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Forward

Plaster, and the many variations of its compositions and applications, represents one of the oldest and most continually utilized construction methods and processes known to man. Whether you are examining ruins of the ancient Greeks, early European cultures, or structures of the Native Americans of the Southwestern United States, plaster existed and was used extensively in cultures and societies before the written word.

The worldwide use of plaster, in one variety or another, serves to bolster its importance not only to the environment built by our predecessors, but also to illustrate plaster's versatility as a construction medium, crossing both geographic and cultural boundaries. More importantly, the process of plastering and the materials used in this skill have continued to evolve with history, making it one of today's most preferred systems in the construction industry.

In modern times the knowledge and skill displayed by those involved with the plastering industry represents literally thousands of years experience dealing with the plastering trade. This experience serves as a link to our past heritage and our future as an industry. The responsibility of those currently involved is one of continually reviewing and refining both the products and processes associated with plaster to better serve all involved with the construction industry.

Introduction

This CD-ROM is published as a joint effort of both the Texas Bureau of Lath and Plaster (TBLP) and the Texas Lathing and Plastering Contractors Association (TLPCA).

The objective of this undertaking is to provide those within the building industry a guide or reference with respect to interior and exterior wall and ceiling systems. More specifically, those systems, which involve the use of lath, plaster, sprayed on fireproofing, and exterior wall systems.

The format of this manual provides graphic and technical information that will serve to benefit the architect, general contractor, professional engineer, and construction specifier who needs to establish a better understanding of the composition and application of plaster, and it's related components.

This manual replaces the previous edition (1982), and our initial product and systems manual of the 1970's. The information contained herein is the most currently recognized and approved specifications, and trade data available. As publishers, we wish to gratefully acknowledge reproductive rights of those documents which appear here either in part, or in whole.

We would like to provide you with some background information on the two primary organizations, which have undertaken the publication of this manual:

Texas Lathing and Plastering Contractors Association (TLPCA)

The TLPCA is an organization composed of contractor and supplier members who are primarily associated with the plastering industry. The main objective of this group, which was founded in 1952, is one of promotion and education with regard to quality methods and practices within the plastering trades. Through publications such as this CD ROM, and educational seminars, programs and instructional data, TLPCA is funded and driven by its members to promote the highest degree of excellence with regard to the industry.

Texas Bureau of Lath and Plaster (TBLP)

The Bureau is an industry promotional and educational organization funded in part by both TLPCA and Bureau members for the goal of established design and specification standards with regard to the plastering industry. With input and direction from both manufacturers and contractors, TBLP serves as a provider of consistent and factual information with respect to products and their application.

It is our sincere desire that the information contained in this manual; serves to clarify and help those involved in the design and construction process. We hope that you join us in finding that plaster and its use, can serve to better enhance the life and function of many different types of buildings.

To contact either of these organizations:

TLPCA/TBLP
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Texas Watts: 1-800-441-2507
E-Mail: tlpca@aol.com
Web Site: www.tlpca.org

For a complete listing of recommended TLPCA Contractors, call the Association Office or consult the TLPCA Web Page for a current list of firms and their phone numbers and addresses.

Other Contributing Associations and Individuals

Association of Wall & Ceiling Industries International (AWCI)

Foundation of the Wall and Ceiling Industries (FWCI)

The mission of the *Association of the Wall and Ceiling Industries International* is to provide services and undertake activities that enhance the members' ability to operate a successful business. AWCI represents acoustics systems, ceiling systems, drywall systems, exterior insulation and finishing systems, fireproofing, flooring systems, insulation and stucco contractors, suppliers, manufacturers, and those in the allied trades.

General Office Number: (703) 534-8300
Fax Number: (703) 534-8307
E-Mail: info@AWCI.org
Web Site: www.AWCI.org

EIFS Industry Members Association (EIMA)

Founded in 1981, EIMA is a non-profit trade association comprised of leading manufacturers, suppliers, distributors, and applicators involved in the exterior insulation and finish systems (EIFS) industry. EIMA's mission is threefold:

- Enhance, improve, and promote the EIFS industry.
- Advance the EIFS industry through research and dissemination of technical information.
- Educate specifiers and users about EIFS products.

EIMA promotes industry-wide performance standards and develops specification guidelines and standards for EIFS systems, materials, and methods of application. The association also publishes specifications and test methods on such topics as performance, durability, fire testing, and application and use of related exterior wall components. EIMA-sponsored research and testing programs are the basis for many model building code requirements. For additional information, contact:

EIFS Industry Members Association
Phone: 1-800-294-3462 or 1-770-968-7945
Web Site: www.eifsfacts.com.

J. Dick Hopkins & Associates, Inc.

Wall & ceiling consultants specializing in Exterior Insulation and Finish Systems
P.O. Box 81145
Conyers, GA 30013
Phone: 770-760-1177
Fax: 770-760-0514
E-mail: eifsd1@cs.com
Web Site: www.eifsweb.com

Northwest Walls & Ceilings Bureau (NWCB)

The *Northwest Wall and Ceiling Bureau* (NWCB) is an international professional trade association serving a wide ranging membership of contractors, manufacturers, dealers (suppliers and distributors) and labor. On behalf of its membership, NWCB serves as a coordinating, development, and promotional center to enhance the position of the wall and ceiling industry in the construction field. The association maintains a trained professional staff for immediate response to memberships in Alaska, Idaho, Oregon, Washington, Alberta, British Columbia, Manitoba, and Saskatchewan.

Northwest Wall and Ceiling Bureau
1032-A N.E. 65th St.
Seattle, WA 98115
Phone: 206/524-42431 or 800-524-4215
Fax: 206/524-4136
E-mail: info@NWCB.org
Web Site: www.NWCB.org

Note: Details shown in Chapter 2 and 3 are courtesy of the Northwest Wall and Ceiling Bureau.

Disclaimer

The drawings and comments contained in the pages that follow are for general information only, and *TPLCA/TBLP* specifically disclaims any design or construction intent or responsibility. *There are no warranties, express or implied, issued or made by TPLCA/TBLP, AWCI, FWCI, EIMA, J. Dick Hopkins & Associates, Inc., NWCB, or any other contributor in connection with these drawings and comments or regarding the use of specific materials*.

These drawings are not intended, and should not be used as a substitute for any applicable manufacturer's specifications or professional building design services.

Construction trade practices used in the State of Texas are contained in the text and the details of this publication and may be different from some published codes and standards. They are represented because of many years of successful use in the Texas market.

The specification, design, and construction of all structures described herein, must comply with local building codes and standards, applicable compliance reports and the individual manufacturer's system requirements.

Only the manufacturer or design professional can furnish specifications, details, drawings, and construction practices to be followed for actual construction and use of any product and for compliance with applicable local building codes and construction practices. The successful installation and performance of materials used are dependent upon the proper design and construction of the adjacent materials and systems of the structure. For these reasons, only a licensed and qualified design professional can create and issue specifications, drawings, and details for actual or prospective construction, or renovation using the products herein. These drawings are not intended as an exclusive method for achieving desired performance. Alternative configurations may achieve equal or better performance.

Selecting a Quality Lathing and Plastering Contractor

Following are a few helpful guidelines you might want to consider before selecting a Lathing and Plastering Contractor to do your project:

- Is the contractor a *member of a professional association,* which sets standards and is recognized in the construction community, such as the Texas Lathing and Plastering Contractors Association?
- Does the contractor carry all required insurance coverage? Is the contractor *bondable*?
- Will the contractor provide a *list of previous jobs* similar to the one you are planning?
- Can the contractor *meet the financial terms* and *time schedule* involved?
- Is the contractor an *approved applicator of the method or system* being specified?

TESTING AUTHORITY

The following alphabetical designations have been used throughout this manual to refer to authorities cited as sources for fire resistance and sound transmission loss ratings:

Abbreviation	***Testing Authority***
C	University of California
N	National Bureau of Standards
NBFU	National Board of Fire Underwriters "Fire Resistive Ratings".
OSU	Ohio State University
R	Riverbank Acoustical Laboratories of Armour Research Foundation
UL	Underwriters Laboratories, Inc.
E	In the absence of specific test or rating data, rating shown is publisher's estimate based on test of similar assembly.

The sponsors and its Member Contractors make no warranties or other representations regarding these assemblies or their use because of varying situations under which they may be constructed.

TABLE OF CONTENTS

Section I

Sprayed Fireproofing

This section describes the various materials, uses, and types of Sprayed Fireproofing applications and systems.

Sprayed Fireproofing

Buildings are classified as to building Type and occupancy usage according to the code authority adopted by the city in which the building is to be constructed. The most common code authorities in use today are the *Uniform Building Code* (UBC), the *Standard Building Code* (SBC), and *Building Officials and Code Administrators* (BOCA). The classification of building Type and occupancy is the key as to whether or not fireproofing is required.

Spray applied fireproofing is classified as a passive fire protection because once it is installed it remains in place and ready to perform. Alternative fire protection methods such as sprinkler systems rely on a fire to reach a certain temperature to activate a fuse before the system is activated. The system needs to be tested on a regular basis to assure the systems readiness. The percentage of systems that malfunction when tested is significant.

Once it is determined that sprayed fireproofing is required, the decision as to what Type product is best for the project must be made. Spray fireproofing materials in use today include:

- Low, medium, & high density cementitious
- Low and medium density mineral fiber
- Interior or exterior grade
- Intumescent

Each of these projects have specific design characteristics that when specified correctly will satisfy all of your fireproofing needs.

Underwriters Laboratory has fire tested hundreds of fire tests using products from all the manufacturers in specific construction assemblies. These tests are published and updated yearly, taking advantage of new and improved products and reduced thicknesses. This publication is *the Bible* for the fireproofing industry, and sets the standard for all fireproofing applications.

Low Density Fireproofing:

Proven in place performance on interior structural members makes these products the most widely used fireproofing in the world. They are cost effective spray applied products designed for easy and fast applications to protect steel and concrete substrates. These products provide the maximum flexibility to fit a wide variety of job site conditions.

Typical Use: Interior Concealed Applications

Medium Density Fireproofing:

Designed for applications where the potential for physical abuse is a consideration. These products offer an increased bond strength and density over the low density materials.

Typical Use: Interior Exposed Applications

High Density Fireproofing:

Designed for use in applications where environmental or climatic conditions exist. It is a durable product excellent for use in exposed high traffic areas such as parking garages.

Typical Use: Interior or Exterior Exposed Applications

Intumescent Fireproofing

A decorative, thin filmed fireproofing for structural steel. It allows the designer to express structure as an art form at interior locations in buildings where fire resistance ratings are required.

Typical Use: Interior Exposed Structural Steel

Design Charts

Wide Flange Columns

UL Design X790	UL Design X772	UL Design X829	UL Design X772	UL Design Y708
CAFCO® 300,SB,400	Monokote MK-6	CAFCO® BLAZE-SHIELD® II, HP	SWV Type 5	Carboline Type 15

Hollow Sections

UL Design X790	UL Design X771	UL Design X827	UL Design X771	UL Design Y707
CAFCO® 300,SB,400	Monokote MK-6	CAFCO® BLAZE-SHIELD® II, HP	SWV Type 5	Carboline Type 15

Floor Joists Supporting Unprotected Deck

Normal Weight Concrete				
UL Design N761	UL Design N777*	UL Design N830	UL Design N736	UL Design N774
CAFCO® 300,SB,400	Monokote MK-6	CAFCO® BLAZE-SHIELD® II, HP	SWV Type 5	Carboline Type 15

Light-Weight Concrete				
UL Design N761	UL Design N777 Lower thickness available when joists are spaced 4 ft. or less on center.	UL Design N830	UL Design N736	UL Design N774
CAFCO® 300,SB,400	Monokote® MK-6	CAFCO® BLAZE-SHIELD® II, HP	SWV Type 5	Carboline® Type 15

Floor Beams Supporting Unprotected Deck

Normal Weight Concrete

All-Fluted Floor Decks				
UL Design N759	UL Design N782	UL Design N823	UL Design N708	UL Design N772
CAFCO® 300,SB,400	Monokote® MK-6	CAFCO® BLAZE-SHIELD® II, HP	SWV Type 5	Carboline® Type 15

FLUTED, CELLULAR, OR CORRUGATED DECKS				
UL Design N759	UL Design N782	UL Design N823	UL Design N708	UL Design N772
CAFCO® 300,SB,400	Monokote® MK-6	CAFCO® BLAZE-SHIELD® II, HP	SWV Type 5	Carboline® Type 15

Floor Beams Supporting Protected Deck

Normal Weight Concrete

Deck Thicknesses Beam Thicknesses							
UL Design N805	UL Design N779	UL Design N771	UL Design N706	UL Design N805	UL Design N779	UL Design N771	UL Design N706
CAFCO® BLAZE-SHIELD® II, HP	Monokote® MK-6	Carboline® Type 15	SWV Type 5	CAFCO® BLAZE-SHIELD® II, HP	Monokote® MK-6	Carboline® Type 15	SWV Type 5

Light Weight Concrete

Deck Thicknesses Beam Thicknesses							
UL Design N805	UL Design N779	UL Design N771	UL Design N706	UL Design N805	UL Design N779	UL Design N771	UL Design N706
CAFCO® BLAZE-SHIELD® II, HP	Monokote®MK-6	Carboline® Type 15	SWV Type 5	CAFCO® BLAZE-SHIELD® II, HP	Monokote® MK-6	Carboline® Type 15	SWV Type 5

Floor Assemblies – Protected Deck

Deck Thicknesses					
UL Design D759	UL Design D739	UL Design D832	UL Design D858	UL Design D739	UL Design D767
CAFCO® 300,SB,400	Monokote® MK-6	CAFCO® BLAZE-SHIELD® II, HP	CAFCO® BLAZE-SHIELD® II, HP	SWV Type 5	Carboline® Type 15

Floor Assemblies – Unprotected Deck

Use Fire Protection Thicknesses From* Beams Supporting Unprotected Deck *Table					
UL Design D902	UL Design D902	UL Design D902	UL Design D925, D916	UL Design D916	UL Design D927
CAFCO® 300,SB	CAFCO® 400	CAFCO® BLAZE-SHIELD® II, HP	Monokote® MK-6	SWV Type 5	Carboline® Type 15

Roof Assemblies – Protected Deck

Deck Thicknesses				
UL Design P723	UL Design P819	UL Design P732	UL Designs P711	UL Design P736
CAFCO® 300, SB, 400	CAFCO® BLAZE-SHIELD® II, HP	Monokote® MK-6	SWV Type 5	Carboline® Type 15

Beam Thicknesses				
UL Design P723	UL Design P732	UL Design P819	UL Designs P711	UL Design P736
CAFCO® 300, SB, 400	Monokote® MK-6	CAFCO® BLAZE-SHIELD® II, HP	SWV Type 5	Carboline® Type 15

Roof Assemblies – Protected Deck

Joist Thicknesses				
UL Design P719	UL Design P819	UL Design P732	UL Designs P734	UL Design P701
CAFCO® 300, SB, 400	CAFCO® BLAZE-SHIELD® II, HP	Monokote® MK-6	Carboline® Type 15	SWV Type 5

Roof Assemblies – Unprotected Deck

Beam Thicknesses				
UL Design P908	UL Design P908	UL Design P908	UL Designs P908	UL Design P927
CAFCO® 300, SB, 400	CAFCO® BLAZE-SHIELD® II, HP	Monokote® MK-6	SWV Type 5	Carboline® Type 15

Joist Thicknesses				
UL Design P908	UL Design P908	UL Design P908	UL Designs P908	UL Design P927
CAFCO® 300, SB, 400	CAFCO® BLAZE-SHIELD® II, HP	Monokote® MK-6	SWV Type 5	Carboline® Type 15

Section II

Exterior Insulated Finish Systems (EIFS)

EIFS is a multi-layered exterior wall system that is used on both commercial and residential projects. Since EIFS is a proprietary system requiring specific code approval by manufacturer, the objective of this section is to represent the history, advantages, terminology and basic installation do's and don'ts. Please refer to specific manufacturer specifications and details for information about a specific system.

EIFS typically consists of the following components:

- Insulation board made of polystyrene, which is secured to the exterior wall surface with a specially-formulated adhesive and/or mechanical attachment.
- A durable, water-resistant base coat, which is applied on top of the insulation and reinforced with fiberglass mesh for strength.
- An attractive and durable finish coat, typically using acrylic copolymer technology, which is both colorfast and crack-resistant.

EIFS – A Story of Proven History

EIFS has a proven, impeccable, reputation for success. With history in Europe since shortly after World War II, and a successful history in North America since 1969, EIFS has been installed on millions of buildings throughout the world. In the United States alone, the EIFS industry is estimated to exceed $1 billion (installed) annually. Problems are reported with less than 1% of installations.

Development EIFS Technology

Development of EIFS occurred after WWII and is generally credited to Germany. The war caused shortages of many natural raw materials. This resulted in the accelerated development of synthetic polymer chemistry, including architectural coatings and foam plastic insulation. Europe had a disposition toward stucco-like exterior finishes, a long history of plastering expertise, and the war-induced need for new buildings. Therefore, it is plain to see why EIFS became popular and remains an important cladding in Europe, even to this day.

EIFS in the United States

In the mid-1960's, developing world concern for energy-related issues caused an American businessman by the name of Frank Morsilli to investigate EIFS and ultimately bring the concept to North America for manufacture in 1969. As people started looking to save on heating and cooling costs, and because EIFS is such an energy efficient exterior wall cladding, the 1970s Arab oil embargo became the triggering event that gave EIFS a jump start in the United States. EIFS obtained its start in Texas in 1975, and has shown continued growth in all market sectors since.

Advantages of EIFS

The chief advantage of EIFS is its energy efficiency. EIFS literally wraps the exterior in an energy-efficient thermal blanket. By insulating the outside of the structure, EIFS reduces air infiltration, stabilizes the interior environment, and reduces energy consumption. In fact, EIFS can reduce air infiltration by as much as 55% compared to standard brick or wood construction. EIFS adds an R-value of R-4 per inch of foam. Additional advantages of EIFS are:

1. Lightweight
2. Economical - Quick Installation
3. Pollution Resistant
4. Design Friendly
5. Water Resistant
6. Crack Resistant
7. Easily Repaired
8. Variety of Color/Texture
9. Fire Safety
10. Low Maintenance
11. Code Approved
12. Performance Tested
13. Variety of specially engineered systems to meet construction needs
14. Ideal for either New Construction and/or Renovation

TLPCA/TBLP Class PB System Definitions

Class PB EIFS are defined as a system applied over various types of insulation board, in which the base coat ranges from not less than 1/16" (1.6 mm) to 1/4" (6.4 mm) in dry thickness, depending upon the number of nonmetallic reinforcing mesh layers encapsulated in the base coat. The base coat is then covered with a finish coat of various thicknesses in a variety of textures and colors.

Term	Definition
Aesthetic Reveal	A groove cut into the insulation board which serves the function of decoration and/or to provide a starting/stopping point for finish coat application. A minimum thickness of ¾" foam must be left behind the reveal.
Base Coat	The initial wet-state material used to adhere the insulation board to the substrate or to encapsulate the fiberglass reinforcing mesh: can be a factory or field-mixed material.
Cold Joint	The visible junction in a finish coat.
Cure	To develop the ultimate properties of a wet state material by a chemical process.
Dry	To develop the ultimate properties of a wet state material solely by evaporation of volatile ingredients.
Edge Wrap (Backwrap)	To protect the exposed edges of the EPS board by wrapping with fiberglass reinforcing mesh embedded in base coat.
Embed	To encapsulate the fiberglass reinforcing mesh in the base coat.
Expansion Joint (In EIFS construction)	A structural separation between building elements that allows independent movement without damage to the assembly.
Exterior Insulation and Finish System (EIFS)	Non-load bearing, exterior wall cladding system that consists of an insulation board attached adhesively, mechanically or both to the substrate, an integrally reinforced base coat, and a integrally colored, textured protective finish coat.
Factory Mix	A material that is prepared at the point of manufacture and is ready to use without the addition of other materials, except possibly water to adjust consistency.
Field Mix	A material that is mixed in the field with other components and/or water.

Term	Definition
Finish Coat	The final wet state material, which provides color and texture.
Framing Member	Studs, joists, etc. manufactured or supplied in wood, or hot or cold-formed steel.
Initial Grab	The ability of a wet-state material to remain in place initially after it has been applied.
Initial Set	A time related set caused by the hydration process.
Lamina	Composite section of base coat, reinforcing mesh, and finish coat over EPS board.
Mechanical Fastener	Corrosion resistant component used to attach the insulation board to the substrate or framing member. *NOTE: Seldom used in PB type EIFS*
Primers	Liquid coatings applied to improve the adhesion of the EIFS to the substrate or the finish to the base coat. *NOTE: Primers are sometimes applied to improve the water resistance of cementious base coats.*
Reinforcing Mesh	A fiberglass material encapsulated in the base coat to strengthen the lamina; provides impact resistance. *NOTE: Reinforcing mesh is available in various weights to achieve different levels of impact resistance.*
Running Bond	Pattern used when installing the EPS thermal insulation board, to offset the vertical insulation board joints from joints in adjoining rows of insulation board.
Substrate	Surface to which the EIFS is applied.
Texture	Any surface appearance as contrasted to a smooth surface; aesthetic appearance of final coat.
Thermal Insulation Board	System component of expanded polystyrene board (EPS) of a specific type and density that functions to reduce movement and airflow through the wall, and serves as the surface to receive the EIFS lamina.
Water Management System	Generally refers to EIFS designed with a secondary air and moisture barrier that allows incidental moisture which can enter the wall through sealant joints, improperly flashed or caulked openings, or wall penetrations to drain behind the EIFS.
Wet Edge	The leading edge of a continuously applied wet state material.

Term	Definition
Wet State Material	The base coat and finish coat components applied in liquid or semi-liquid state.

TLPCA/TBLP Checklist for EIFS (PB) Application

System Materials

1. Provide copy of current code approval and proof of other testing as required by building code.

2. Has applicator provided manufacturer's recommended application procedures, repair procedures and warranty information?

3. Keep wet materials from freezing and do not apply if ambient temperature is less than recommended by manufacturer.

Applicator

1. Trained and certified by EIFS manufacturer?

2. Provided reference list of successfully completed EIFS jobs equivalent to current project?

Quality Assurance

1. Provide mock-up sample panel for approval of color, texture, and workmanship.

2. Have review of plans, details, and substrate prior to starting to identify problem areas. Pay particular attention to location of impact mesh, flashing and caulking details. Is specified caulking compatible with EIFS system?

3. Has the substrate been properly prepared; in plane, properly attached, uncoated, etc.? Is substrate sound and undamaged by weather exposure? Is surface clean and free from any foreign materials?

EPS Board

1.Is edge or face of each piece of insulation board labeled with manufacturer's identification and approved agency's identification? Lot number marked on each package?

2. Insulation board maximum size 24 in. wide X 48 in. long; 3/4" min. thickness (check at reveals)

3. Stored under cover, stacked flat with care to avoid damage or exposure to sunlight (UV rays).

4. Has the detail mesh been put on the wall before any board is put on? The detail mesh has to come from behind the board and cover any exposed edge.

5. If the substrate is sheathing, is the adhesive being applied to board by notched trowel method? If the su7bstrate is wood, check for use of proper adhesive.

6. Is the board being installed in a *running bond* pattern, no joints lining up from row to row? All joints in sheathing should be bridged at least 6" with foam. Are the EPS boards interlocked at all inside and outside corners? Are there any gaps between boards? All gaps should be filled with slivers of the same type insulation board.

7. Has proper spacing been left around windows, doors, and expansion joints for sealant? (In residential construction sealant around openings is often omitted. This is a major point of entry for moisture.)

8. Cut aesthetic reveals into insulation board before application of reinforcing mesh.

9. Before base coat is applied, has the surface of the EPS board been rasped to level the wall or remove any UV damage?

Base Coat And Mesh

1. Has the detail mesh been pulled tight around the exposed edge of the EPS and embedded completely in the base coat?

2. Apply the impact mesh with base coat where indicated.

3. Is the impact mesh covered with standard fabric? Has the standard fabric been overlapped at least 2 ½"?

4. Have the corners of all openings been reinforced with *butterfly* pieces of mesh?

5. Is the base coat the proper thickness? If you can see the color of the mesh, the base coat is too thin; the mesh should be fully covered. It is acceptable for telegraphing of the mesh pattern in the base coat. Base coat should be applied first and mesh embedded into base coat.

6. All special foam shapes are to be covered with reinforcing mesh and encapsulated in base coat.

7. Is the base coat smooth and continuous? Variances in the base coat can not be covered up by the finish coat.

Finish Coat

1. Is the finish being applied in a continuous application, always working away from a wet edge to avoid cold joints?

2. Is the finish being troweled and floated out consistently by all mechanics?

3. Is the color and texture per the approved sample?

4. Cap flashing and caulking should be installed as soon as practical after application of finish coat.

5. At surfaces to receive caulking, do not apply finish coat.

EIFS - Guide to Exterior Insulation and Finish System Construction

The drawings and comments contained in the pages that follow are for general information only, and EIMA specifically disclaims any design or construction intent or responsibility. *There are no warranties, express or implied, issued or made by EIMA, or TPLCA/TBLP in connection with these drawings and comments or regarding the use of EIFS*. These drawings are not intended and should not be used as a substitute for the EIFS system manufacturer's specifications and/or for professional building design services.

The specification, design, and construction of all EIFS must comply with local building codes and standards, applicable compliance reports and the individual manufacturer's system requirements.

