacturers of the EIFS products are developing new systems in an attempt to eliminate the problems experienced with the earlier EIFS projects. Training programs are being developed and provided by various industry groups and individual companies to train the applicators in the proper installation techniques, types and proper use of backer materials and sealants, flashing, and other issues leading to better EIFS installations. An American Society for Testing and Materials (ASTM) committee is writing standards for EIFS materials and installations; however, they may delay their publication due to the rapidly changing and evolving EIFS industry.

The National Association of Home Builders (NAHB) has established an EIFS Task Force to work with various EIFS manufacturers, builders, insurers, and the class action property owners in a formal mediation effort aimed at resolving the EIFS lawsuits. According to the NAHB, as a part of these negotiations, considerable resources have been devoted to developing cost-effective methods for repairing EIFS problems. The NAHB Research Center and other interested groups are working on systems to repair or retrofit existing barrier EIFS with a permanent fix. Other negotiations are centering on inspection procedures for EIFS installations, possible sinking funds for inspections, set schedules for tests and inspections of EIFS projects one to five years after completion, training of inspectors, and other issues.

All these actions and proposals will be developed and possibly carried out during the future on the national level. At this time, no one can really predict what these future actions will be exactly or when they might be implemented on the national or industry-wide level. Therefore, the committee developed the following specific recommendations for the Board of Housing and Community Development to implement in Virginia to address the concerns of and protect the citizens of this Commonwealth rather than wait for something further to develop on the national scene.

- A provision should be added to the USBC to require all EIFS projects to meet the new BOCA requirements, as amended by the membership on September 30, 1997, whatever the Use Group of the building or the size of the EIFS on the building. This would resolve the question of whether the BOCA requirements would be enforceable on single family dwellings built under the CABO standards. The USBC would address the requirements for all projects.

- A provision should be added to the USBC to require that the person responsible for "signing off" that the EIFS project was completed correctly shall be trained and/or certified by either the specific product manufacturer or a generic program, approved by the official having jurisdiction (i.e., building official), provided by manufacturers or other trade associations and organizations. The person signing off on the project could be the company owner or chief officer, a foreman, or the worker that actually did the installation. One member of the committee expressed concern about "self certification" by the product manufacturer or installer, since problems with self certification in other construction areas have been noted by local officials in the past. Verification of the training of that person shall be a part of the certification for that project. The committee does not recommend that every worker on an EIFS project would have to go through the required training/certification and "sign off" on the project.

- The USBC should be amended to require that only water managed or drainable type EIFS products with valid and current BOCA, National Evaluations Services (NES), or other equivalent research and evaluation reports will be considered for approval on wood frame construction or with other types of construction where the substrate under the EIFS is susceptible to damage from moisture. The barrier types of EIFS would be prohibited from being used on those types of construction and substrates. The recently amended provisions in BOCA address this concern.

- There should be provisions for identifying the specific manufacturer's products used on or in an EIFS project so that owners, inspectors, builders, insurers, or others would be able to know or identify those products at a later date. If there are problems after the building has been completed and occupied, either through manufacturer's marks on drain moldings, notations on the certificate of occupancy, or a combination of both, the identity of the manufacturer of the products could be determined.

- The USBC should be amended to require special inspections for all EIFS applications except those where the EIFS is not relied upon to provide the water resistance barrier for the building wall. The special inspections shall be based upon the information provided in the manufacturer's installation instructions and the construction documents. The manufacturer's installation instructions shall include criteria for the type and conditions of the substrate, foam plastic materials and application, mesh application, base and finish coat applications including thickness, ambient conditions and cure, sealant requirements, joint details, eaves, corners, penetrations of the EIFS, and any other criteria necessary for the proper installation of the EIFS materials and completion of the project. Adoption of the BOCA amendments will address this recommendation.

The requirement for special inspections will add some costs to the projects. These added costs will vary depending upon the size of the project, numbers of inspections necessary, and the individual hourly charges or rates of the inspection personnel. For special inspections of commercial and multi-family EIFS projects of 10,000 square feet or more, some estimates have

been at the rate of $0.10 per square foot of EIFS inspected. This results in a cost of $1,000 for special inspections for a building with 10,000 square feet of EIFS, for example. Other estimates figure a two-hour pre-construction meeting, and on-going inspections of one to two hours each, three days a week. This would result in about eight hours charged for the first week and about six hours for each subsequent week of the installation work multiplied by the hourly charge for that company or person. Some companies in the Northern Virginia area gave estimates of $2,500 to $4,500 for commercial projects, depending on project size and design complexity, with costs rarely exceeding $5,000.