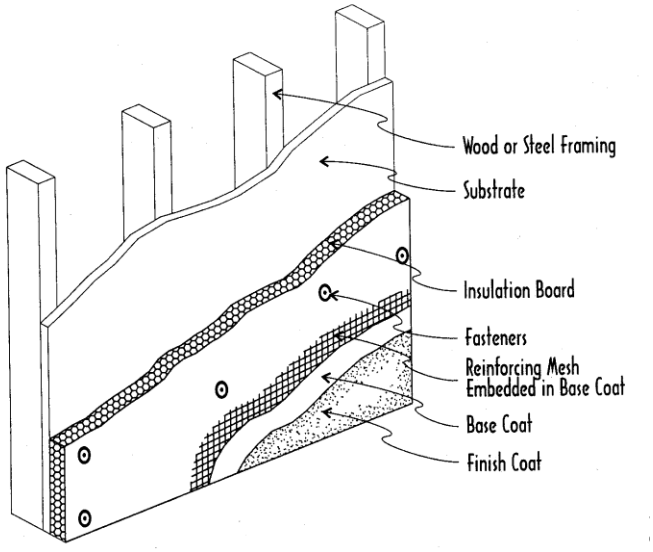
These requirements differ materially. Only the manufacturer or design professional can furnish specifications, details, drawings, and construction practices to be followed for actual construction and use of an EIFS product and for compliance with applicable local building codes and construction practices. The successful installation and performance of EIFS cladding is dependent upon the proper design and construction of the adjacent materials and systems of the structure. For these reasons, only a licensed and qualified design professional can create and issue specifications, drawings, and details for actual or prospective construction or renovation using EIFS. These drawings and comments apply only to new construction beginning in 2000, and are not intended for inspections, retrofit or repair. These drawings are not intended as an exclusive method for achieving desired performance. Alternative configurations may achieve equal or better performance.

These drawings and comments apply only to complete EIFS products as specifically defined in the current edition of EIMA Classification Paper.

Typical PB EIFS Configuration

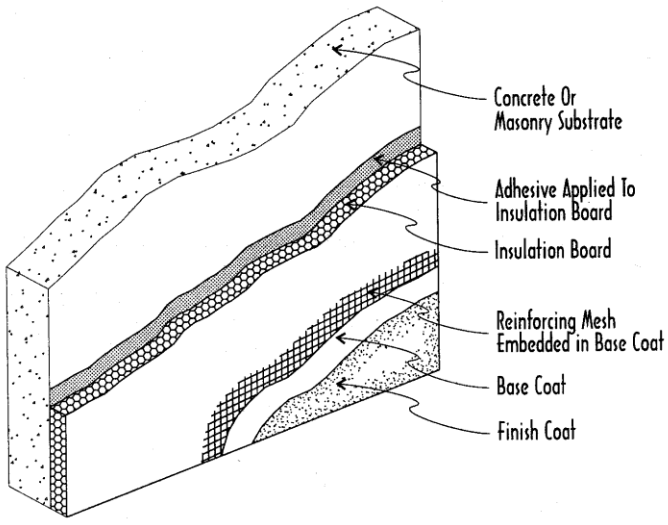
Steel or Wood Framing

This drawing demonstrates EIFS being attached with mechanical fasteners.



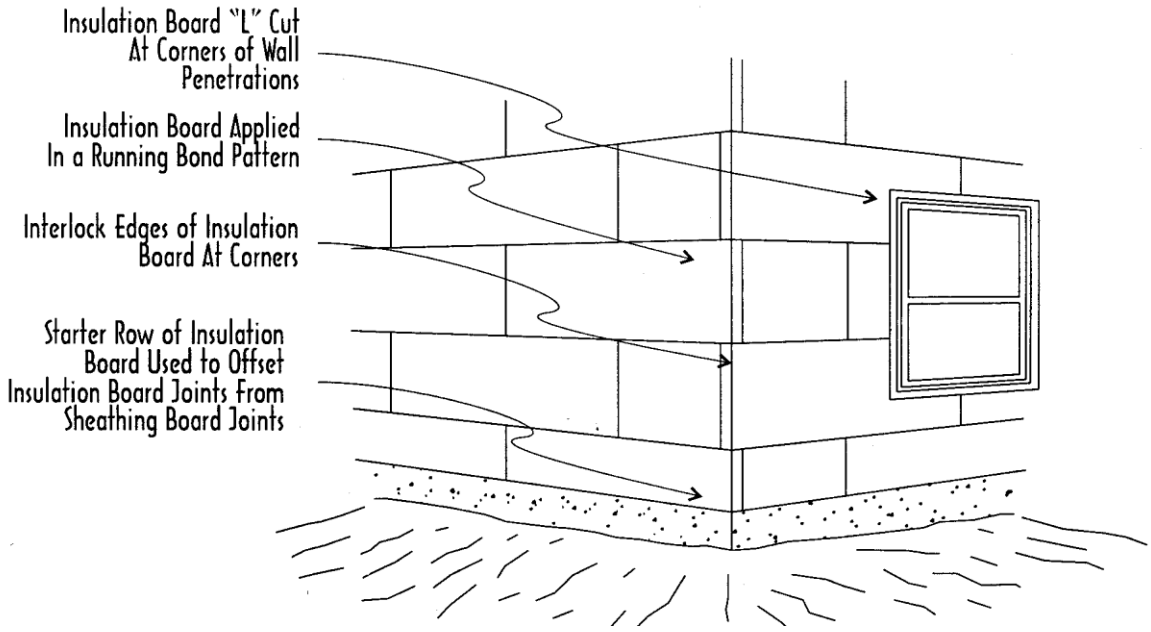
Concrete and Masonry

This example shows EIFS attached to concrete or masonry using adhesive.



EPS Board Layout

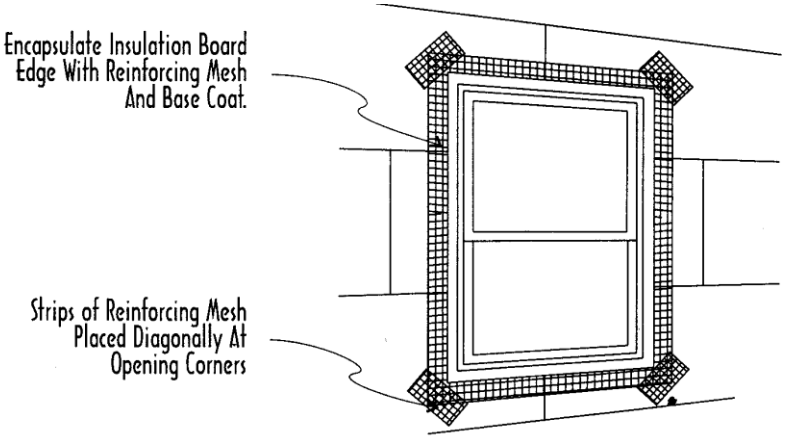
The expanded Polystyrene Board (EPS) is placed on the wall in a running-bond pattern. The first row is generally half width to minimize EPS board joints from lining up with sheathing joints. To decrease base coat stress at corners of wall openings, EPS boards are "L" cut.



Mesh Treatment at Fenestration

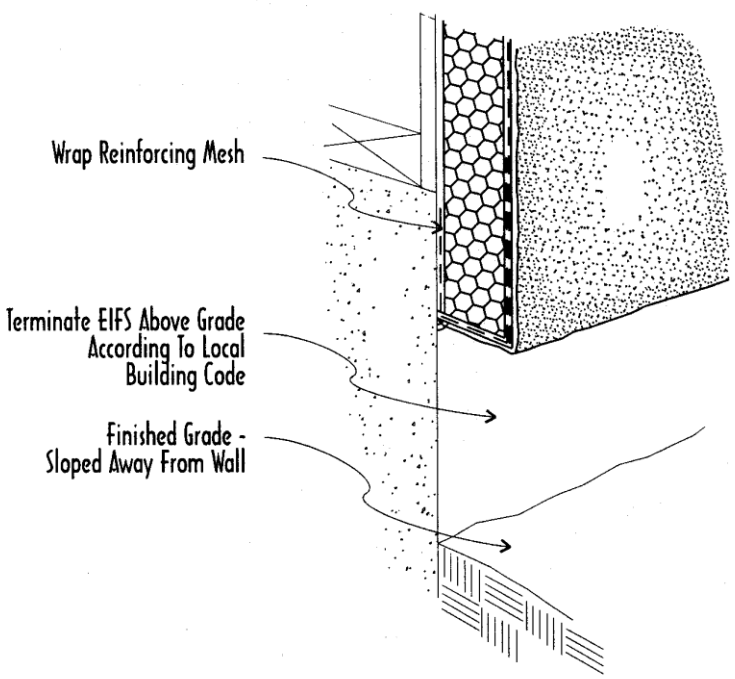
To further guard against cracking, diagonal pieces of mesh called butterflies are placed over the wrapped mesh at corners of the opening.

Note: Window flashings, not shown are placed at the head and sill.



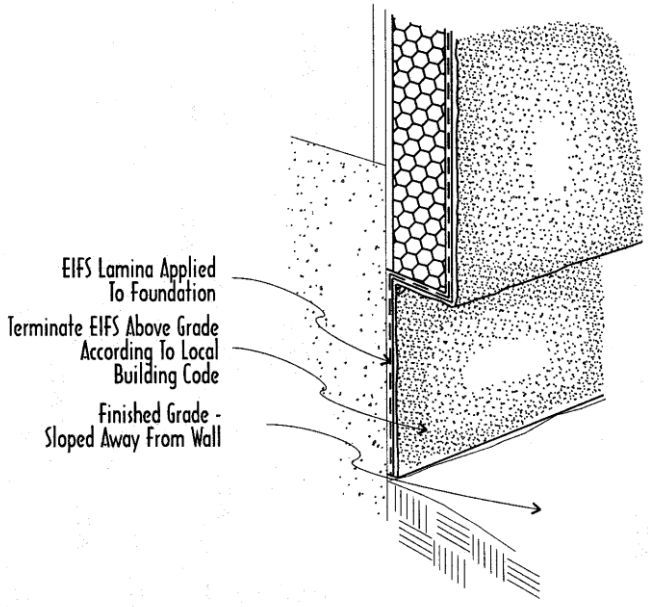
Options for

Terminating at Foundation



Wrapping – Alternative 1

Fiber mesh located between substrate and insulation is attached either by base coat, adhesive, or mechanical anchorage.



Wrapping – Alternative 2

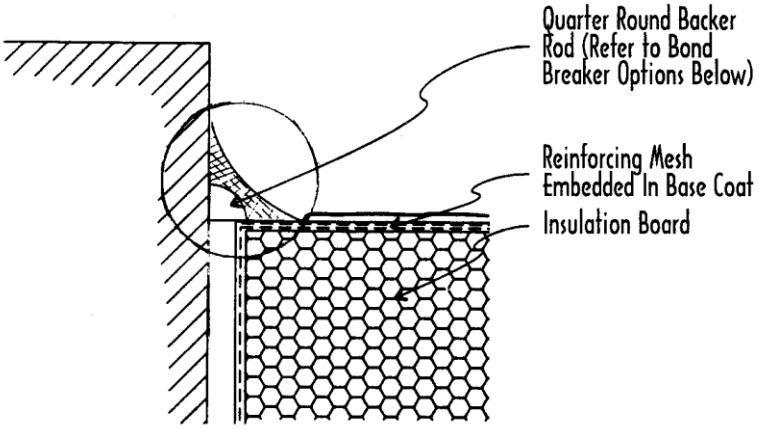
To give the foundation the appearance of EIFS, the reinforced base coat and finish may be lapped onto the foundation.

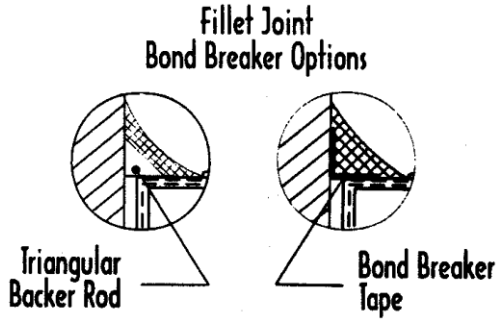
Sealant Configuration Options

Note: Refer to the sealant manufacturer's guidelines for specific installation requirements.

Fillet Joint

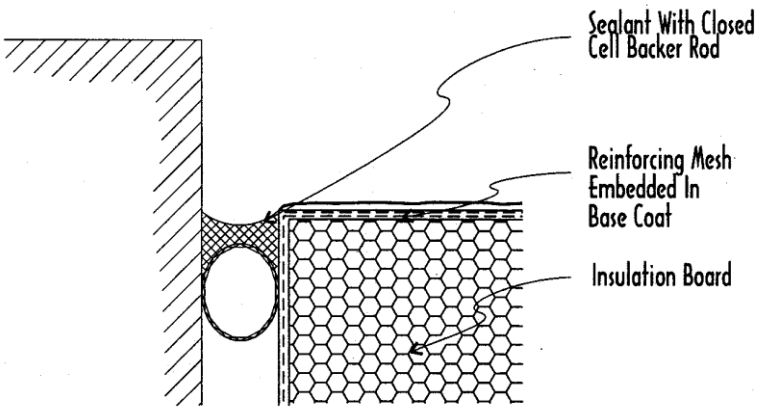
Fillet beads may be used for weather seal joints, such as at window and door perimeter. Notice that sealant is applied to the reinforced base coat and at not to the finish coat.





Butt Joint

Expansion joints should be designed for a minimum of four times the anticipated movement, but not less than ¾" (19 mm). For joints were movement has been determined to be negligible, the minimum butt joint size is ½" (13 mm). Notice that sealant is applied to the reinforced base coat and not to the finish coat.

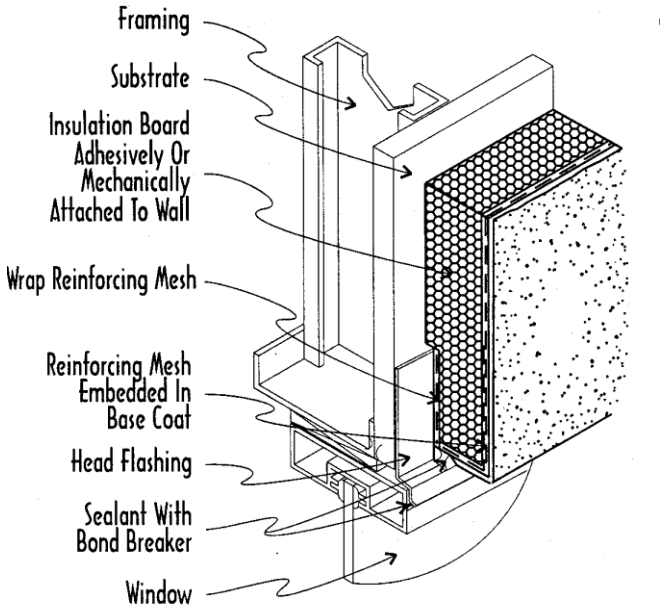


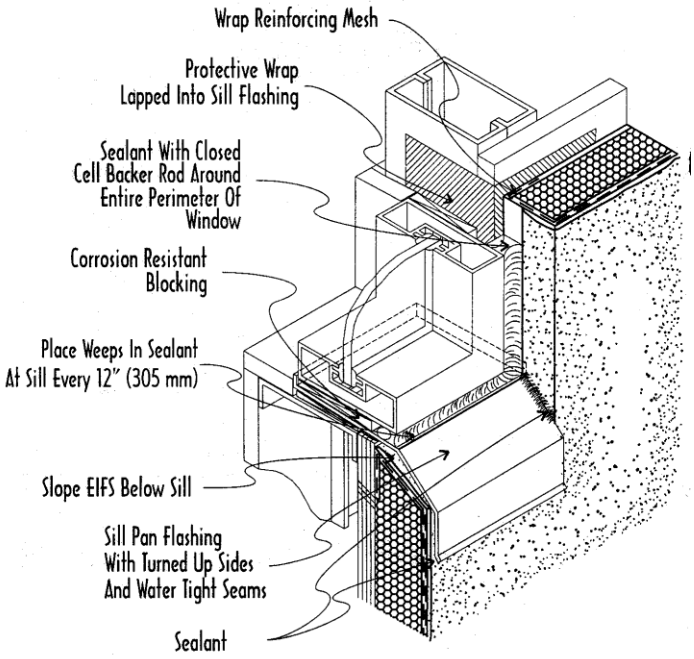
Window - Metal Framed, Exposed Sill Pan

Note: Refer to the window manufacturer's guidelines for specific installation requirements.

Window Head

Even with the use of head flashing, sealant is still required, as indicated, and serves to complement the flashing in establishing a water tight, continuous weather seal between the EIFS and the window frame.





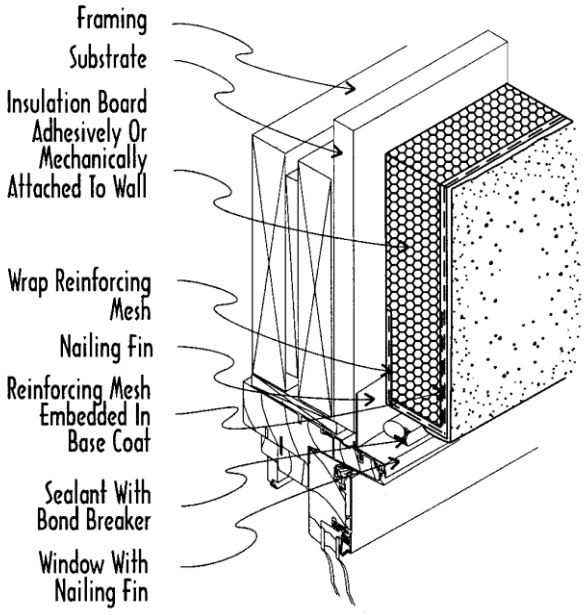
Window Sill and Jamb

The purpose of a sill pan flashing is to catch water that may breach the window's barrier or pass beyond the sealant. The flashing should extend between the framing members of the rough opening and be sloped to allow water to drain to the outside of the EIFS. In addition, sill pan flashing end dams should extend 1/8" to 3/16" beyond outer plane of window frame. Exposed end dam edge maybe covered with sealant if desired for improved appearance. To properly fabricate this detail, the EIFS

should be installed before the pan flashing is set in place. This detail reflects an exposed sill pan. However, this type of window may also be installed with a concealed sill pan as depicted in this picture.

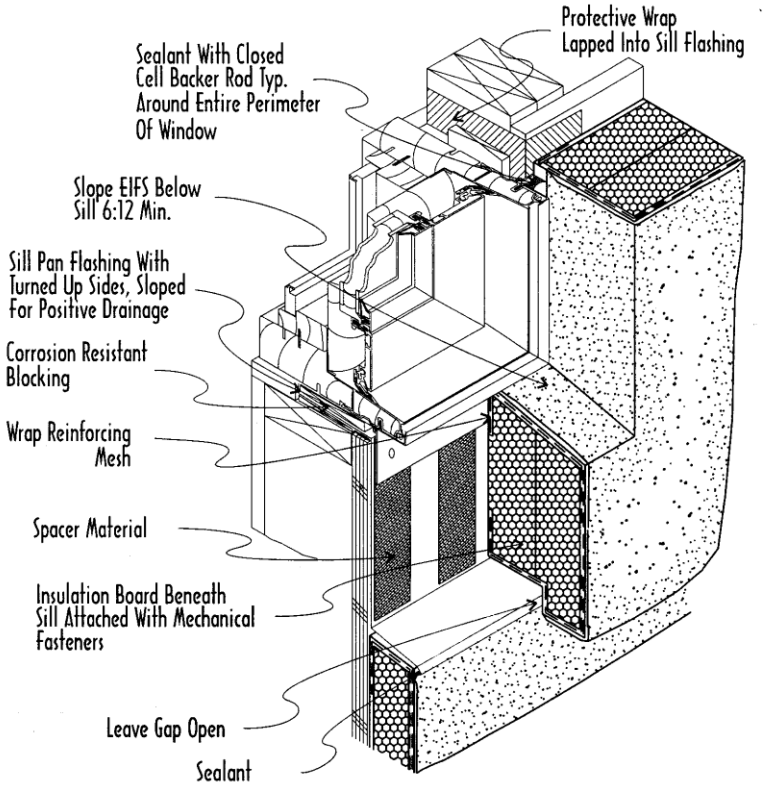
Window – Nailing Fin, Concealed Sill Pan

Note: Refer to the window manufacturer's guidelines for specific installation requirements.



Window Head

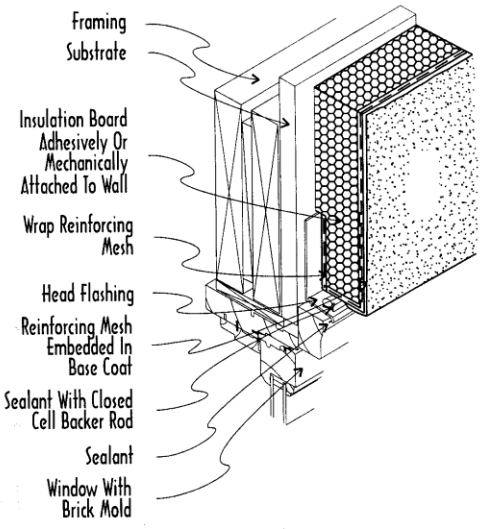
Some finned windows are considered *self-flashed*. However, a careful examination should be made of the joinery between the head, jamb and sill fins to ensure continuous protection against air and water passage. Any breach in the window's outer cladding should be resolved with additional flashing and/or sealant. Consult the window manufacturer for installation recommendations.



The purpose of a sill pan flashing is to catch water that may breach the window's barrier or pass beyond the sealant. The flashing should extend between the framing members of the rough opening and be sloped to allow water to drain to the outside of the EIFS. The spacer material should hold the nailing fin off the sill pan extension by at least 1/8" (3 mm) to form drainage channels.

Window - Brick Mold, Concealed Sill Pan

Note: Refer to the window manufacturer's guidelines for specific installation requirements.

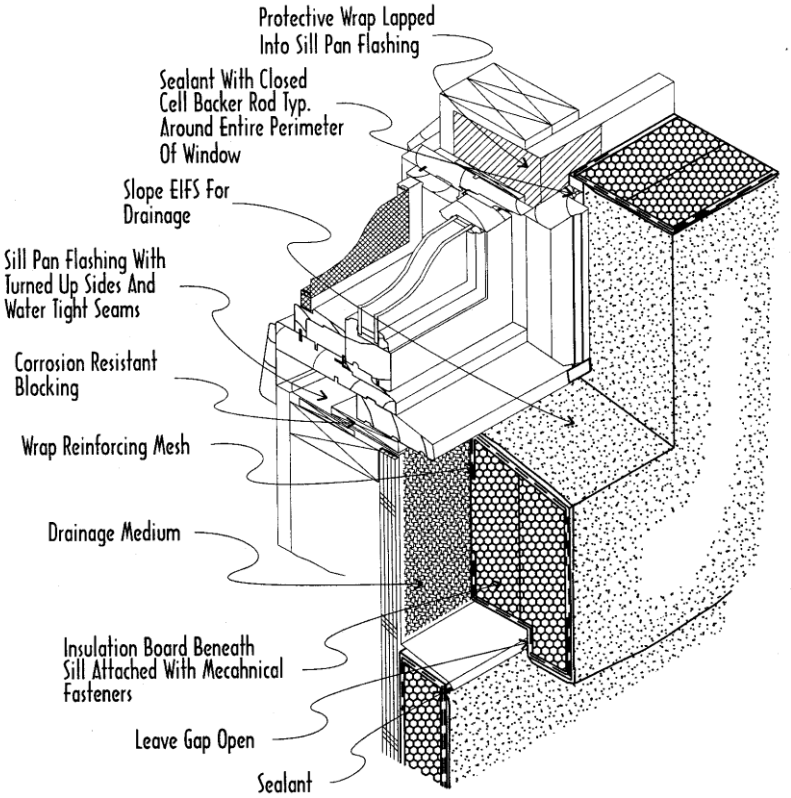


Window Head

Even with the use of head flashing, sealant is still required, as indicated, and serves to complement the flashing in establishing a water tight, continuous weather seal between the EIFS and the window frame.

Window Sill and Jamb

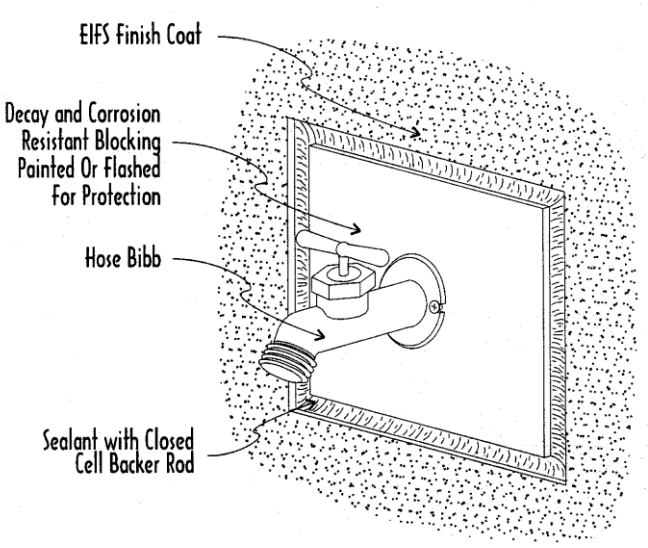
The purpose of a sill pan flashing is to catch water that may breach the window's barrier or pass beyond the sealant. The flashing should extend between the framing members of the rough opening and be sloped to allow water to drain to the outside of the EIFS. The drainage medium should hold the EPS insulation board off the sill pan extension by at least 1/8" (3 mm). This detail depicts a concealed sill pan. However, this type of window may also be installed with an exposed sill pan as depicted in the following picture.

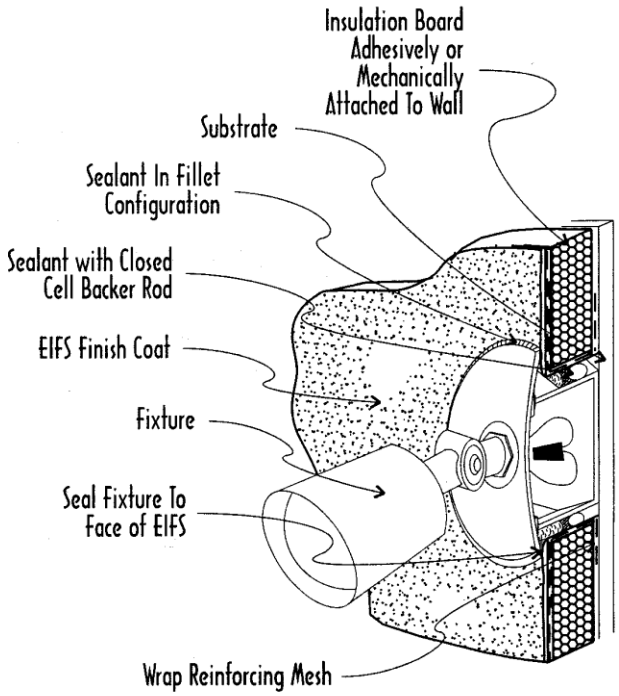


Plumbing And Electrical Penetrations

Hose Bib Attachment

For accessories subjected to handling, such as hose bibs and railing supports, wood blocking offers protection to the EIFS while providing a base for rigid attachment. The wood blocking may be painted or encapsulated in flashing.





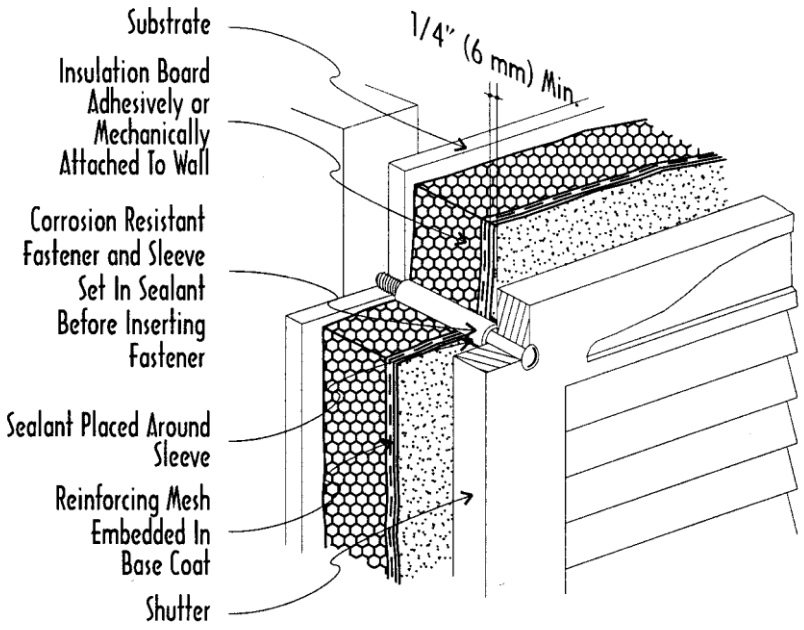
Electrical Attachment

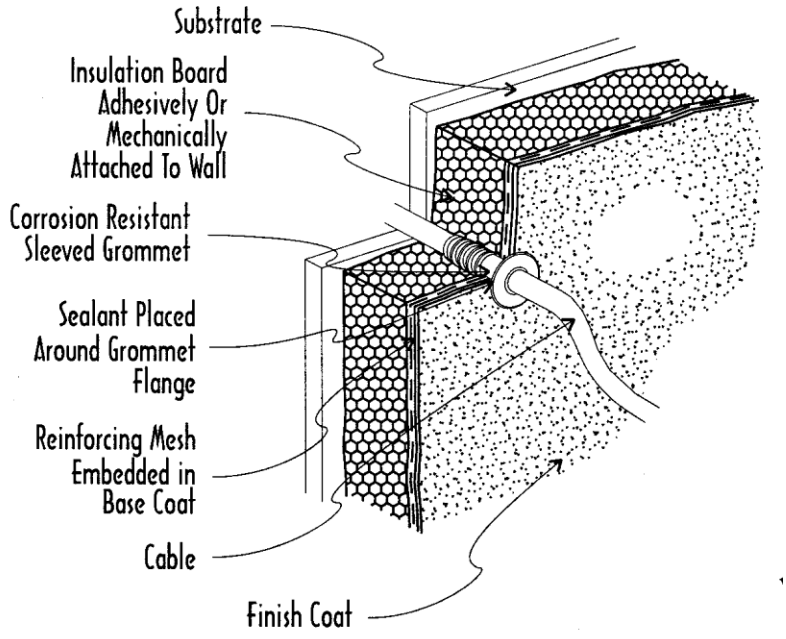
Electrical box installations, whether for light fixtures or outlets, may be shimmed back to the sheathing to allow for flush mounting of the electrical accessory.

Sleeved Attachments

Shutter Attachment

Sleeve and fastener attachment is adequate for most accessories. Downspouts, mail boxes, awnings, and other lightweight accessories may be mounted using the procedure shown. For nonstructural sheathing such as gypsum board, ensure fasteners are placed in framing or blocking to provide rigid attachment.





Wiring Penetrations

Phone lines, cable lines, outdoor speaker wire and the like may penetrate the EIFS with the use of a sleeved grommet sized to fit snuggly around the wire. The grommet flange provides an area for sealant application.

The EIFS Project Homeowner's Checklist, - by Dick Hopkins

(Reprinted with permission)

Existing Homes

O Inspect wall/roof intersections for flashing. Flashing should extend at least 4" up the wall and under shingles. EIFS should terminate at least 2" above roof The edges of the insulation board must be wrapped with the base coat, reinforcing mesh, and finish. Caulking should be applied where EIFS and flashing intersect.

O Inspect for kick outs, turn outs or a diverter to divert water from behind wall where roofs intersect with walls below. I Inspect chimneys for flashing, crickets (if necessary) and kick outs, turn outs or a mechanism to divert water from behind walls where roofs intersect with walls below. The interface of the kick out and the EIFS must be caulked.

O Check for caulking around windows and doors. There should be a 3/8" to 1/2" joint with backer rod and caulking. The edges of the insulation board must be wrapped with the base coat, reinforcing mesh, and finish as required by the EIFS manufacturer.

O Inspect caulking to ensure that it is tightly bonded to each side of the joint. Inspect caulking to ensure its continuity.

O Inspect penetrations of utility lines and pipes to make sure they are caulked. There should be a 3/8" to 1/2" joint with backer rod and caulking. Inspect penetrations by dryer vents, etc., to make sure they are caulked. There should be a 3/8" to 1/2" joint with backer rod and caulking.

O Inspect electrical meters and, boxes to ensure that the fastener penetrations are sealed.

O Inspect electrical outlets and light fixtures. These locations should be caulked.

O Inspect downspout and shutter fastener penetrations to ensure that they are sealed.

O Inspect locations where decks are attached for effective flashing and waterproofing.

O Inspect the bottom of walls at decks, patios, and entrances for proper termination of the EIFS. The edges of the insulation board must be wrapped with the base coat, reinforcing mesh and finish. There should be a 3/4" joint with backer rod and caulking at these locations.

O Inspect the bottom of walls at grade to ensure that the insulation, board is wrapped with the base coat, reinforcing mesh, and finish.

O If you retain an inspector to inspect your house, check their credentials to make sure they have enough expertise to perform a thorough inspection.

New Homes

New construction projects should include the items listed on the previous page as well as the following items:

O Make sure the EIFS selected has an Evaluation Report issued by the governing code body.

O Make sure the EIFS manufacturer is able to provide technical and field support and product test results.

O Require the applicator to produce a certificate of training from the manufacturer of the EIFS being installed. Require the applicator to meet all local licensing requirements. The applicator should be knowledgeable and experienced with the product. Require references such as Architects, other Builders and Homeowners, with names and phone numbers. Check these references and verify that the applicator is listed with the EIFS manufacturer as an applicator of their products.

O Prior to construction, have the EIFS manufacturer review and comment on plans and specifications.

O Make sure the builder installs the EIFS product selected.

O Make sure the substrate is acceptable for use with the EIFS.

O Make sure all EIFS components are from the same EIFS manufacturer. Do not allow the intermixing of various manufacturers components.

O Obtain a copy of ASTM C 1397 - Standard Practice for Application of Class PB Exterior Insulation and Finish Systems. Require builder and applicator to conform to this standard. This standard may be obtained from the American Society for Testing

and Materials, 100 Barr Harbor Drive-, West Conshohocken, PA 19428. Telephone (610) 832-9585.

- Make sure caulking used is as recommended by the EIFS manufacturer.

- Make sure windows and doors are manufactured under a *Third-Party Quality Certification* program.

- Consider retaining a third-party inspector to periodically inspect the work. Check their credentials to make sure they have the necessary expertise to perform a thorough inspection.

Maintenance and Repair

Unlike wood, stucco, and other siding materials, EIFS rarely needs painting. Most EIFS are specially formulated with 100% acrylic binder, which gives EIFS superior resistance to fading, chalking, and yellowing. Consequently, the systems tend to maintain their original appearance over time. Moreover, since the color is integral to the finish coat, even if the surface is scratched, the same color appears beneath the abrasion.

EIFS also have excellent resistance to dirt, mildew and mold, which helps keep the building exterior looking clean and freshly painted. Should the surface ever become soiled, it can usually be cleaned by hosing it down.

EIFS are designed to be very flexible, which makes them extremely crack resistant. When walls expand or contract due to rising or falling temperatures, EIFS

are resilient enough to *absorb* building movement and thus resist the unsightly cracking problems that are so common with stucco, concrete and brick exteriors.

EIFS are among the most water-resistant exterior surfaces you can put on a house. But as with all claddings, EIFS must be correctly installed and properly detailed if they are to perform properly. Otherwise, moisture can get behind the systems and cause damage, just as it can with wood siding, brick, or any other exterior.

Water intrusion is seldom a problem on commercial structures with EIFS. Water intrusion damage to homes is uncommon, but when it does occur, the moisture typically affects only small areas, which can be easily and inexpensively repaired.

In cases where homes have been damaged, the problems have been traced to the use of poor quality (even leaky and/or non code-compliant) windows and/or improper flashing and sealing. As a result, when building with EIFS, it is wise to use quality windows (such as those with AAMA certification) which are code-compliant, and to make sure there is proper flashing and sealing around windows, doors, roofs, deck-to-house attachments, and all other exterior wall penetrations.

Periodic maintenance, at least annually, should include thorough checking of the flashing and sealing to ensure that the building envelope remains watertight. Damaged or missing flashing should be repaired or replaced immediately; likewise, cracked or deteriorated sealants should immediately be repaired, or removed and replaced.

Again, due to the proprietary nature of the systems, we urge you to follow the specific guidelines of the manufacturer of the system used on your project.

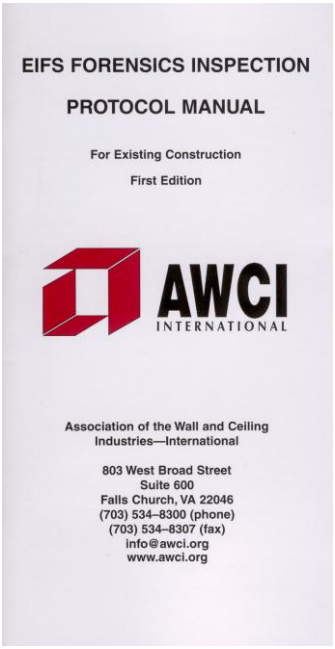
EIFS Quality Control

Inspection

The *Association of Wall & Ceiling Industries International* (AWCI) has developed a manual for the standardization of forensic installation inspection of EIFS. This manual is intended to be a uniform and fair guideline for the owner, the inspector, and the installer.

EIF Systems Forensics Inspection Protocol Manual

AWCI is now offering a new technical publication, the *EIFS Forensics Inspection Protocol Manual*. This practical 29-page vest pocket document addresses EIF system inspections for existing structures. The document contains six chapters that include the introduction, tools, and equipment, client information, report documentation, codes and standards, and reference information.



Training

The mission of the AWCI's EIFS Education and *Certificate EIFS – Doing it Right,* is to raise the level of knowledge in the EIFS industry through instruction of correct application procedures and testing of the acquired knowledge. This mission is accomplished by:

- Educating EIFS mechanics about correct application techniques
- Teaching independent third party inspectors and building officials about the correct application and inspection of EIFS
- Instructing other entities of the EIFS delivery systems about the correct application procedures, general inspection practices and quality assurance for EIFS construction.

Reference Standards

ASTM C 1397 Standard Practice for Application of Class PB Exterior Insulated and Finish Systems

ASTM Standard Practice document C 1397 covers the minimum requirements and procedures for field or prefabricated application of Class PB EIFS as developed by the American Society for Testing and Materials.

This standard is issued under the fixed designation C 1397; the number immediately following the designation indicates the year of original adoption, or in the case of revision, the year of the last revision.

American Society for Testing and Materials
100 Barr Harbour Drive
West Conshohocken, PA 19428-2959
Phone: 610-832-9585
Fax: 610-832-9555
E-mail: support@astm.org
Web Site: www.astm.org

Refer to the following Reference Standards more detail or information on a particular item or specified material or procedure.

Uniform Building Code

Federal Specifications

1. FS UU-B-790a: Building Papers
2. FS FF-N-105B: Nails, Wire Staples for Application of Gypsum Board
3. FS QQ-W-461H: Wire, Steel and Carbon (round, bare & coated)

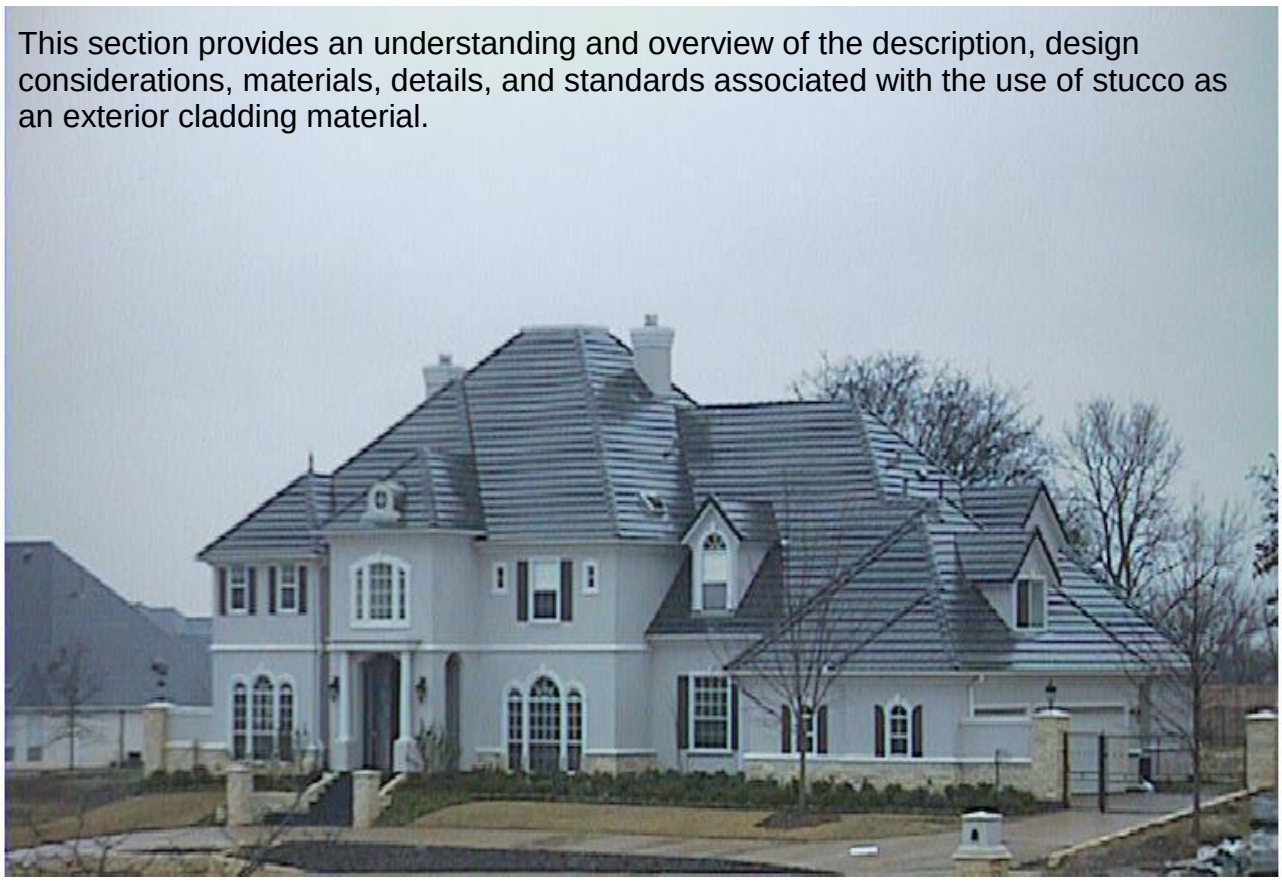
Section III

Cement Plaster/Stucco

Introduction

The term *Portland Cement Plaster* (stucco) refers to a blend of basic cementious materials, sand, and water. *Portland Cement Plaster* and *stucco* are interchangeable terms. This manual refers to this exterior cladding assembly as *stucco*.

This section provides an understanding and overview of the description, design considerations, materials, details, and standards associated with the use of stucco as an exterior cladding material.



There are many reasons for the increase in the use of stucco, which include:

- Versatility of design and aesthetic appeal
- Variety of finish styles and color
- Water resistance
- Endurance through wet/dry and freeze/thaw cycles
- Fire-resistive properties
- Low maintenance and life-cycle cost ratio
- High abuse and impact resistance.

Properties of Stucco Basecoat

The following are descriptions for the General Physical Properties of Stucco.

General Physical Properties	
Compressive strength	1,500 - 2,800 psi.
Tensile strength	200 lbs.
Thermal resistance	R = 15
Weight per Square Foot (Metal Lath And Cement Plaster Only)	
1/2" thick	5.89 lbs./sf.
3/4" thick	8.85 lbs./sf.
1" thick	11.78 lbs./sf.
Fire Resistance	
	Noncombustible
Flame spread	
Class I - Exterior Cladding	0
Smoke	0

Note: These values apply to properly mixed and applied stucco only.

Chapter 1

Stucco Framing Systems - Substrates

Light-gage Stud Framing - Exterior Walls

Definition

The use of 20 gage to 12-gage cold-formed steel "C" shaped, and channel shaped sections to construct exterior walls, spandrels, fascias, etc.

Design Considerations

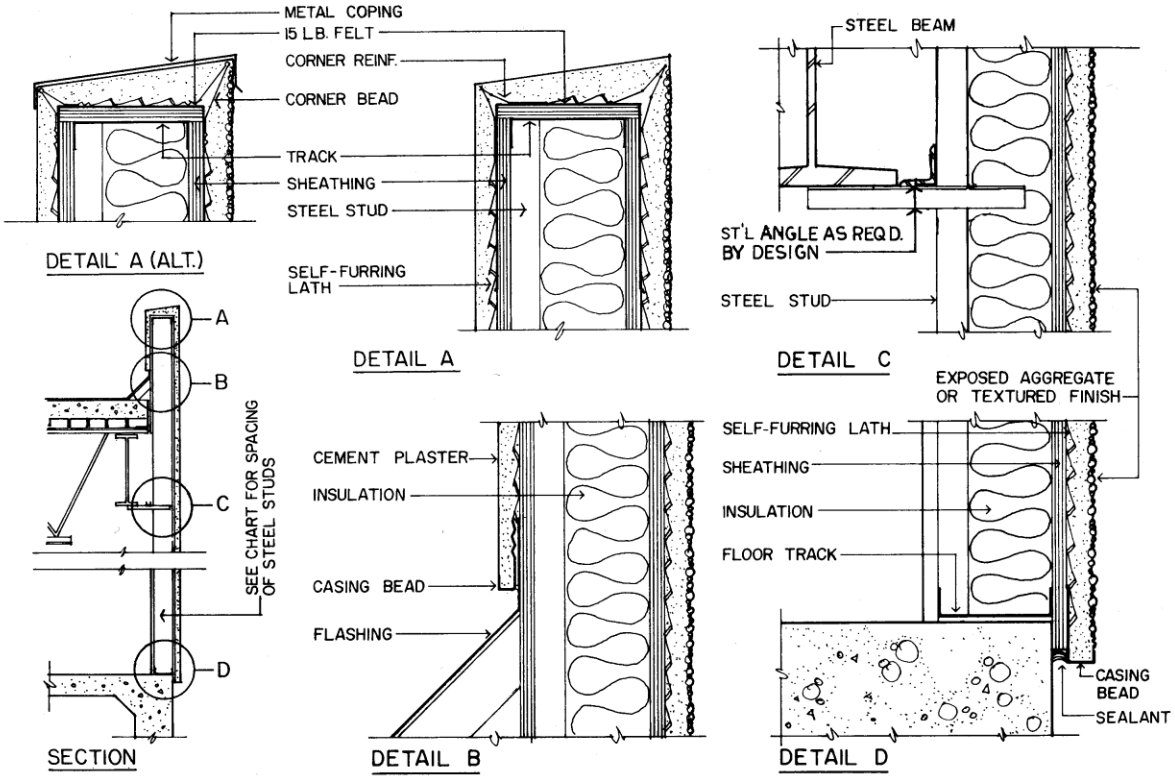
1. The maximum allowable deflection design criteria for the substrate of a horizontal or vertical stucco assembly shall be a maximum of L/360. Total building movement needs to be considered in framing design.
2. Wind loads per building code; consider not only flat wall area but corners and openings.
3. Height of building.
4. Method of attachment to structure.
5. Method of attachment of light-gage members to each other.
6. Bridging.
7. Sheathing.

Recommendations

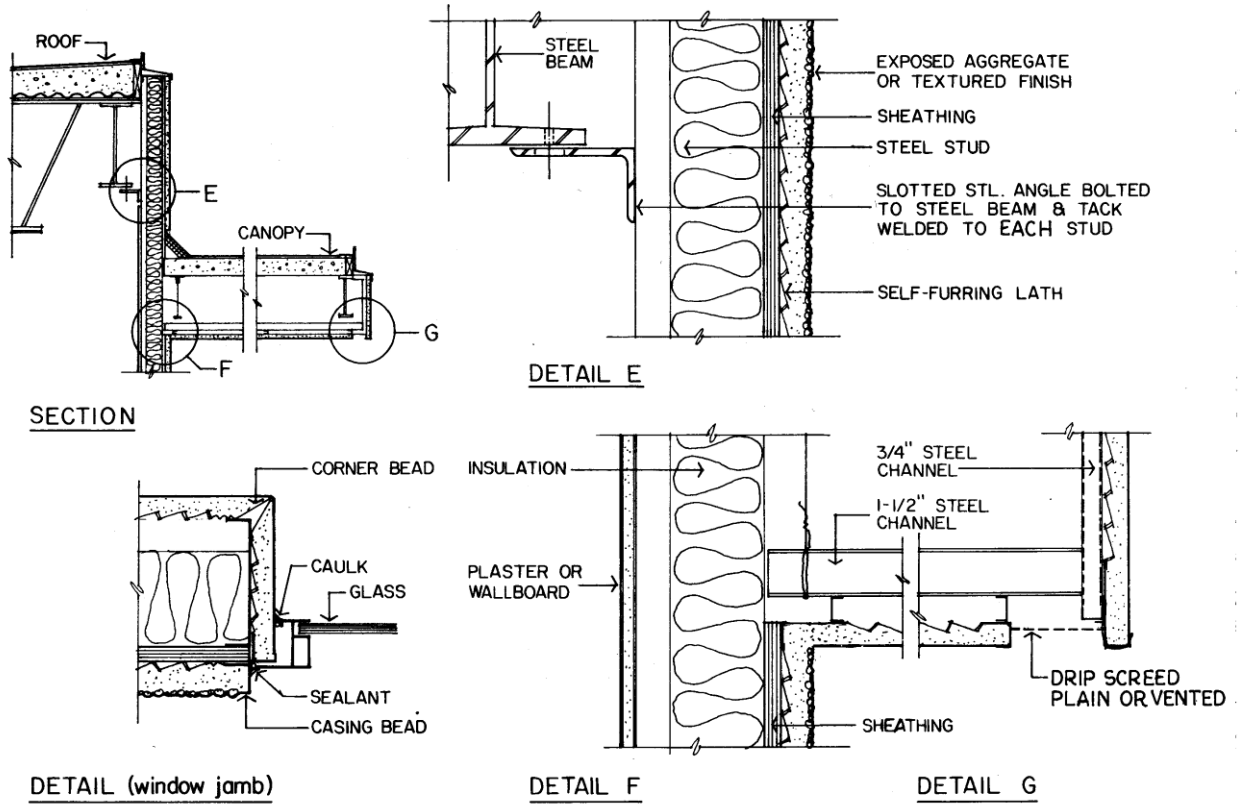
1. Lightgage stud framing should be a minimum of 20 gage galvanized metal.
2. All lightgage framing to receive stucco should have sheathing between the framing and the lath.