For single family EIFS projects, some estimates for costs for the special inspections usually run about $100 to $150 per inspection, with an average of three inspections during the stages of application. The total estimated costs would be around $300 for a house with 1,500 to 2,000 square feet of EIFS up to approximately $450 to $500 for houses of around 3,500 square feet of EIFS. Northern Virginia companies estimate inspection costs ranging from $1,000 to $1,500 for a new house and $1,500 to $2,000 for an existing house, again depending upon the size of the house and design complexity.

Appendix A -- House Joint Resolution Number 466

HOUSE JOINT RESOLUTION NO. 466

Requesting the Board of Housing and Community Development to study the use of synthetic stucco in Virginia.

Agreed to by the House of Delegates, January 30, 1997
Agreed to by the Senate, February 19, 1997

WHEREAS, synthetic stucco was first introduced after World War II to fix war-damaged masonry, and has become widely used in the United States since the 1960s; and

WHEREAS, synthetic stucco, also known as "eifs" (exterior insulation and finish system), is being hailed as an energy efficient, low-maintenance and versatile housing exterior; and

WHEREAS, this new generation of wall finishing is seen as a revolutionary way to insulate and coat the outside of a building, virtually eliminating the possibility of water intrusion; and

WHEREAS, last year a controversy erupted in North Carolina and other states about homes clad in synthetic stucco due to water seeping into the stucco-covered walls; and

WHEREAS, extensive damage is caused by the seepage of water which is unable to escape, causing wood to rot and severe damage to inside walls; and

WHEREAS, last year more than 260 million square feet of synthetic stucco was applied in the United States, with about 80 percent on residential property; and

WHEREAS, it is predicted that installation of synthetic stucco will exceed two billion square feet by the end of 1997; and

WHEREAS, a close examination of the problem strongly suggests that the fault with synthetic stucco is not with the product itself, but with the way it is applied; and

WHEREAS, in Virginia, the Home Builders Association has initiated training programs and seminars for builders, distributors and installers to address the problem of installation; and

WHEREAS, many building officials believe that building contractors should be licensed and trained by manufacturers of synthetic stucco to ensure its proper application; now, therefore, be it

RESOLVED by the House of Delegates, the Senate concurring, That the Board of Housing and Community Development be requested to study the use of synthetic stucco in Virginia and make recommendations as to necessary changes to the Uniform Statewide Building Code to protect the public. The Board of Housing and Community Development shall also examine whether special training is necessary for licensed contractors in Virginia.

All agencies of the Commonwealth shall provide assistance to the Board of Housing and Community Development for this study, upon request.

The Board of Housing and Community Development shall complete its work in time to submit its findings and recommendations to the Governor and the 1998 Session of the General Assembly as provided in the procedures of the Division of Legislative Automated Systems for the processing of legislative documents.

Appendix B -- Ad Hoc Committee

The Department expresses appreciation to the following individuals for serving on or providing documents and information to the Ad Hoc Committee and for their work in providing recommendations to the Board.

Oliver P. Farinholt -- The TAF Group (Board of Housing and Community Development)
Jeff Ainsle -- Benchmark Building Corp. (State Technical Review Board)
Dennis B. Clark -- William C. Overman and Associates (State Technical Review Board)
Robert R. Loher -- City of Virginia Beach Permits and Inspections Division
Paul Lynch -- Fairfax County Department of Environmental Management
Susan S. Gaston -- Virginia Peninsula Association of Realtors
Doug Gray -- Virginia Association of Realtors
Natalee D. Grigg -- Home Builders Association of Virginia
Sheldon J. Leavitt -- Leavitt Associates, Ltd.
Elaine Jordan -- Sands, Anderson, Marks & Miller
Channing Pfeiffer -- Tidewater Builders Association

Staff -- Curtis L. McIver, Department of Housing and Community Development