Details

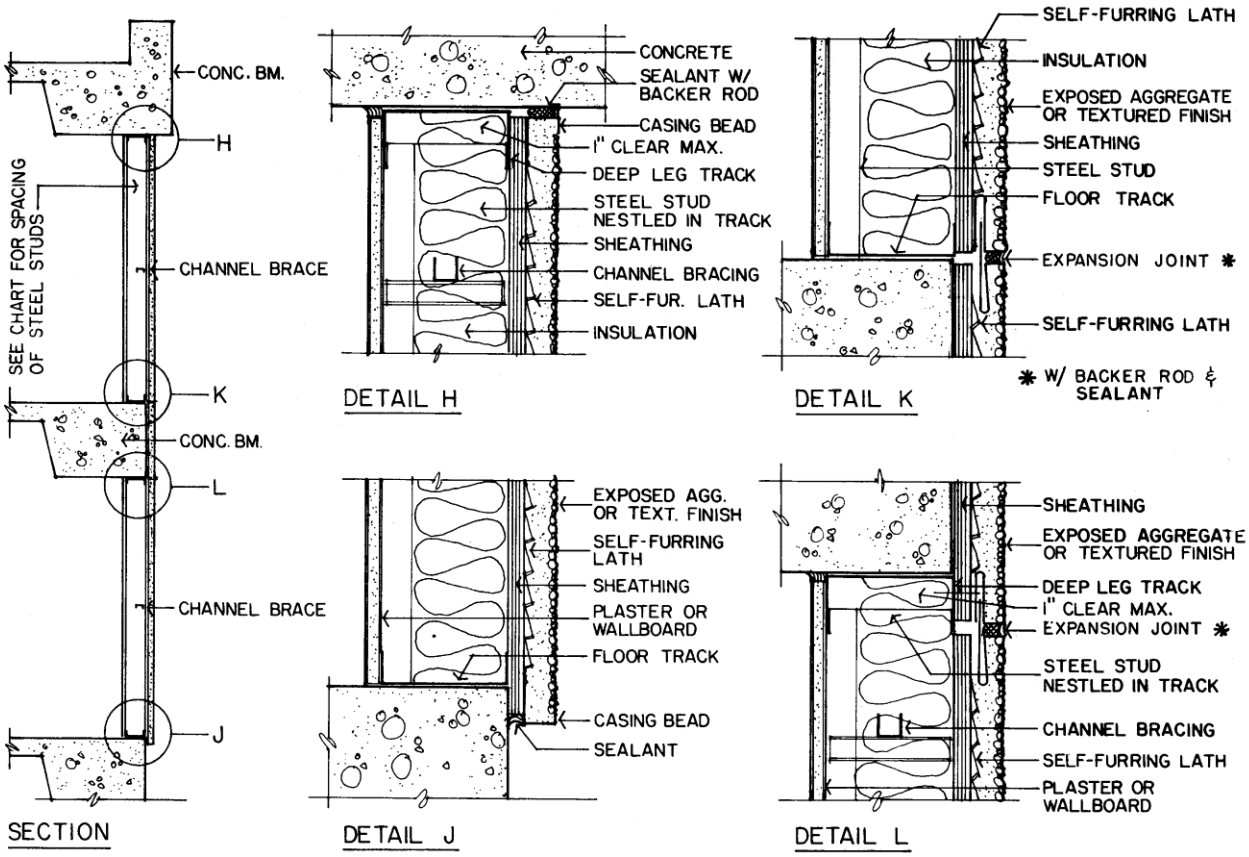
Steel Frame - Continuous



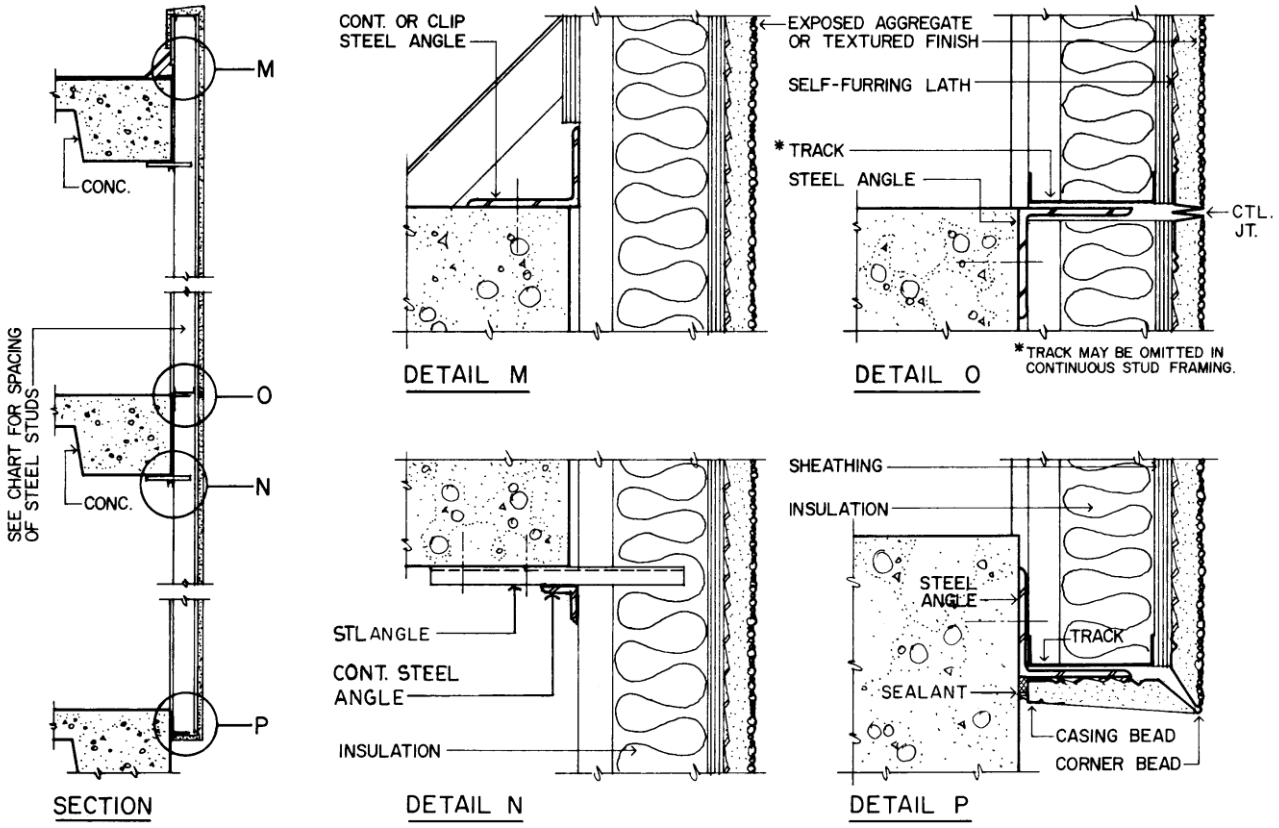
Steel Frame - Details



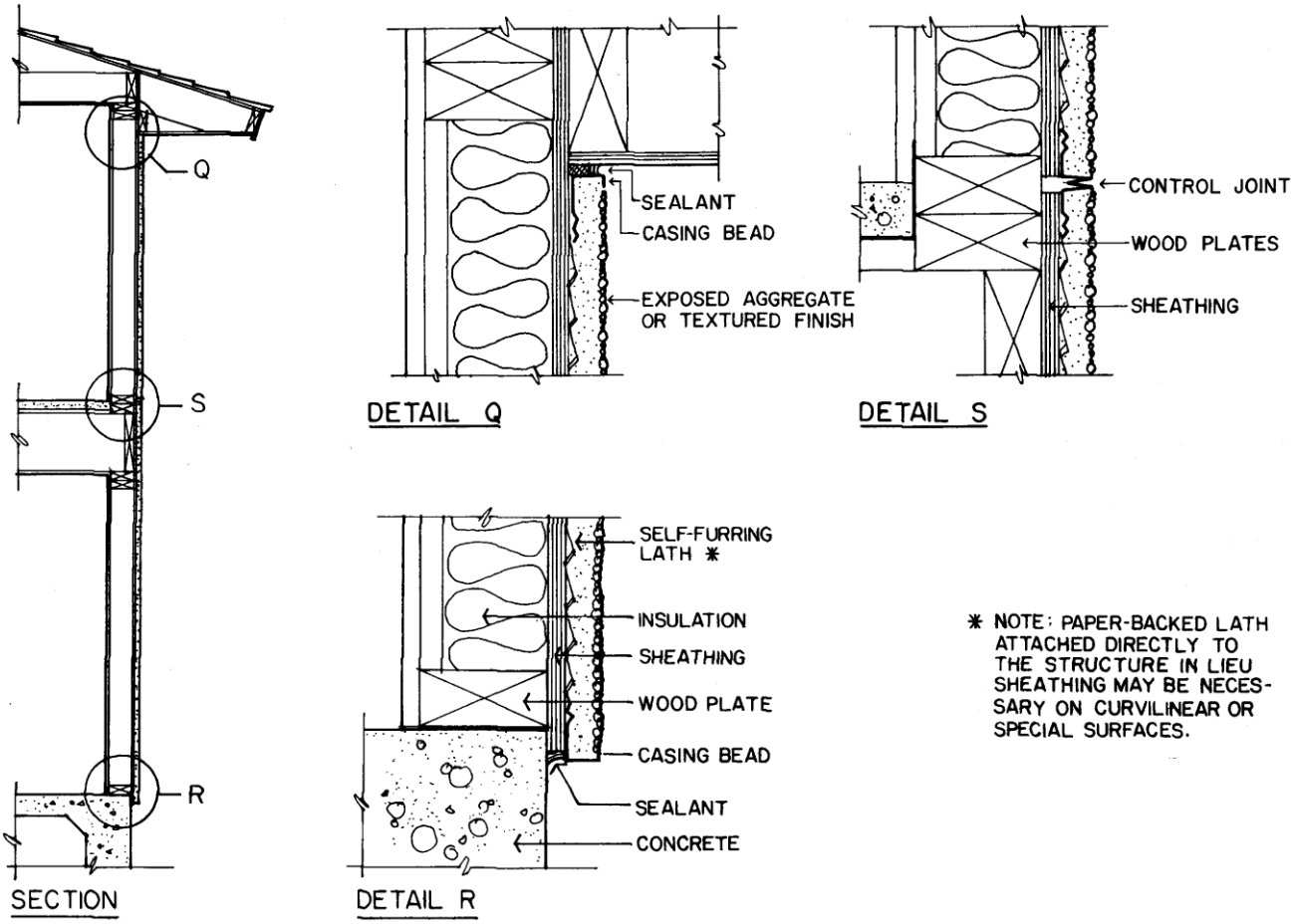
Concrete Frame – Intermediate Allowing for Vertical Movement



Concrete Frame - Continuous



Wood Frame



Channel Iron Framing - Exterior Soffits

Definition

The use of suspended hanger wire grid with cold rolled channels for support of metal lath and stucco ceilings.

Design Considerations

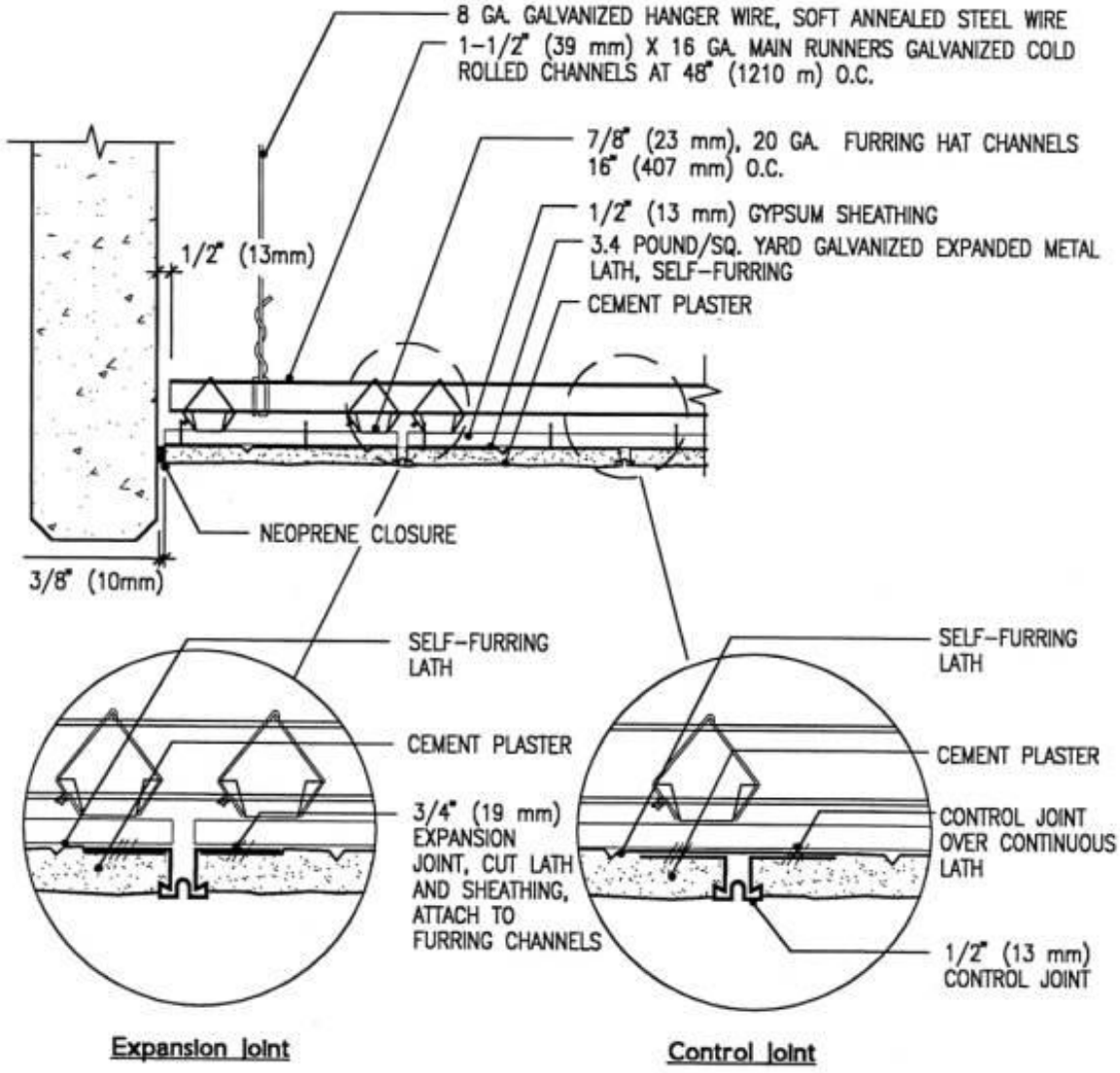
- The deflection design criteria for the substrate that a stucco assembly is attached to is required to be a minimum of L/360. Total building movement needs to be considered in framing design.
- Weight of plaster assembly to be supported.
- Attachment of hanger wires to supporting structure.
- Uplift wind bracing.

Recommendations

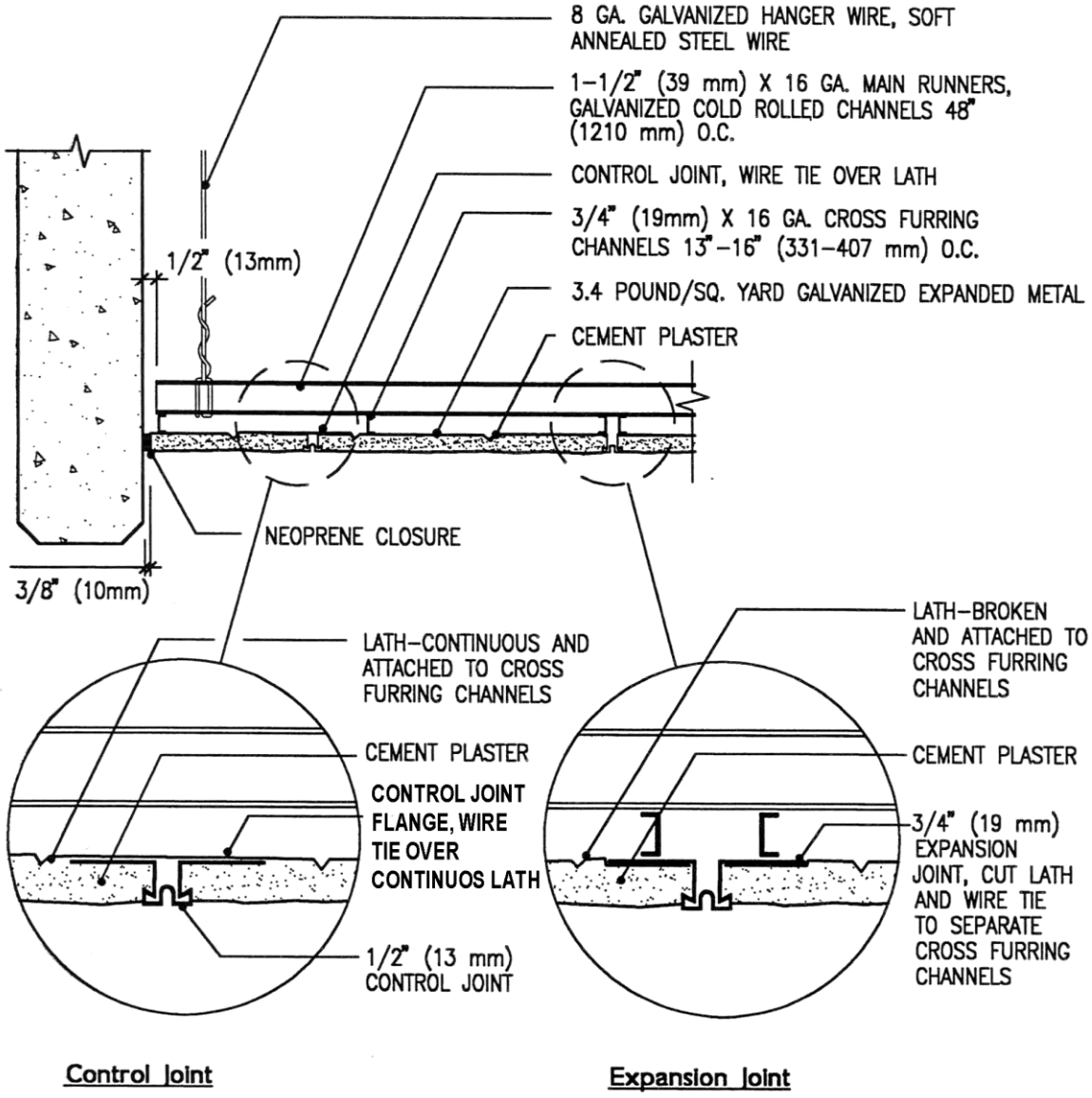
1. Reduce hanger spacing to 3' - 0" on center to reduce cracking.
2. Reduce runner channel spacing to 3' - 0" on center to reduce cracking.
3. If *furring hat channels* are used in lieu of 3/4" furring channels to allow for screw attachment of lath, then 20 gage or heavier furring channels must be used.

Details & Picture List

Suspended Stucco Sheathed Soffit



SF2 - Suspended Stucco Sheathed Soffit



SF3 – Suspended Stucco Soffit

Suspended Stucco Soffit

Manufactured Ceiling Grid Framing - Exterior Soffits

Definition

The use of an engineered suspended component grid system for support of metal lath and stucco ceilings.

Design Considerations

- The maximum allowable deflection design criteria for the substrate of a horizontal or vertical stucco assembly shall be a maximum of L/360. Total building movement needs to being considered in framing design.
- Weight of plaster assembly being supported.
- Attachment of hanger wires to supporting structure.
- Uplift wind bracing.

Recommendations

Follow manufacturers specifications for components and installation.

Advantage

Overall, the labor force familiar with installation of component grid system is in greater supply than labor with traditional framing skills.

Wood Framing - Exterior Walls & Soffits

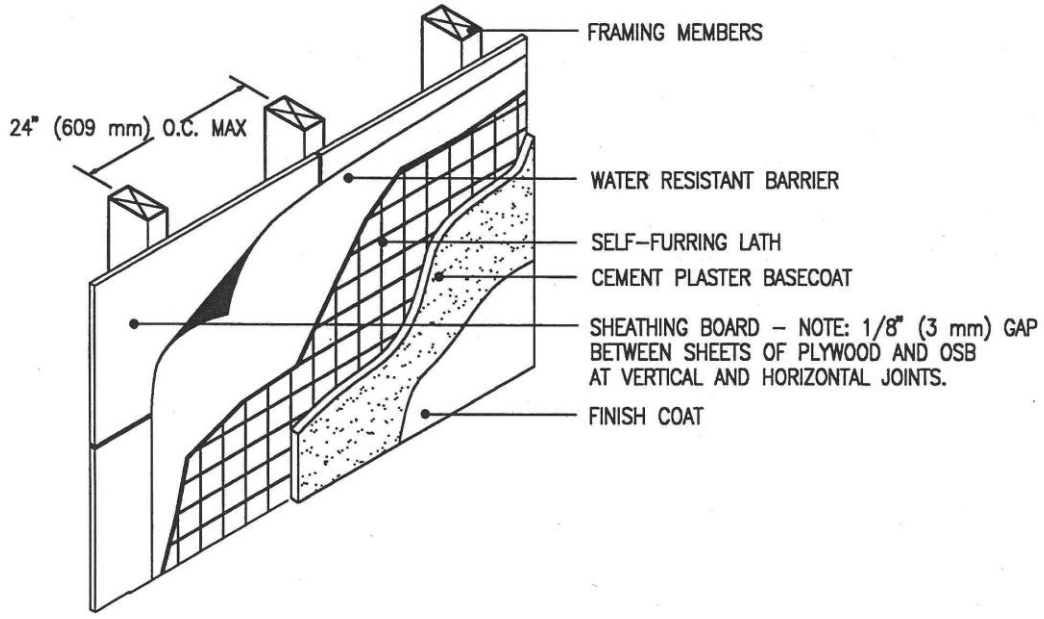
Recommendations

1. The deflection design criteria for the substrate that a stucco assembly is attached to is required to be a minimum of L/360. Total building movement needs to be considered in framing design.
2. Wood framing walls to be a minimum size of 2x4 studs.
3. Wood framing members (studs, plywood, OSB board) should be kept dry with a moisture content of less than 19%.
4. It highly recommended that OSB (oriented strand board) not be used as it has been proven to have excessive moisture retention and movement properties which are detrimental to the performance of the stucco.
5. All plywood and OSB panels *must* be installed with a minimum 1/8" gap along all panel edges and ends.
6. It is recommended that standard or better grade of framing lumber be used.

7. The building structure should be carrying 90% or more of the dead load and the interior gypsum board be installed on the inside of the exterior walls before plastering starts.
8. All flashing and water-resistant barriers must be installed in weatherboard fashion. All flashing must terminate in the daylight.
9. The Uniform Building Code requires two layers of Grade D (minimum 10-minute) water-resistant barrier (paper) over wood based sheathing.

Details & Picture List

Sheathed Wall Construction Wood Framing



A2 – Sheathed Construction Wood Framing

Concrete, Concrete Masonry Units, Masonry

Concrete Substrates

1. Concrete to be cured for thirty days.
2. Concrete surface to be straight and true in accordance with tolerance standards.
3. Concrete surfaces to be clean, no form release agents, no curing compounds or other elements on concrete surface preventing a proper bond.
4. Concrete should be in good condition and have uniform absorption rate over entire surface.
5. Concrete in poor condition (spalling, delamination, voids) requires repair before plastering.
6. If there is a concern about the bondability of the stucco direct to the concrete, application of a test area is recommended.
7. Finish coat of stucco only over concrete is used to enhance the surface appearance; it is not designed to *true up* the surface.

Concrete Masonry Units (CMU)

1. Concrete Masonry Units are an excellent substrate for direct-applied stucco. The CMU surface is to be clean with no substances on the surface or in the block and/or joints which would prevent a proper bond with the stucco basecoat. Reinforcement lath is omitted in this system.
2. Coated (painted) CMU surfaces require self-furring metal lath attached in accordance with standards or removal of the coating.
3. Do not tool the mortar joints; leave mortar joints struck flush with the face of the block.

Masonry Units

1. Masonry is an excellent substrate for direct-applied stucco. The masonry surface is to be clean with no substances on the surface and/or joints which would prevent a proper bond with the stucco basecoat. Reinforcement lath is omitted in this system.
2. Coated (painted) surfaces require self-furring metal lath attached in accordance with standards or removal of the coating.

3. Masonry in poor condition (spalling, cracking,) requires repair before plastering.
4. Do not tool the mortar joints; leave mortar joints struck flush with the face of the block.

Expansion & Control Joints - Concrete, CMU, Masonry

1. Expansion Joints are recommended at locations of concrete, CMU and masonry expansion joints.
2. The use of control joints is limited on a stucco system direct to concrete, CMU and masonry and are not recommended as frequently for framed construction. Control joints are recommended if the area exceed 200-250 square feet. Panel should be in as square a configuration as possible.

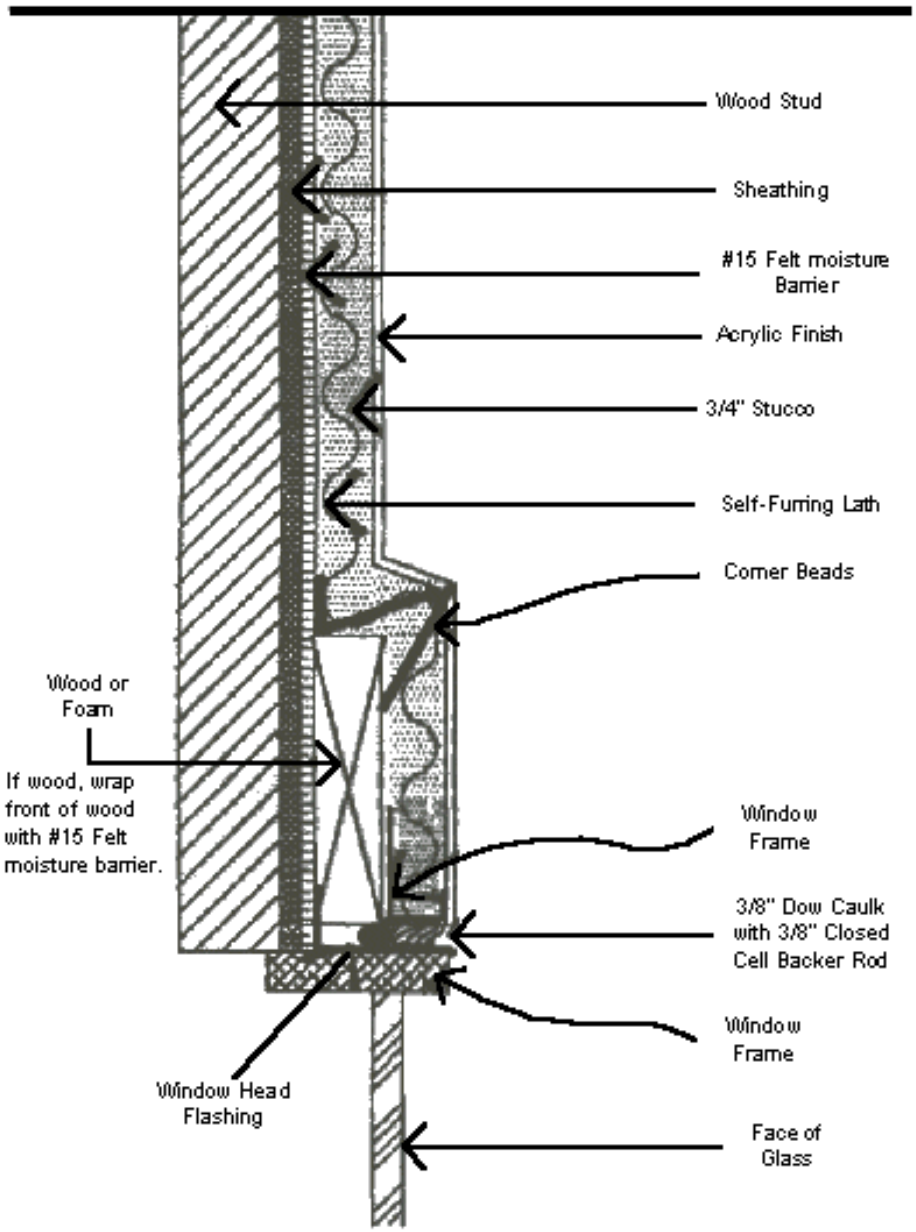
Attach trim accessory joint to concrete, CMU and masonry surfaces with hardened concrete nails; low-velocity, power-actuated pins or drill-and-drive fasteners. Fasteners properties shall be a minimum of head of fastener - 3/8" diameter, length of fastener - 3/4"; spacing of fastener - 12" o/c. staggered.

Residential Window Head and Banding Applications

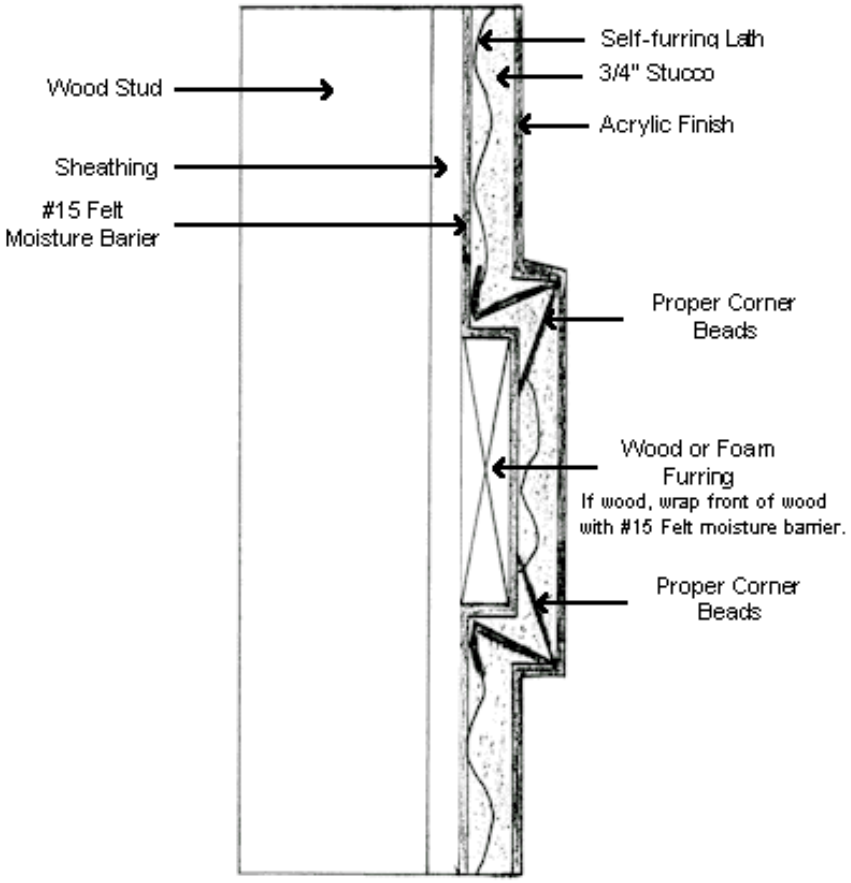
The following drawings depict both proper and improper procedures for residential Window Head and Banding assembly.

Details

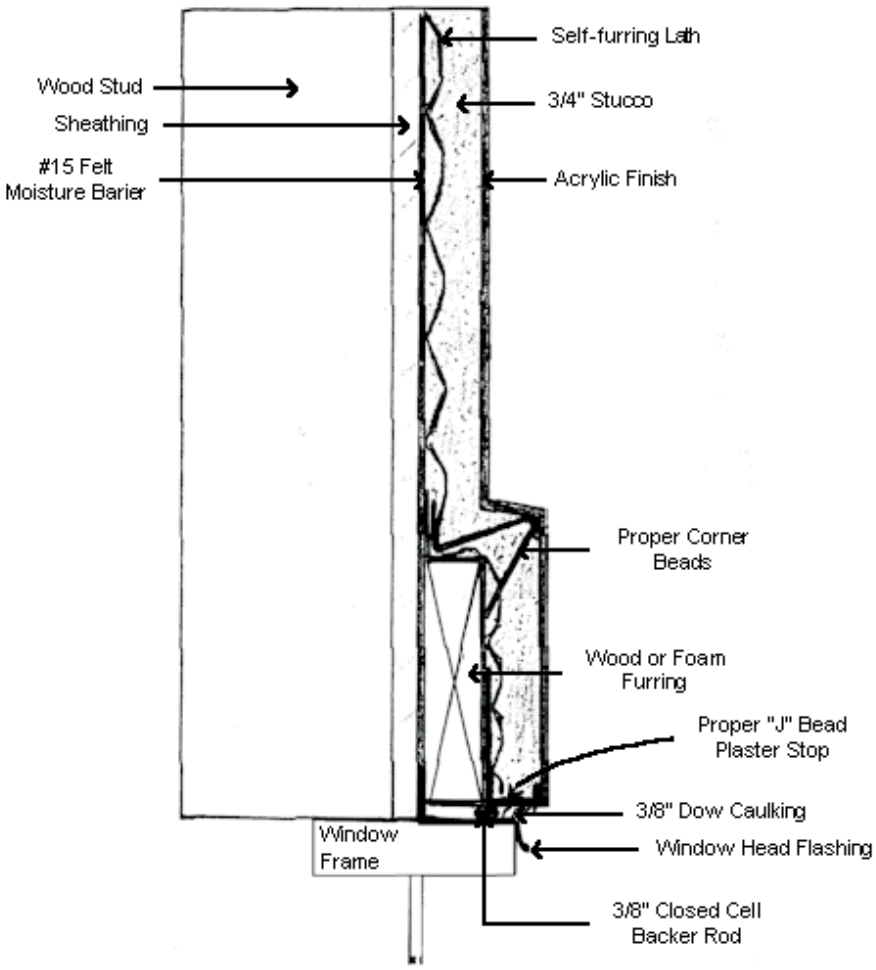
Proper Window Head Detail

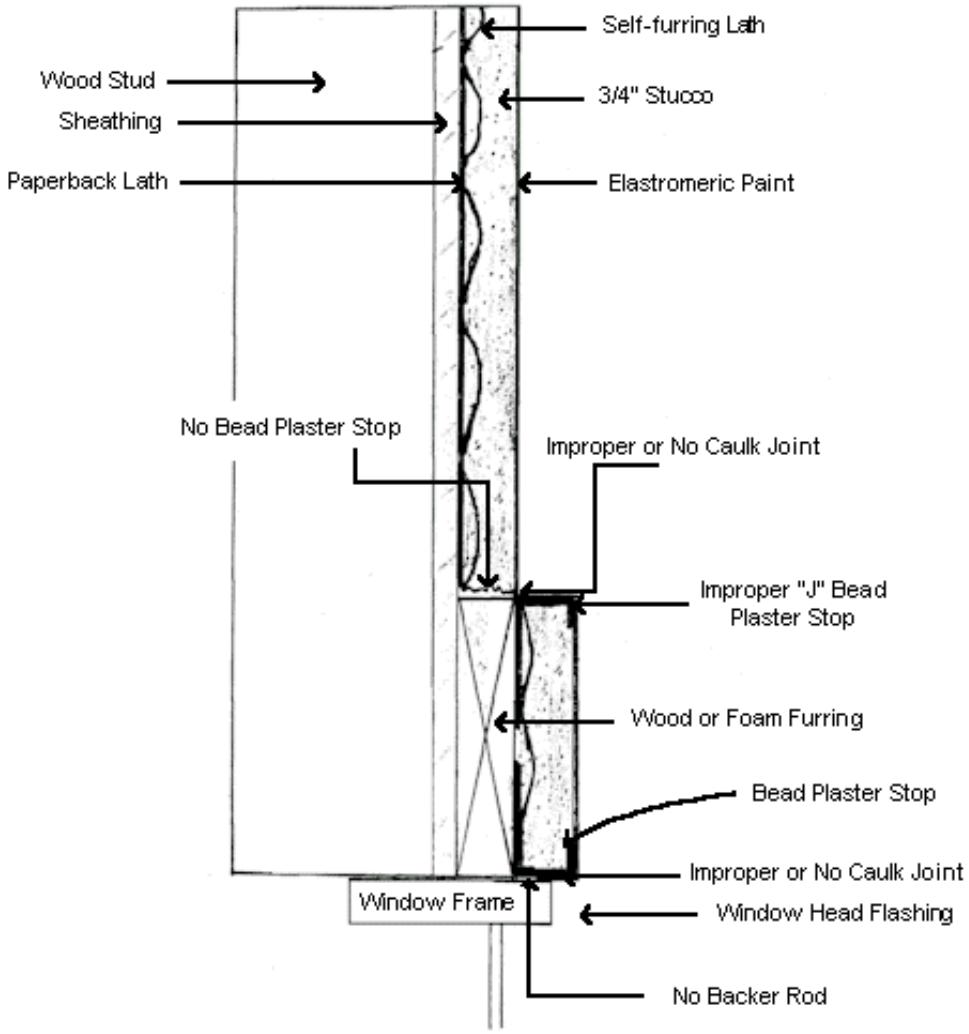


Proper Banding Detail



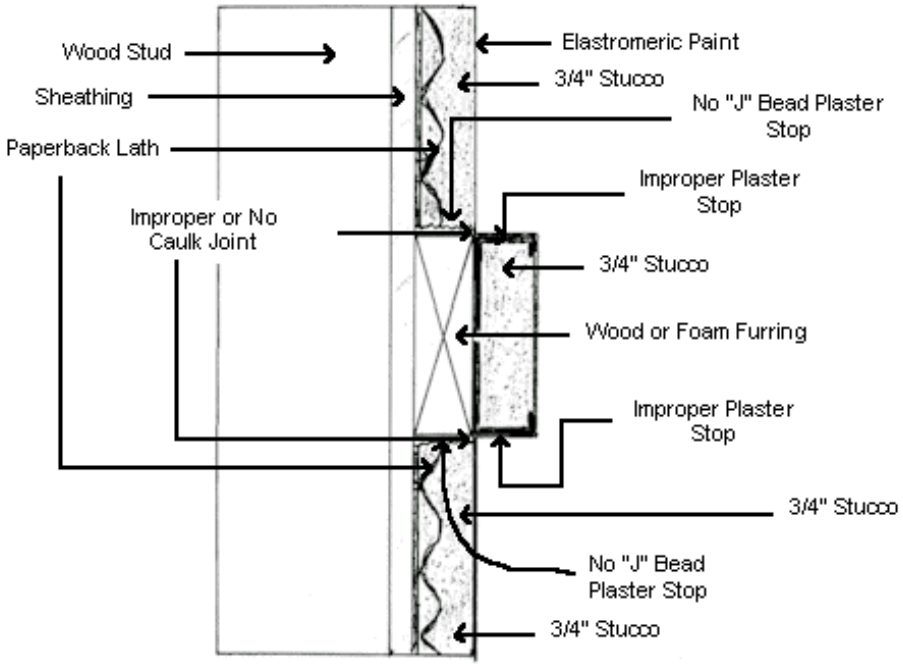
Proper Window Head Detail





Improper Window Head Detail

Improper Banding Detail



Chapter 2

Metal Lath & Stucco Accessories

Metal Lath - Types & Uses

Diamond Mesh Lath

A multi-purpose lath used for all types of plaster work; sheets are flat, of uniform width and squared at ends.

Self-Furred Diamond Mesh Lath

Used extensively in exterior stucco work over a solid base; self-furring dimples hold the lath approximately 1/4" away form solid surfaces to aid in the keying of stucco to the lath.

Paper-Backed Metal Lath

Flat and self-furred metal lath with a continuous backing of asphalt saturated *Kraft* paper, which is water-resistant, yet permeable and meets *Federal Specification UUB-790A, Style 2,*
Grade D.

The following chart depicts the standard weight per sheet size and finish for all metal lath types described above.

Standard Weight Per Sq. Yd (all laths)	*Finish*	*Sheet Size*
1.75 lbs.	Painted / Galvanized	27" x 96"
2.5 lbs.	Painted / Galvanized	27" x 96"
3.4 lbs.	Painted / Galvanized	27" x 96"

Stucco Accessories

General Recommendations

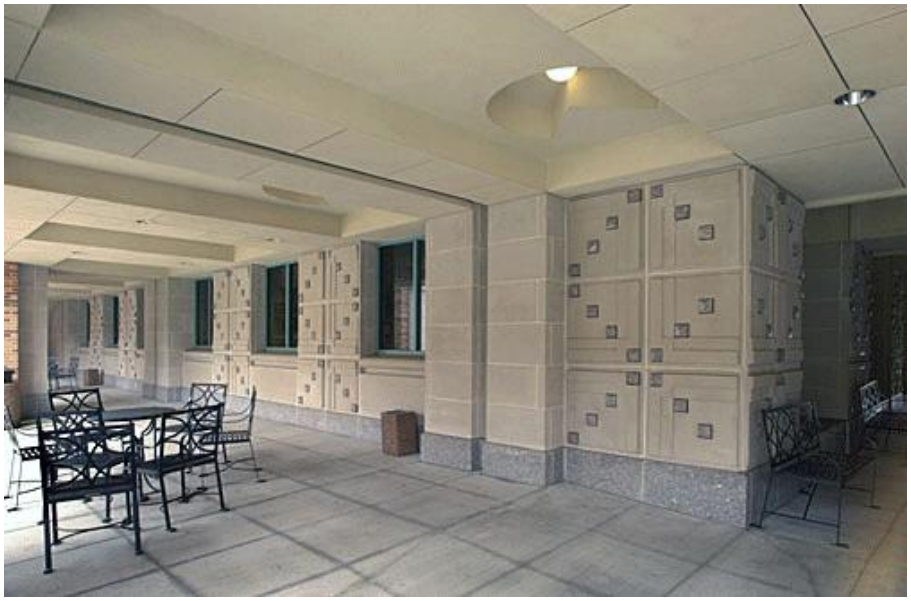
1. Accessories shall be fabricated from galvanized steel, zinc alloy, PVC or anodized aluminum.
2. Depth of the grounds of accessories depends on the required thickness of the stucco basecoat without the finish coat.
3. Accessories of PVC plastic or zinc alloy are recommended if corrosion is a concern because of environmental conditions.
4. Accessories with a finish surface lip flange and/or embedment flange to key into stucco basecoat are recommended.

Termination of Stucco at Foundation

Facts You Should Know

At the foundation plate line, and/or where the bottom of the stucco wall terminates, a continuous trim accessory consisting of a foundation weep screed, casing bead, or a special trim design is required.

The function of the termination trim accessory is to provide a cement plaster stop—a straight and level finish edge for the stucco system—and to establish a uniform thickness *grounds* for the cement plaster.



The foundation trim accessory is to be installed just below the floor line wherever a floor or foundation supports the wall.

The water-resistant barrier (paper) is to extend past the floor line, overlapping the foundation screed flange.

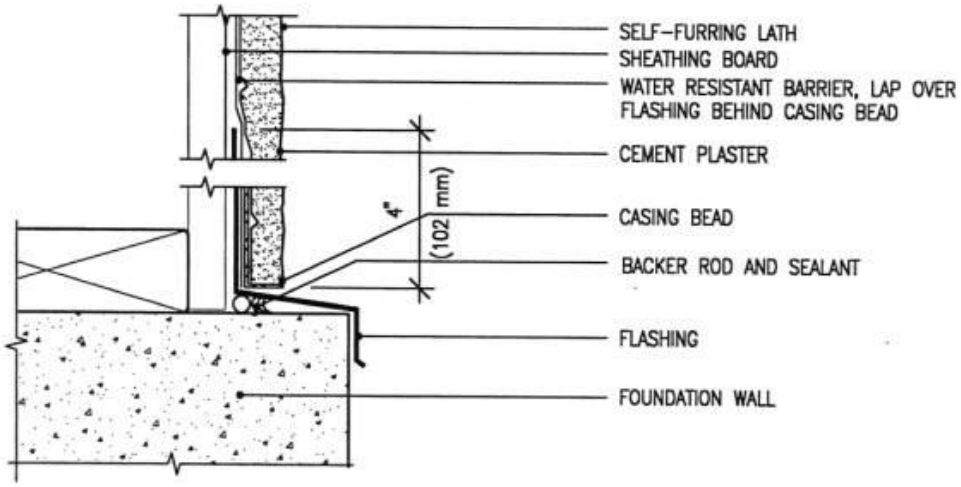
The lath is to be installed over the trim accessory flanges.

The continuous termination trim accessories are to be attached 12 inches (300 mm) o/c. to the framing system, not to the foundation.

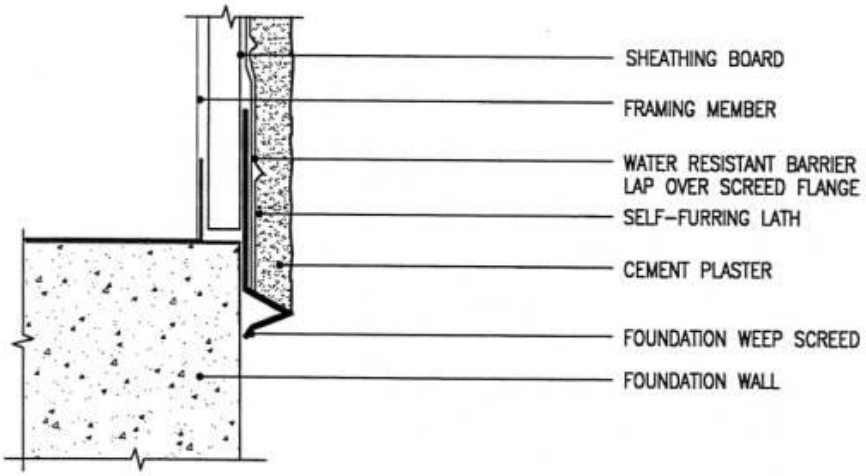
Manufactured trim accessories shall be fabricated from zinc, galvanized steel, rigid PVC (plastic) or anodized aluminum.

Place the bottom edge of the termination trim not less than 1 inch (25 mm) below the joint formed by the foundation and the framing.

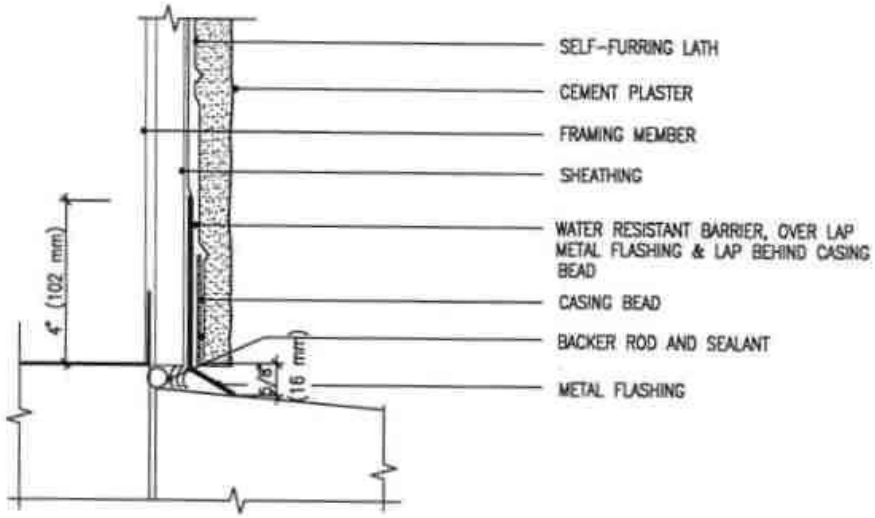
The finished edge of the stucco wall should be located not less than 4 inches (102 mm) above raw earth or 2 inches (51 mm) above paved surfaces.



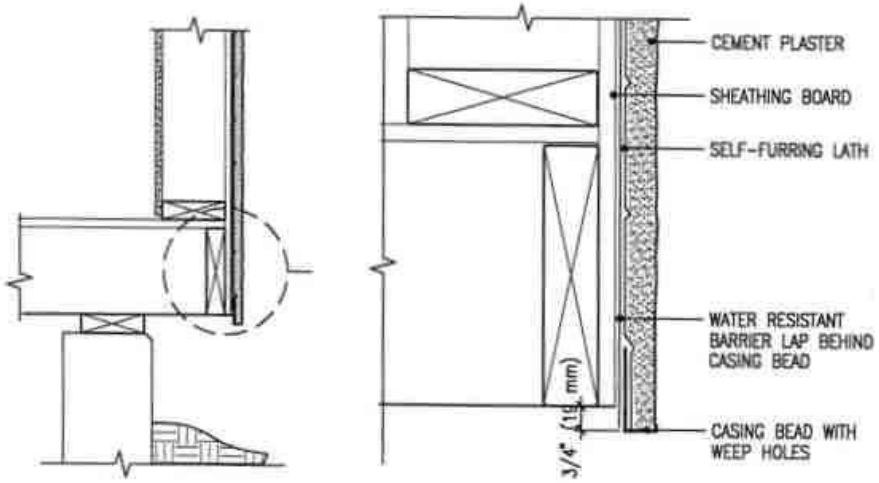
T1 – Casing Bead at Concrete Foundation



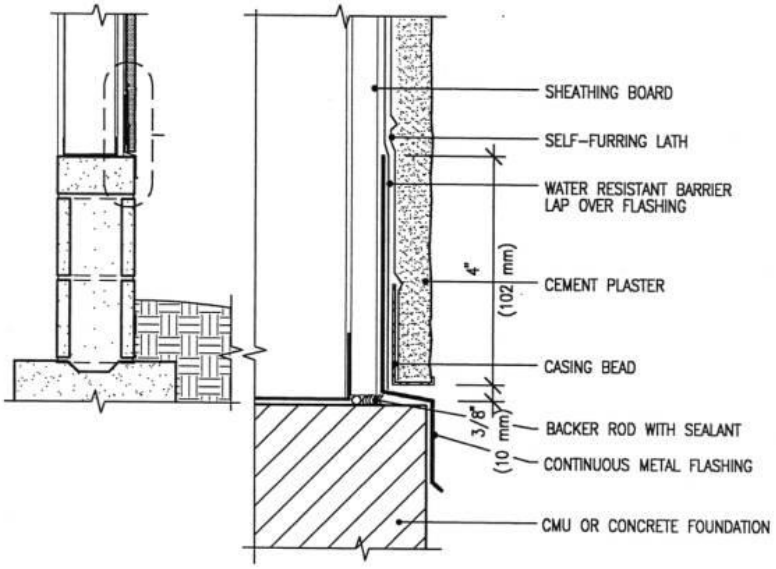
T2 – Weep Screed at Concrete Foundation



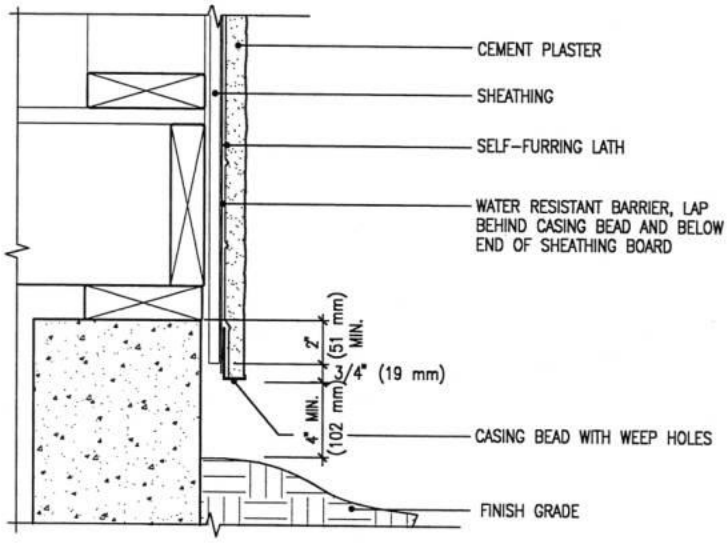
T4 - Termination at Slab/Sidewalk



T5 - Termination at Cantilevered Wall



T6 – Termination at Foundation

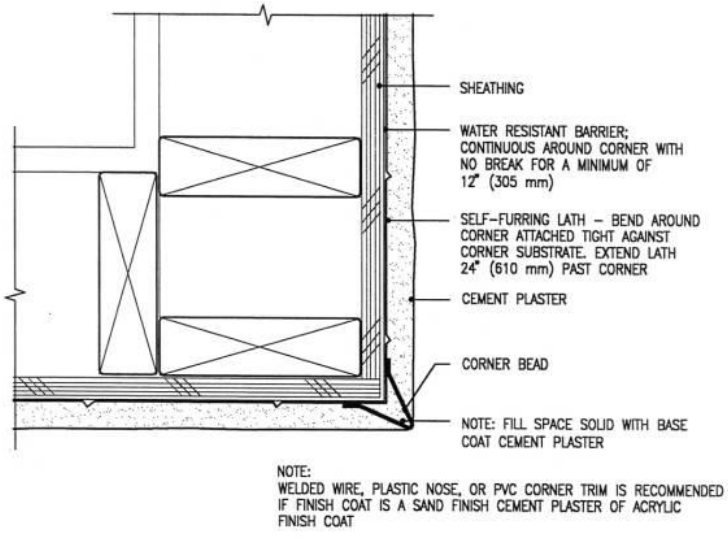


T7 – Termination at Foundation/Finished Grade

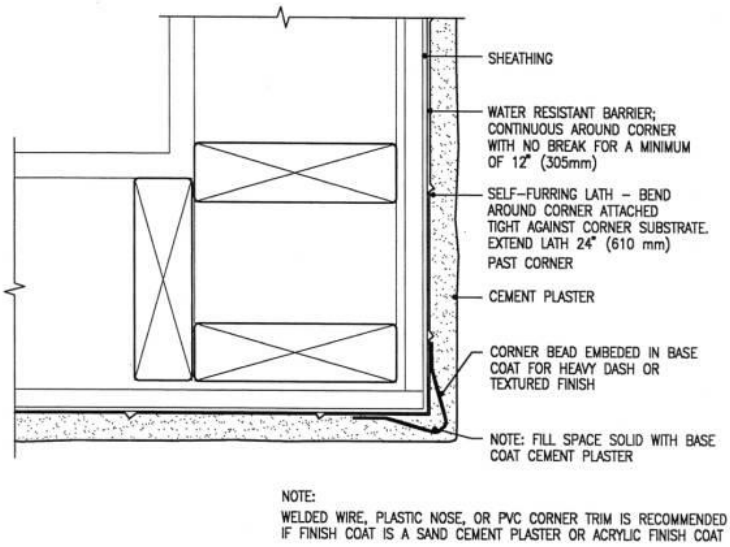
Corners of Stucco Assembly

Facts You Should Know

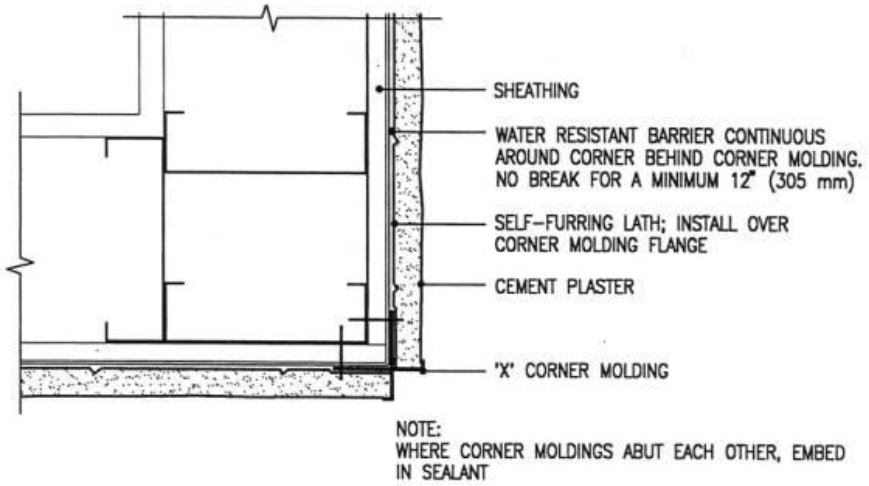
1. Corner reinforcements (corner beads) are recommended for external corners.
2. Inside corner trim accessories are not recommended unless the structure of the intersecting wall construction is different, in which case one or both walls should terminate, and the joint should have a sealant system or a fabricated inside corner expansion joint.
3. Corner beads provide a means of producing a straight vertical or level horizontal stucco surfaces that intersect. They also provide protection from impact damage and establish the thickness or *grounds* of the basecoat cement plaster.
4. It is recommended the inside space (between the flanges) of the corner bead be filled with cement plaster.
5. A standard expanded metal lath corner bead is designed for interior gypsum plaster and is not recommended for stucco. Expanded metal lath corners designed for stucco have wider expansion openings.
6. For stucco assemblies with a sand finish or acrylic finish, the exterior corner bead should be a plastic-nose style, a PVC stucco corner bead or an anodized aluminum “X” corner.



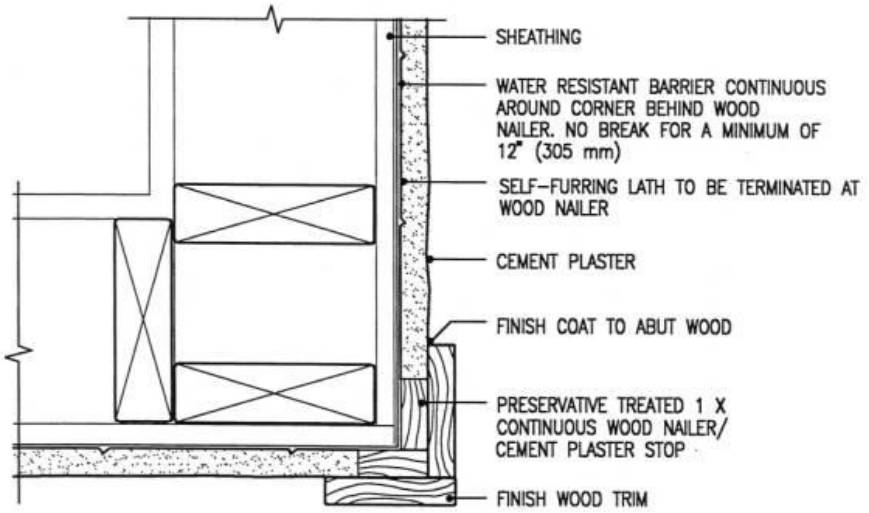
C1 - Corner Trim



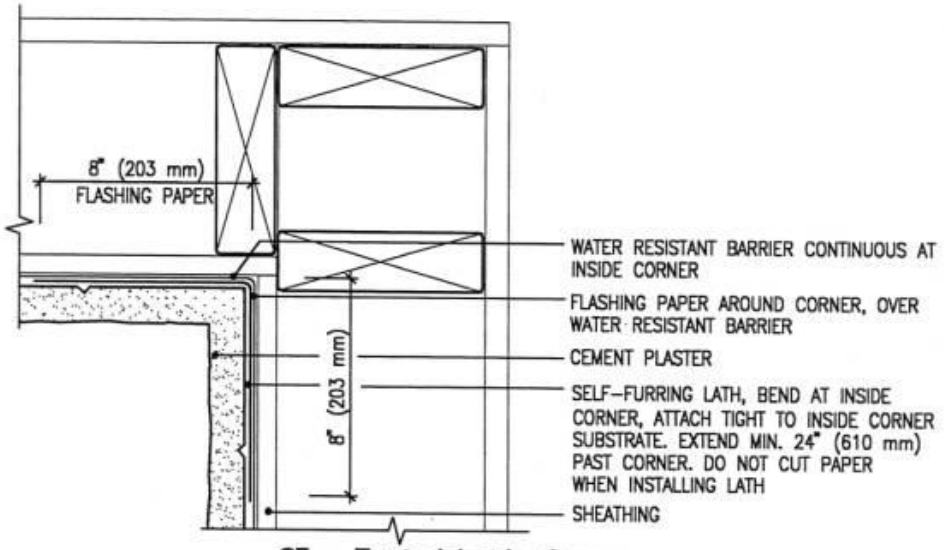
C2 - Corner Trim



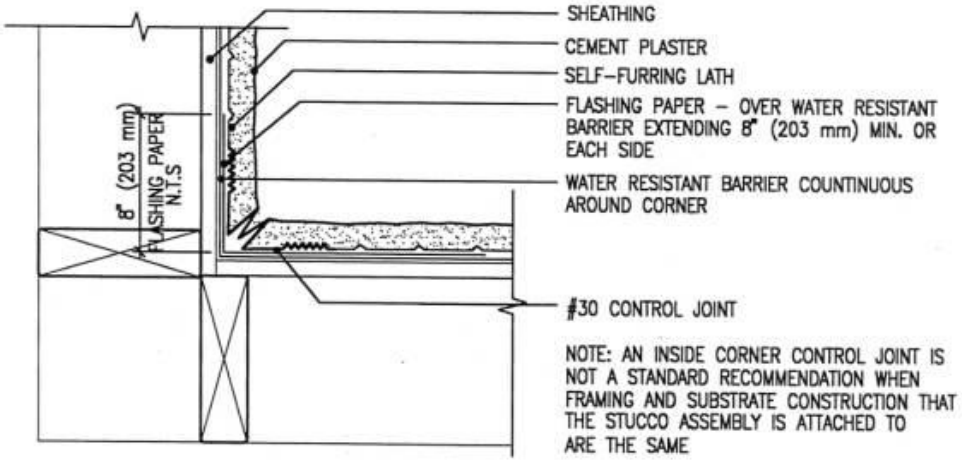
C3 - Corner Reveal Trim



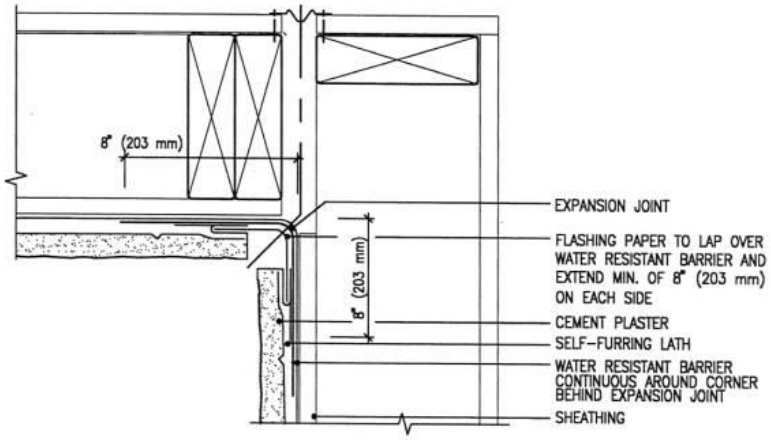
C4 - Wood Corner Trim



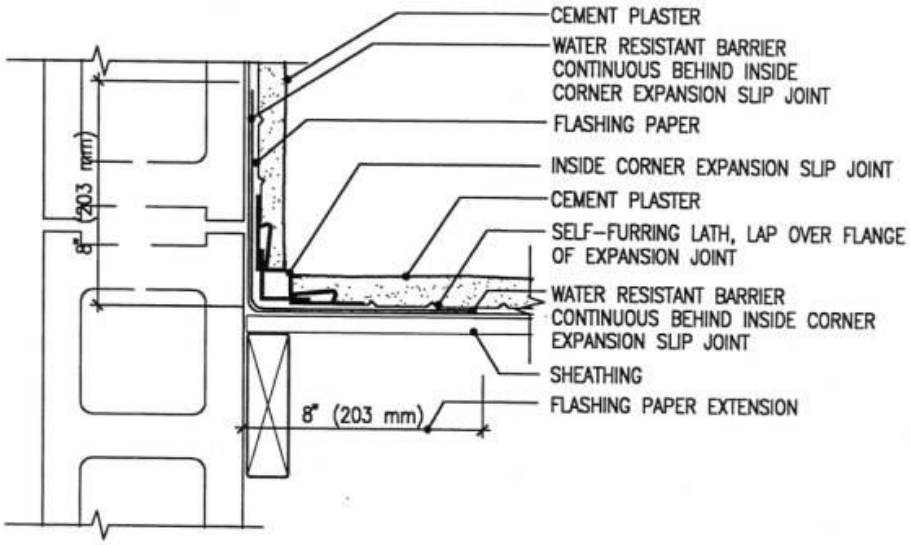
C5 - Typical Inside Corner



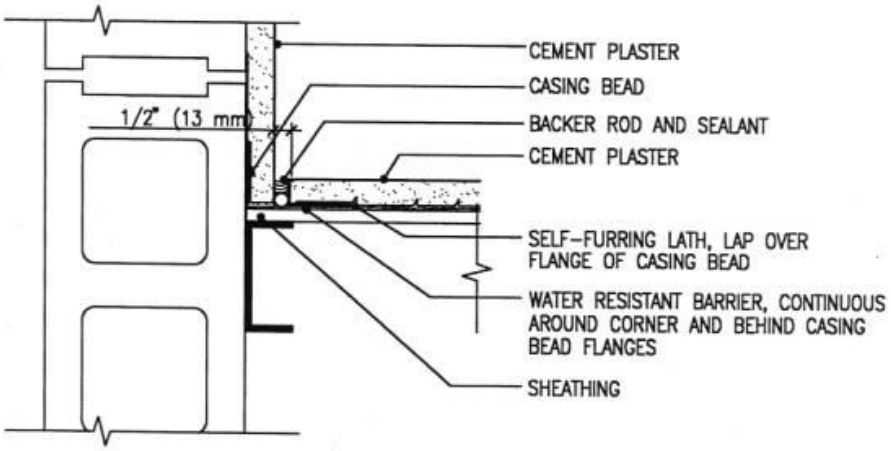
C6 - Inside Corner Control Joint



C7 – Inside Corner Expansion Joint



C8 – Inside Corner Expansion Joint

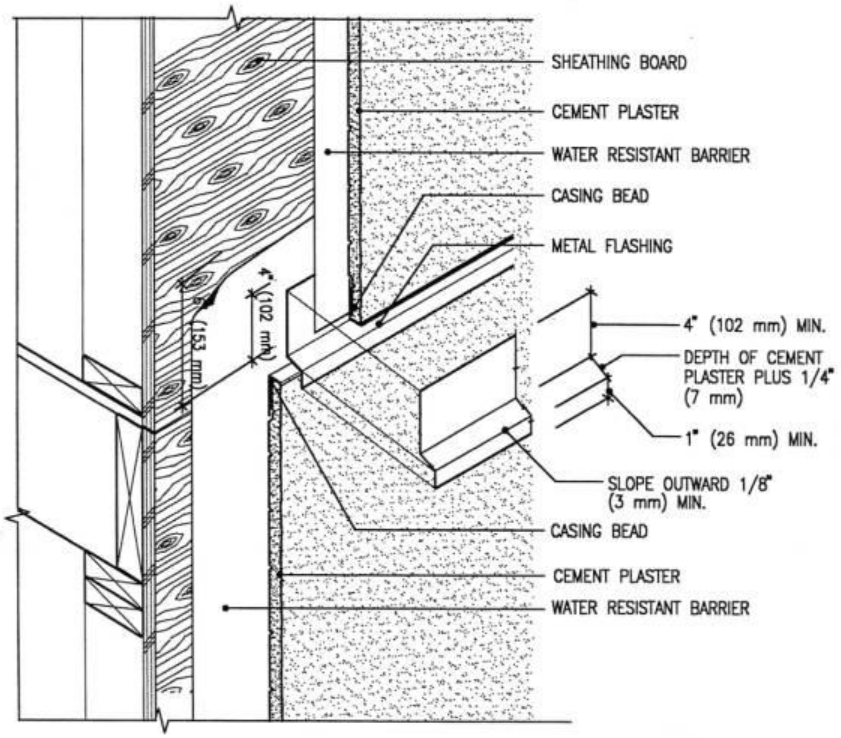


C9 – Inside Corner Expansion Joint

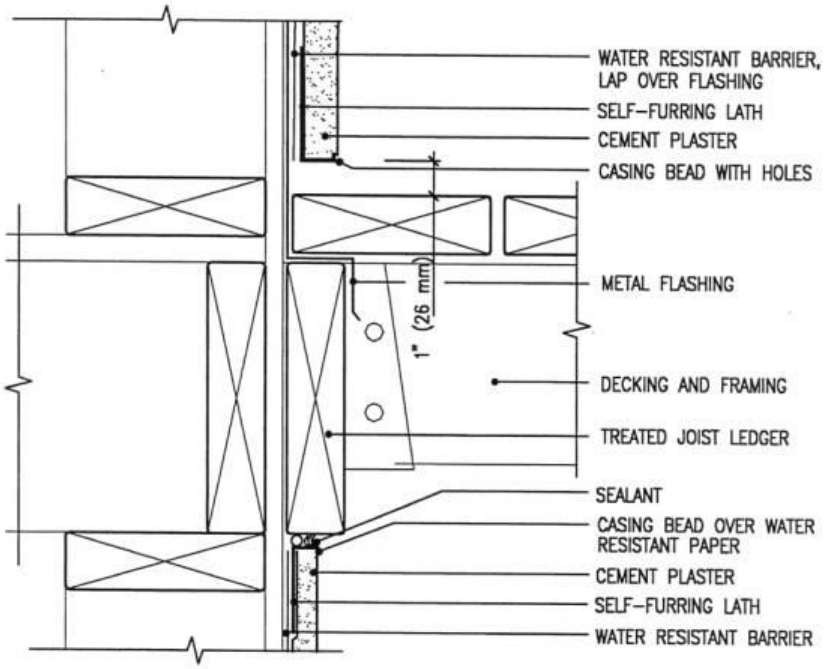
Flashing

Facts You Should Know

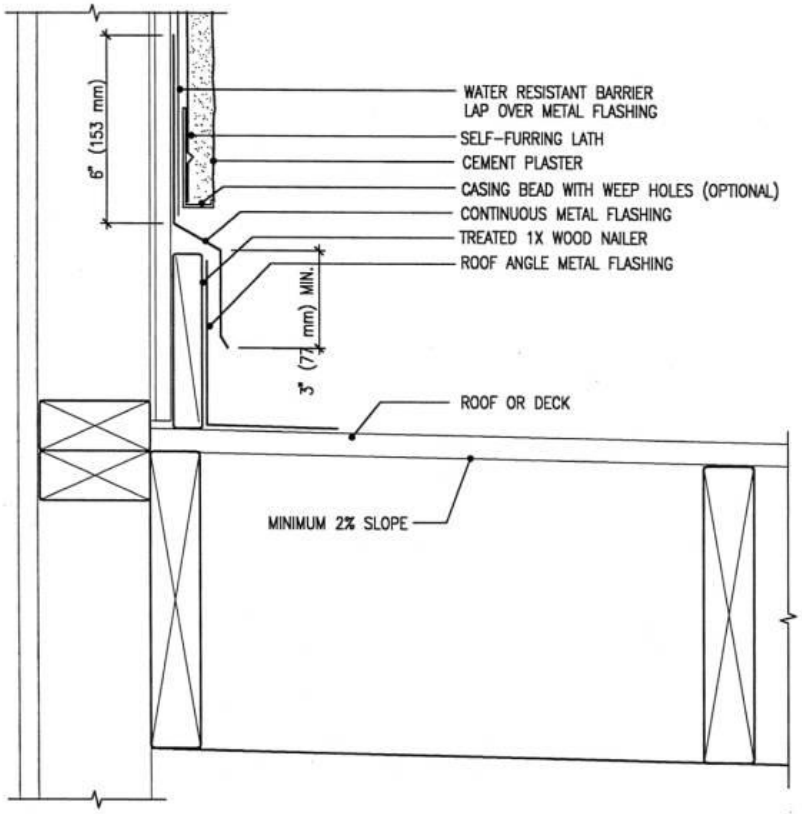
1. Metal and/or other membrane flashing materials are to intercept and redirect the flow of water to prevent it from entering the building. The principles of good design and construction practices for flashing must be followed.
2. The termination of each flashing should be lapped in shingle fashion over the next flashing so that the natural direction of flow is over and onto the next water-shedding surface.
3. Surface tension allows water to flow along the underside (horizontal surface) of the material. A *drip* design is recommended at the points of water discharge to ensure surface tension is broken and water is allowed to drip by gravity.
4. Wind pressure and air current can drive water through at locations of wall penetrations not flashed properly and/or sealed.
5. Flashing is generally not furnished or installed by the stucco contractor, and this information is included for information and reference only.



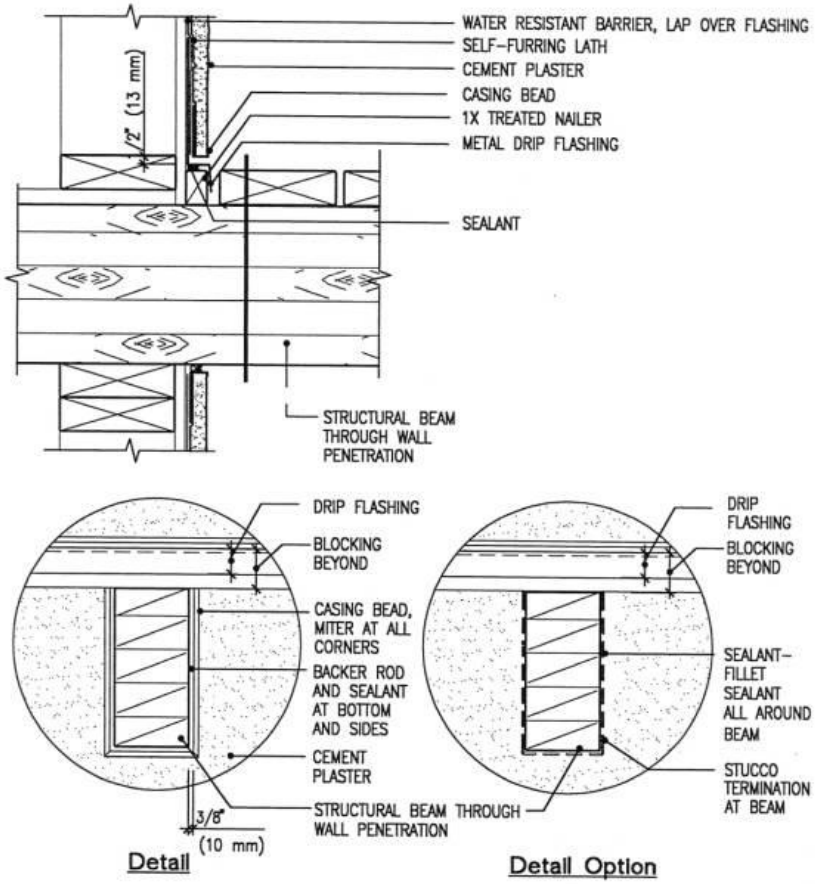
F1 – Horizontal Flashing & Expansion Joint/Weepage Point



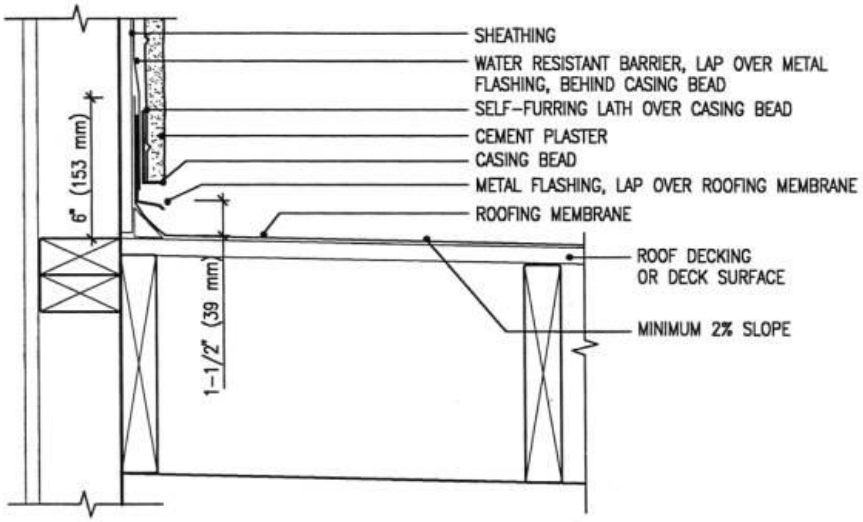
F2 – Deck Flashing



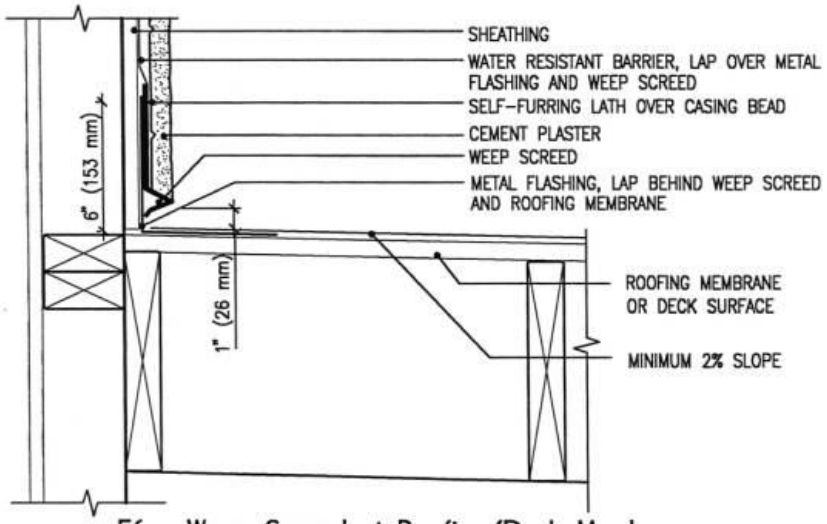
F3 – Counter Flashing at Roof or Deck Curb



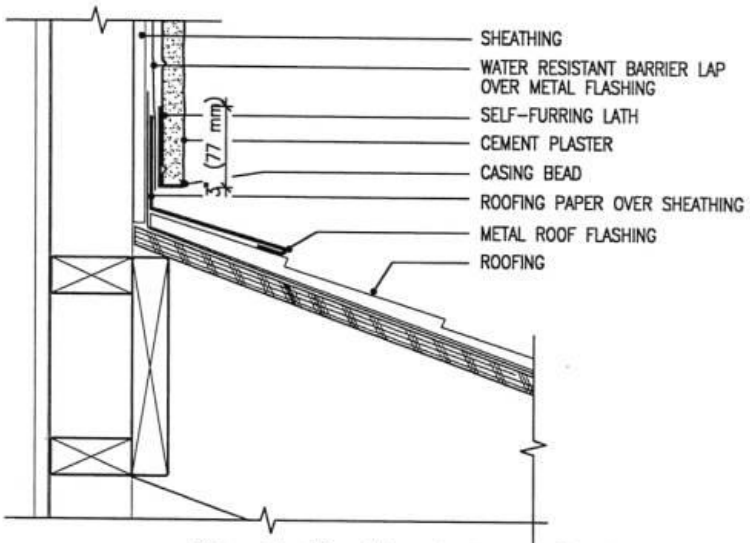
F4 - Flashing at Deck and Beam



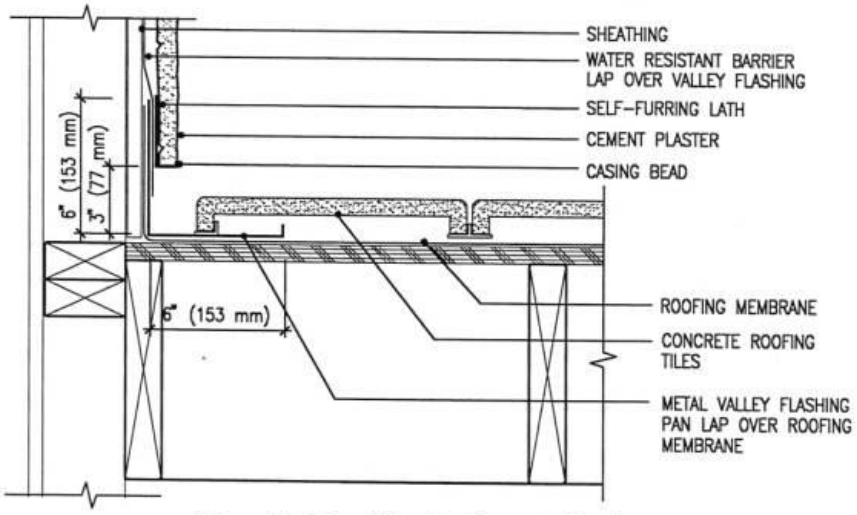
F5 - Counter Flashing at Roofing/Deck Membrane



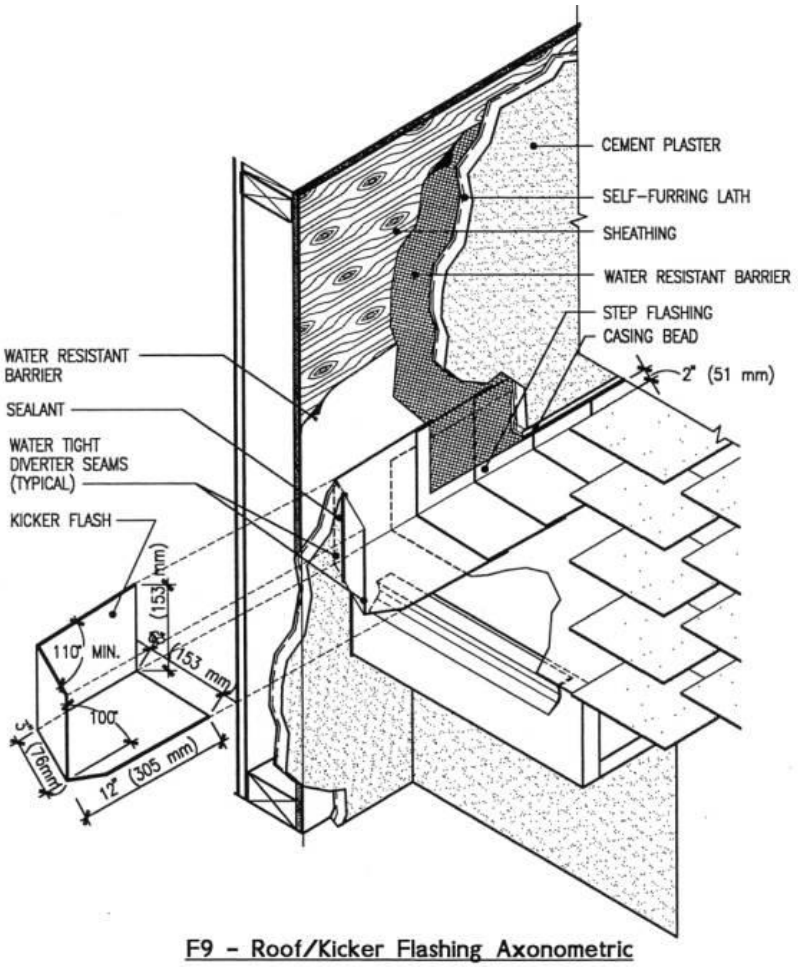
F6 - Weep Screed at Roofing/Deck Membrane



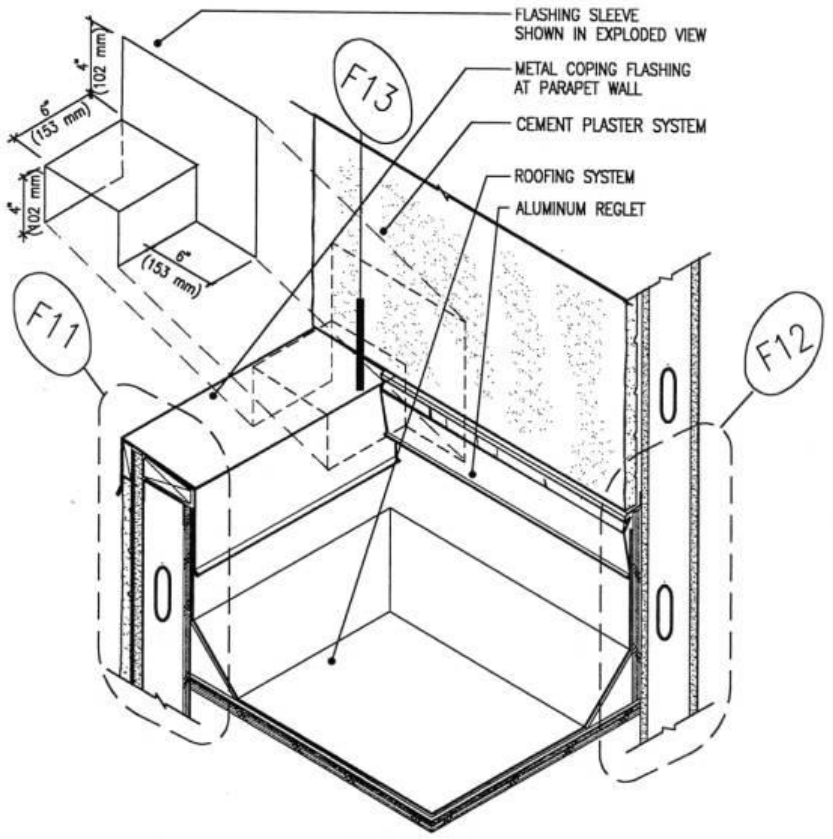
F7 - Flashing/Termination at Roof



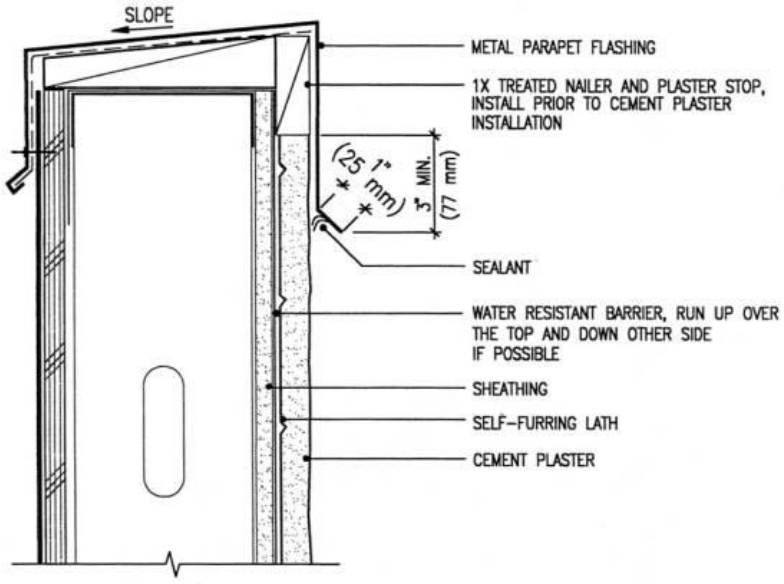
F8 - Flashing/Termination at Roof



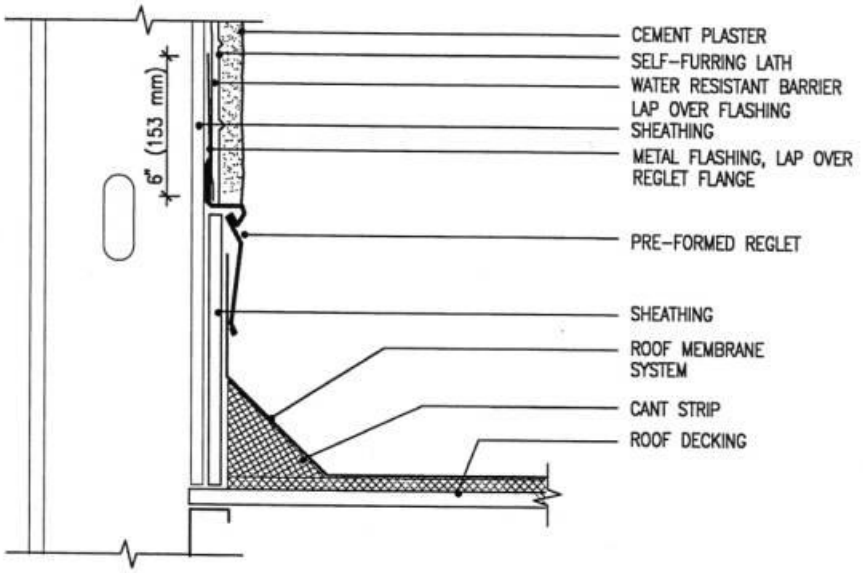
F9 – Roof/Kicker Flashing Axonometric



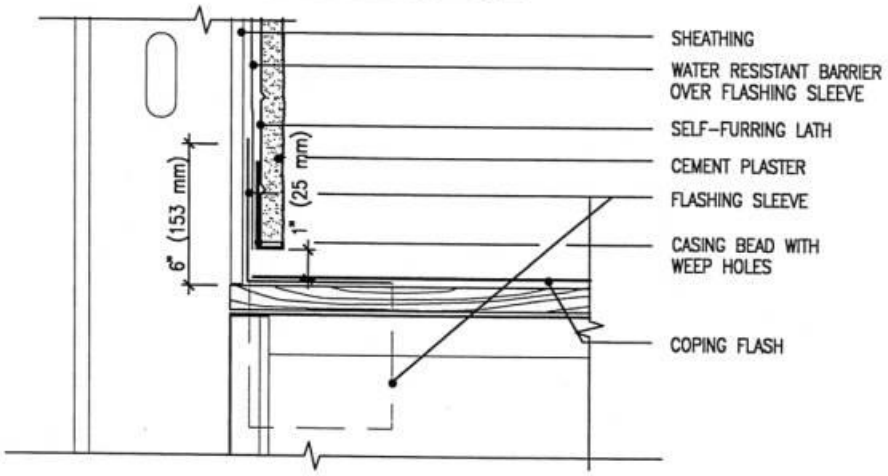
F10 – Flashing/Roof Axonometric



F11 – Parapet Coping



F12 – Flashing Reglet



F13 – Flashing/Top of Parapet at Vertical Wall

Trim Accessory Joints

EXPANSION JOINT – a break in the structure, framing, sheathing substrate and stucco assembly designed to allow for movement in the total wall/ceiling assembly.

CONTROL JOINT – a break only in the stucco assembly designed to absorb movement within the plane of the stucco membrane only.

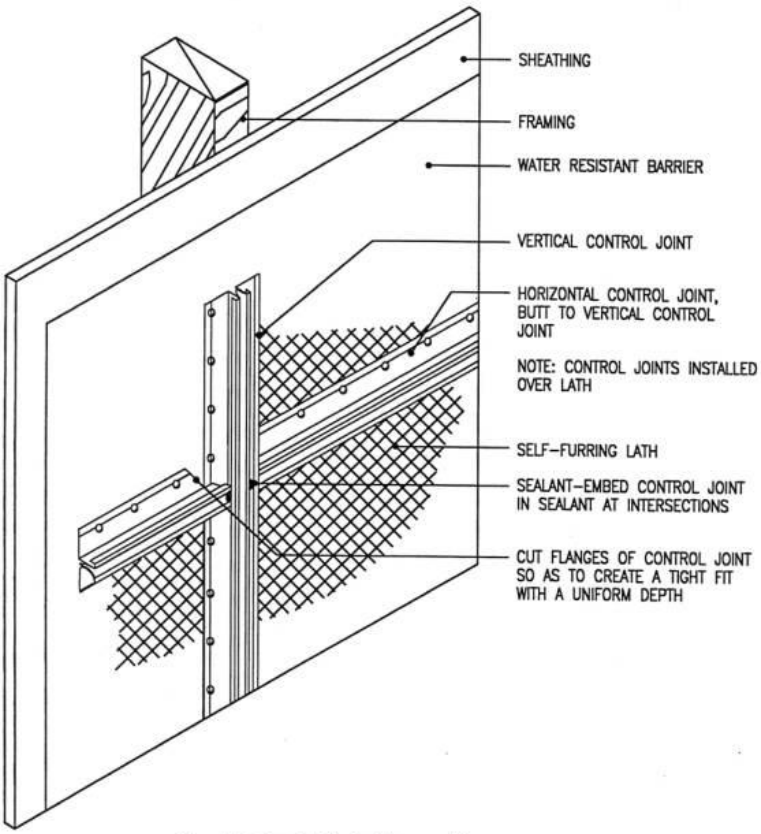
Facts You Should Know

1. Trim accessory joints refer to various types of control joints, expansion joints, reveals and/or any other devices or systems that divide (break) the stucco membrane surface.
2. Architect is to select the type of joint and indicate on drawing the location of joints.
3. It is recommended that control joints be installed for the purpose of controlling the location and the amount of cracking that might occur.
4. Trim accessory joints provide aesthetic value to the stucco surface.
5. The installation of control joints is not an assurance that there will be no cracking in the stucco, nor is it an assurance that cracking will occur only at the control joint locations.
6. The type of building, the design of the exterior walls and the entire stucco system dictate whether control joints should be used and the number involved.
7. Trim accessory joints provide relief of stresses from the structure.
8. Trim accessory joints provide for a plaster stop, a screed for the stucco, and stress relief point for the stucco.
9. Trim accessory joints accommodate expansion and contraction to relieve the stress present in the cement plaster membrane during curing.
10. Locate joints strategically at points where building movement is anticipated, such as wall penetrations, structural plate lines, junctures of dissimilar substrates, existing construction joints in structure, cantilevered areas, and where columns or beams join the walls or soffits.
11. Framed and sheathed construction requires control joints installed more often than in lath-reinforced stucco systems over concrete or concrete masonry surfaces. The use of control joints in a stucco system direct to concrete or concrete masonry substrate is limited.
12. A horizontal trim accessory joint is recommended at the floor-line on multistory framed construction. The architect and/or engineer needs to take into

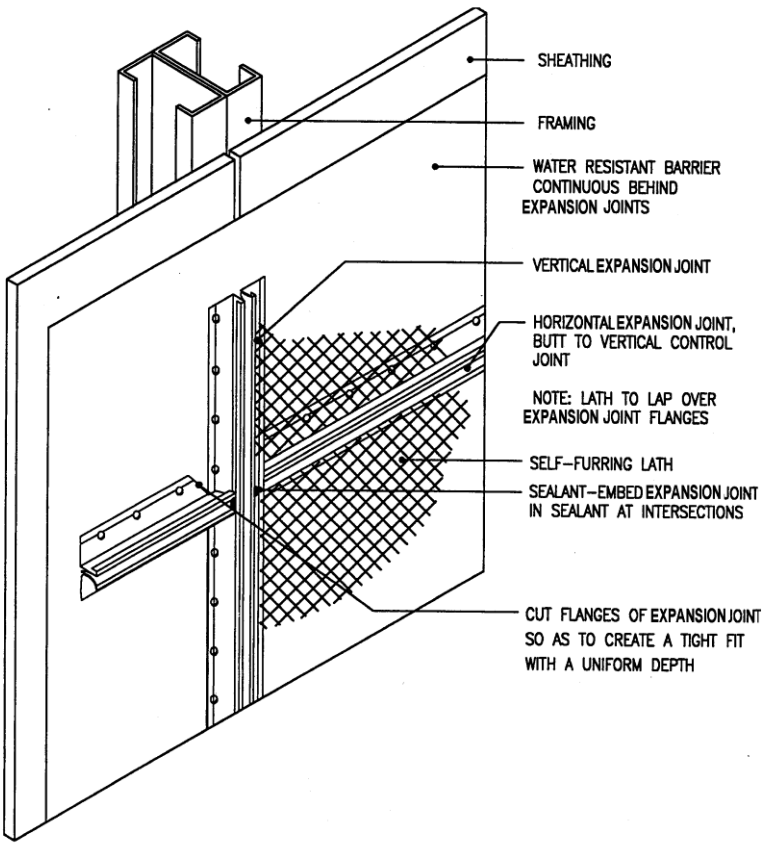
consideration the shrinkage and the compression perpendicular to grain of the wood framing members for the location of joints and the type of joints.

13. Control joints provide for better quality plastering work because they serve as a screed for leveling of the cement plaster, a uniform thickness ground and termination points.
14. The water-resistant barrier must continue unbroken behind trim accessory joints.
15. It is recommended that trim accessory joints be installed in framed and sheathed construction so as to create stucco panels not more than 144 square feet, in as square a configuration as possible. Maximum recommended length of a panel is 18 feet (5.5 m). Panel size should not exceed a 2 1/2-to-1 ratio. Horizontal areas should be limited to panels of 100 square feet.
16. It is recommended that trim accessory joints be installed with concrete or concrete masonry construction so as to create a stucco panel (with lath reinforcement) of 200-250 square feet (19 m2).
17. Installing control joints over continuous lath is an approved method because control joints are a one-piece trim accessory.
18. The recommendation for installation of expansion joints or reveals is to break the lath and lap it over on top of each of the flanges.
19. Expansion joints and/or reveals may consist of one or two pieces.
20. Control joints are limited in their degree of movement. Expansion joints provide greater movement.
21. It is recommended that trim accessory joints be weather-sealed by embedment in caulking at intersections, when placed end-to-end, abutting one another and at terminations.
22. It is recommended to install vertical joints continuously and to abut horizontal joints to vertical. The use of horizontal reveals, flashing designs and! or other horizontal surface breaks may prevent continuous vertical joints.
23. Install longest possible lengths continuously. Do not terminate a section within 24 inches (600 mm) of an intersection, with the exception of pre-manufactured trim accessory joint intersections.
24. Aluminum and/or PVC reveals require that when the lath is installed over the flange, it totally covers it. The welded wire and woven wire lath shall be installed so as the crotch of the lath is over the flange.
25. Sheathed framed construction with vertical trim accessory joints that require the lath to be terminated (cut) and installed on top of the flanges shall be placed at framing member locations. Lath shall be attached with appropriate fasteners

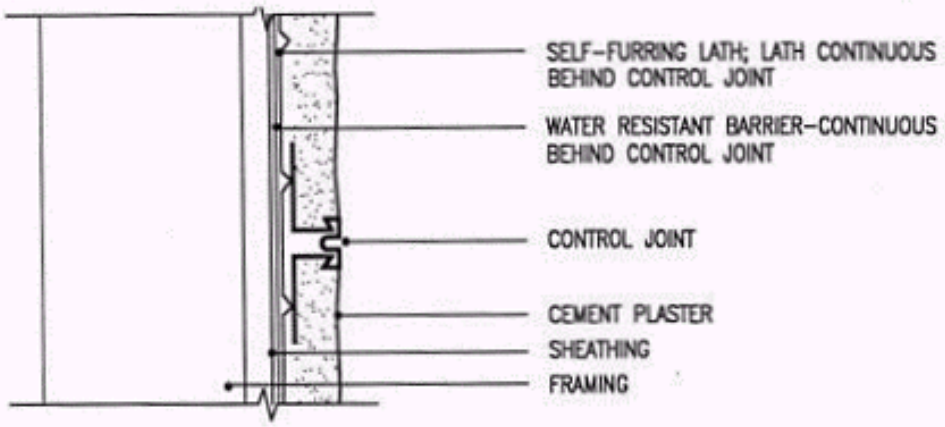
through the trim accessory flange, sheathing and into the framing member. The lath/flange on each side of the trim accessory joint is recommended to be attached to a framing member. Double framing supports may be required at these locations. This condition does not pertain to control joints installed over continuous lath.



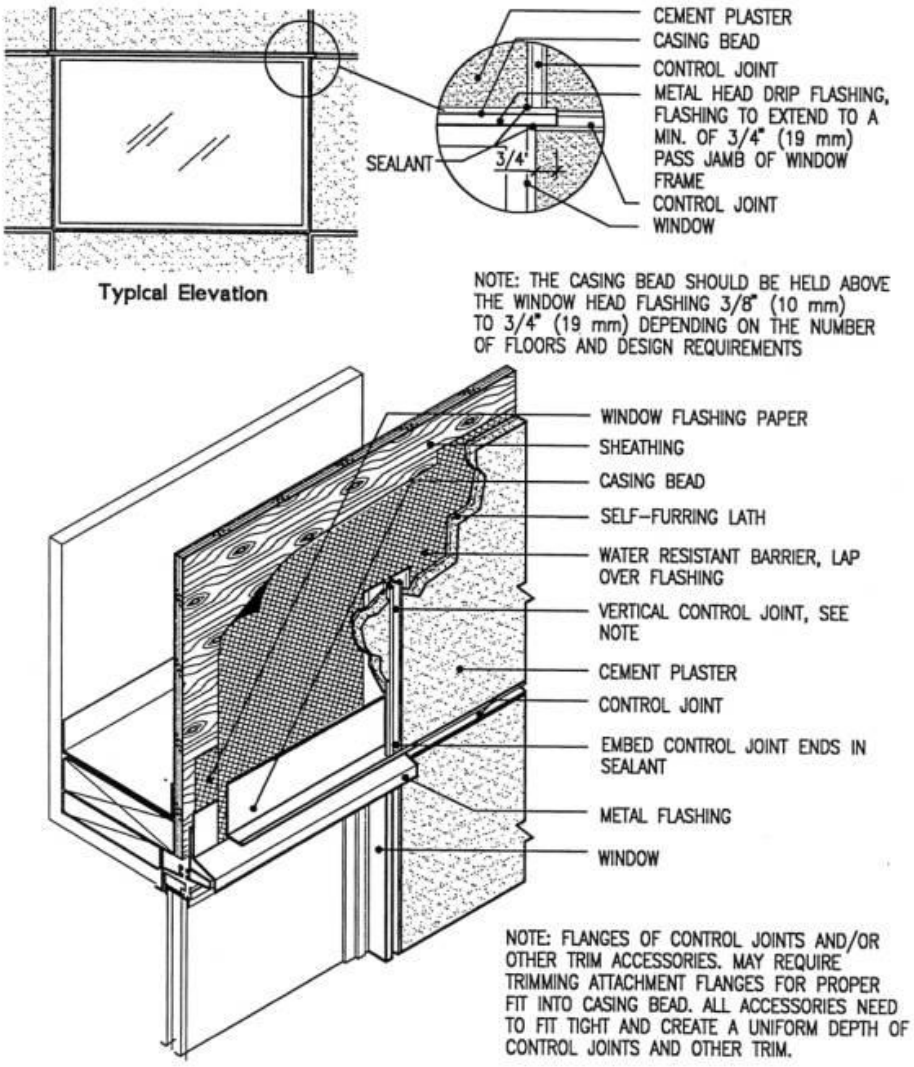
J1 – Control Joint Intersection



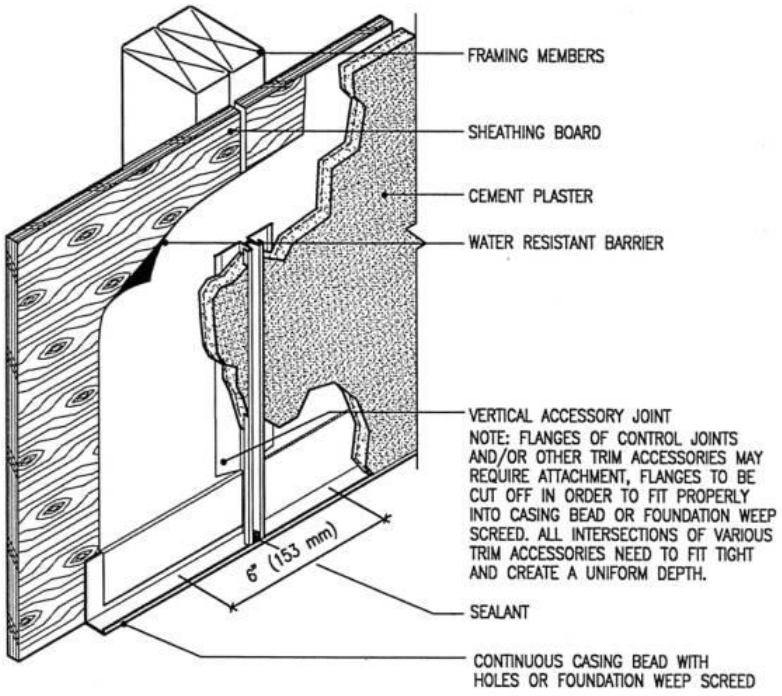
J2 – Expansion Joint Intersection



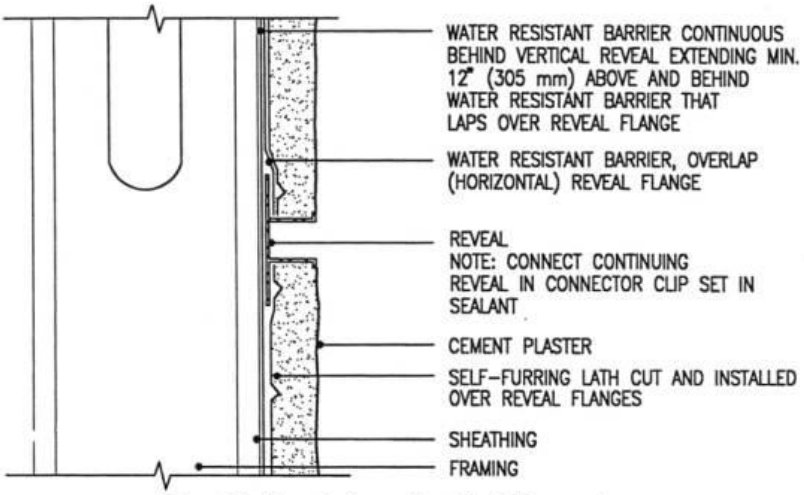
J3 - Horizontal or Vertical Control Joint



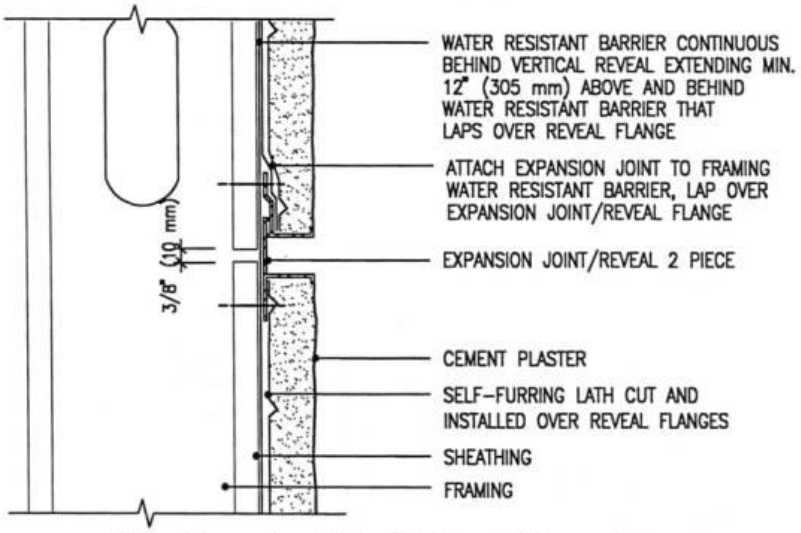
J5 - Flashing/Control Joint at Window Head



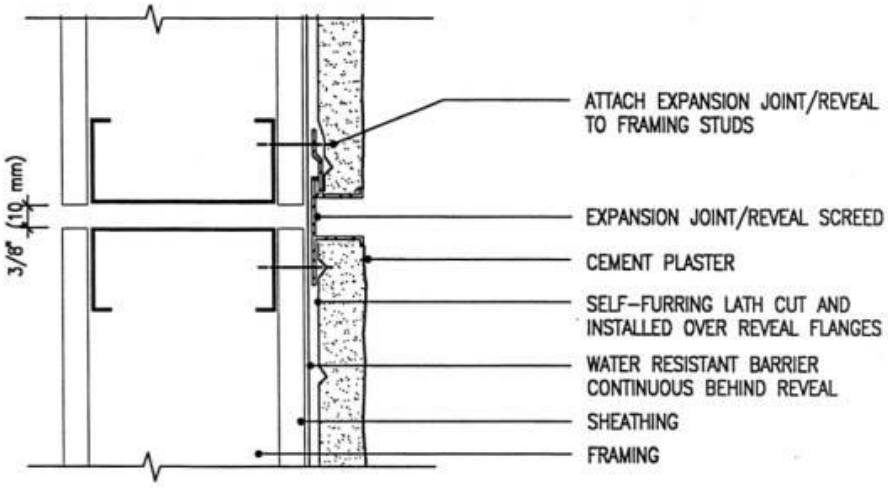
J7- Control Joint at Casing
Bead or Foundation Weep Screed



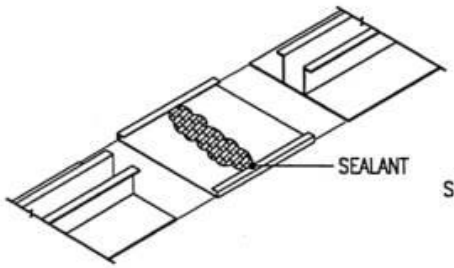
J8 - Horizontal or Vertical Reveal



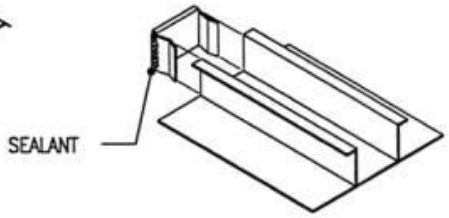
J9 - Expansion Joint/Horizontal Reveal



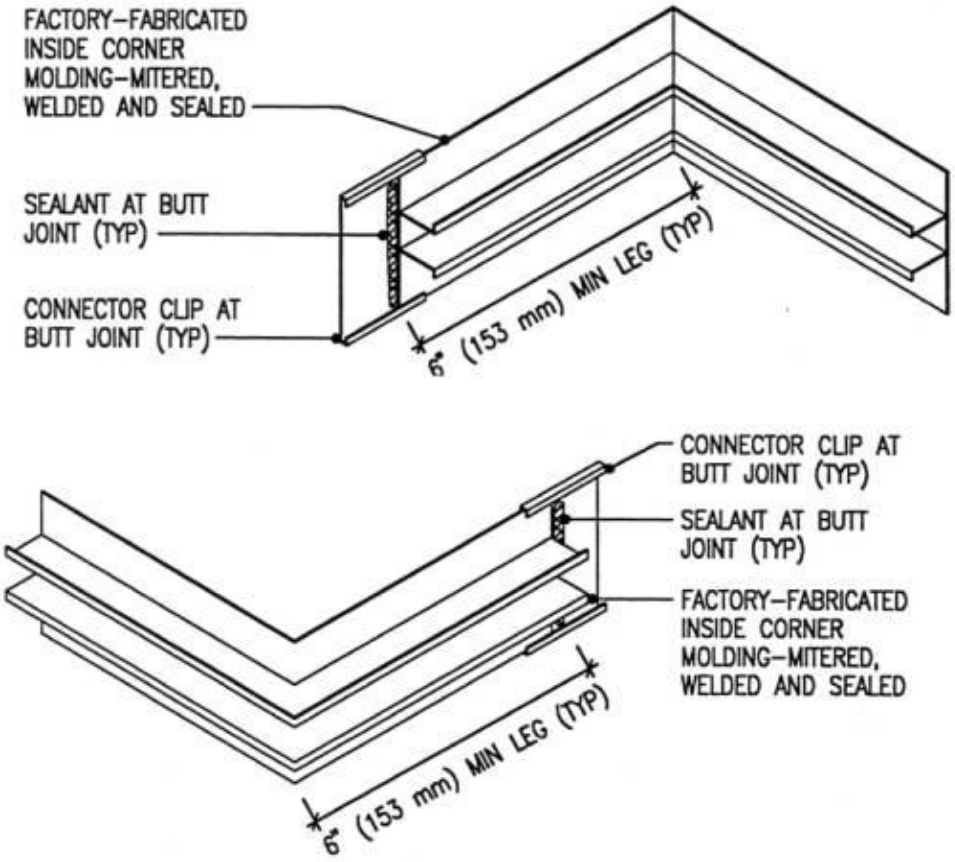
J10 - Vertical Expansion Joint Reveal



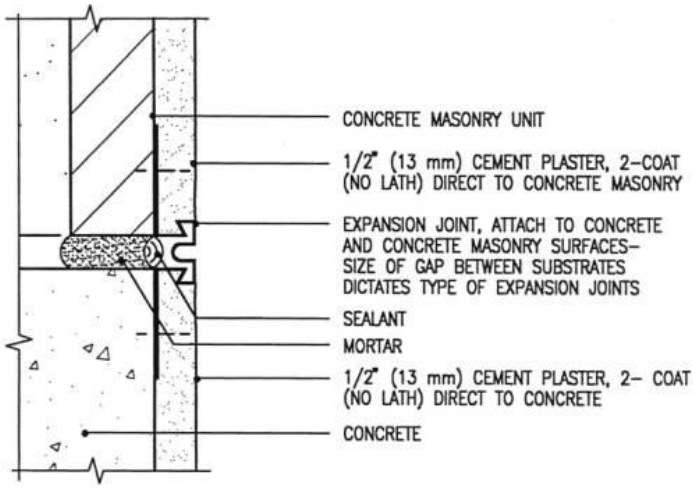
J11 - Butt Reveal Joint Clip Installation



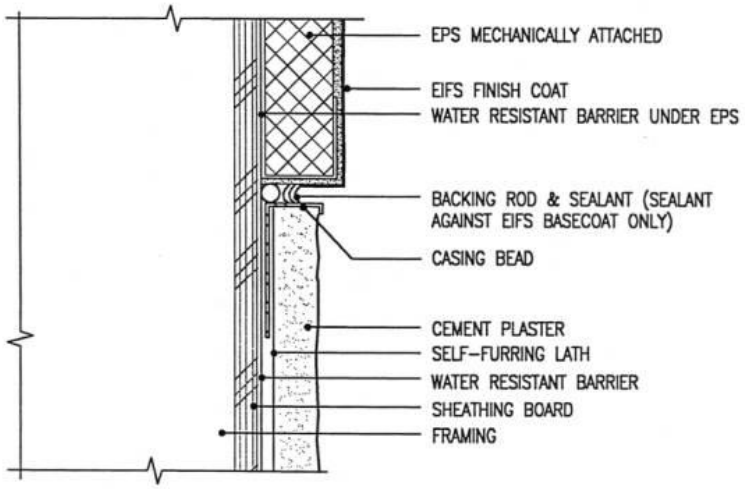
J12 - Reveal End Cap



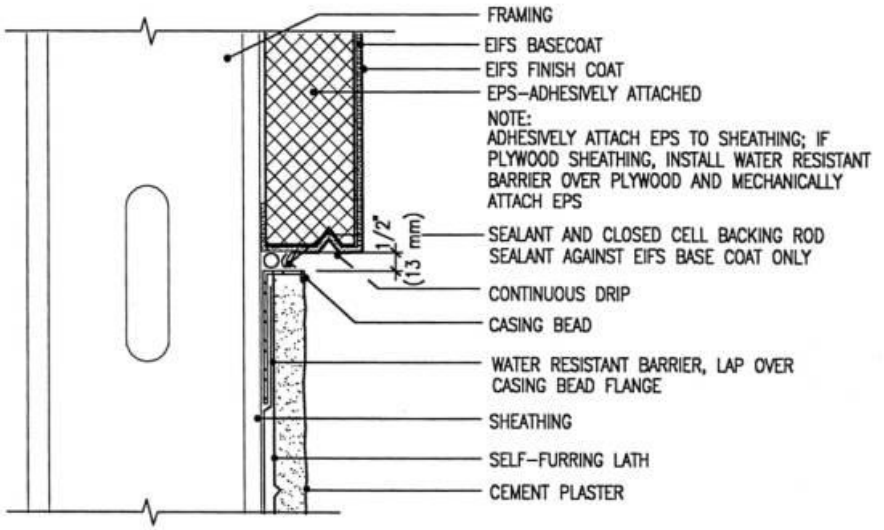
J13 – Inside Corner and
Outside Corner Horizontal Reveal



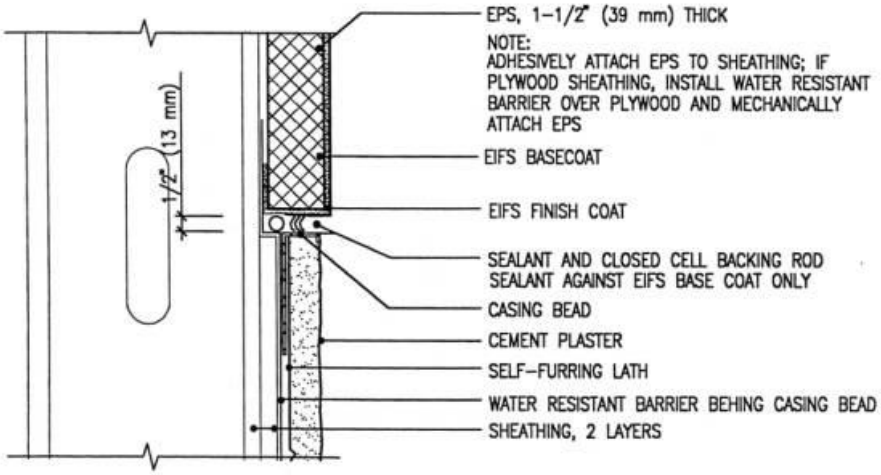
J14-Vert/Horiz Joint at Concrete/CMU



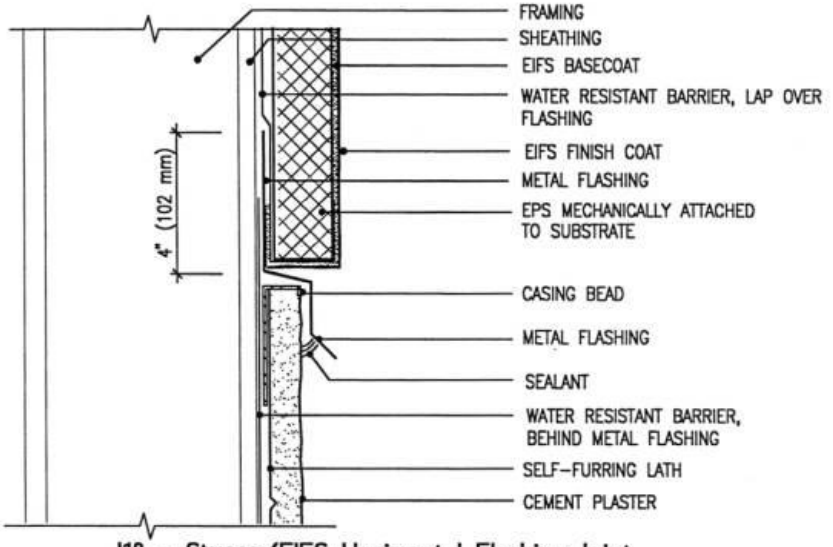
J15 - Vert/Horiz Joint at EIFS



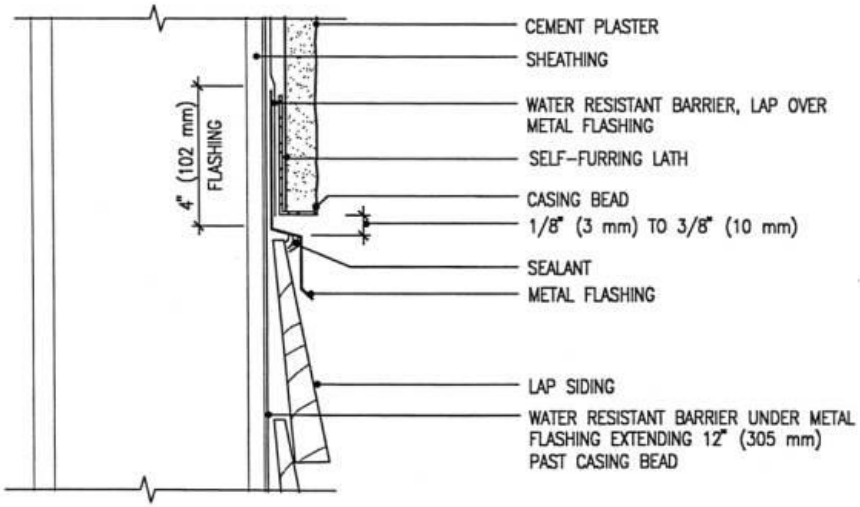
J16 – Stucco/EIFS Horizontal Joint



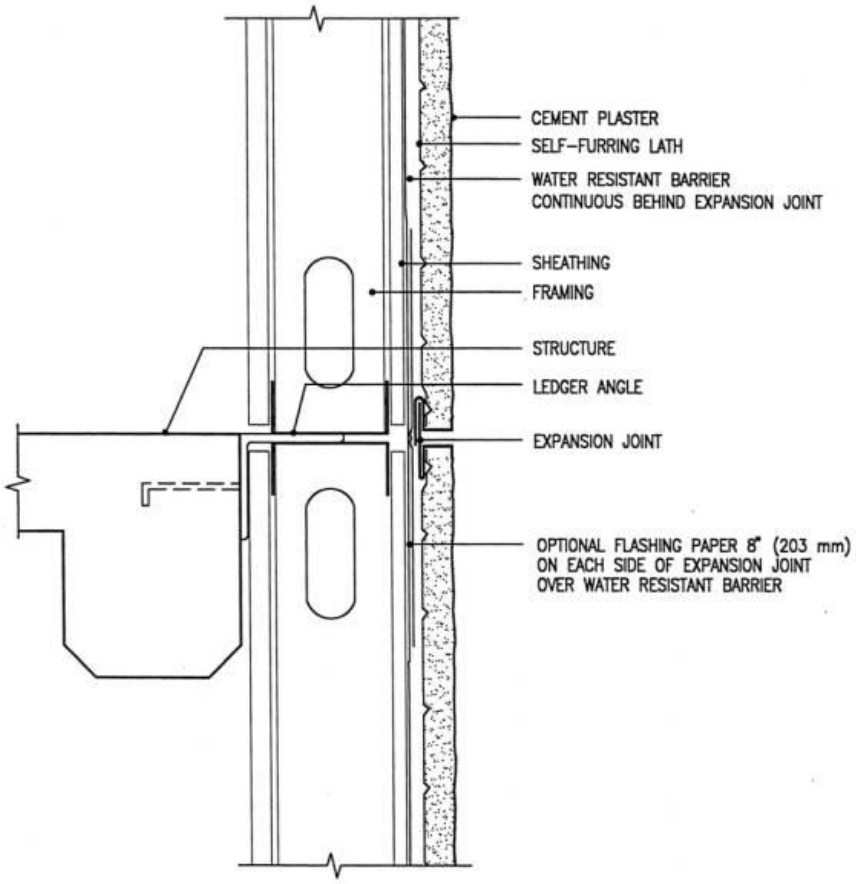
J17 – Stucco/EIFS Horiz/Vert Joint



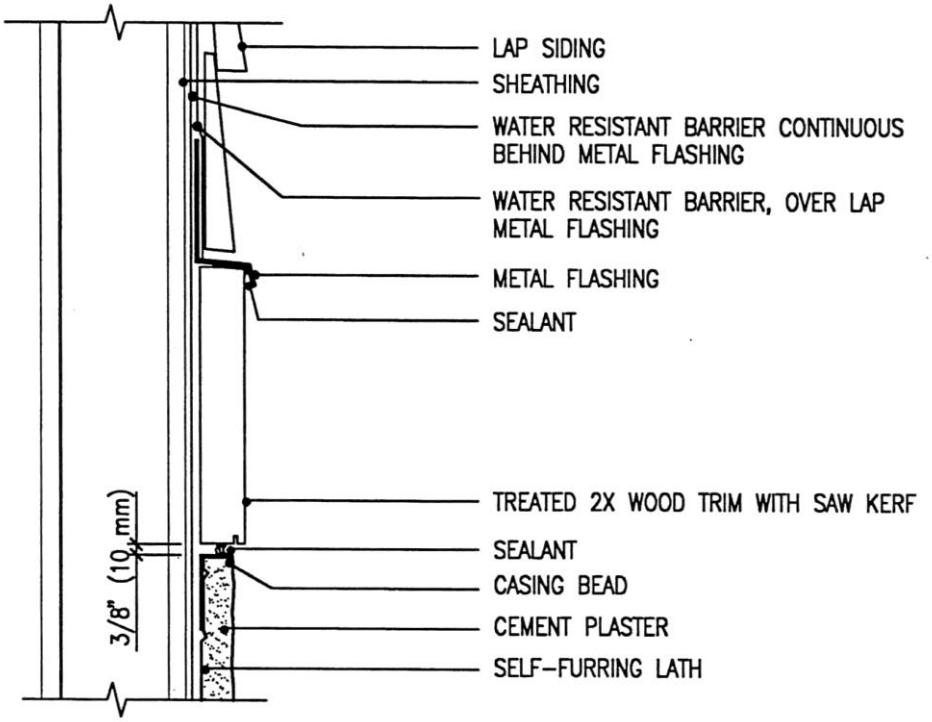
J18 – Stucco/EIFS Horizontal Flashing Joint



J19 – Stucco/Wood Siding Horizontal Joint



J20 – Horizontal Expansion Joint



J21 - Horizontal/Wood Siding Joint

Chapter 3

Stucco Assemblies

Stucco with Cementious Stucco Finish

1. Cement: Sand basecoat consisting of a scratch coat and brown coat.
2. Texture: Color finish coat of factory mixed cementious product with integral color.

Stucco Finish Coat

Note: Stucco finish coat *in this specification refers to the cement plaster finish of which there are two types:*

A. Job-site stucco finish coat.

B. Manufactured stucco finish coat.

- For colored (integral color) stucco finish coat, the use of a manufactured stucco finish is recommended.
- It is recommended that the lighter tones of color (pastel colors) be used for stucco finishes.
- Stucco finish coat color uniformity cannot be guaranteed because of a variety of uncontrollable factors (suction of basecoat and the application of the finish coat will vary with climatic conditions). Manufactured stucco finish coat will produce the most consistent color.
- Time necessary between the completion of basecoat (*brown coat*) and the application of finish coat will vary with climatic conditions.
- For job-site finish coat, it is recommended that the coloring agents be from a stucco finish-coat manufacturer.

C. Stucco basecoat (or concrete surface) is required to be in a proper condition before application of stucco finish coat or acrylic finish coat.

Note: Do not apply finish coat until all irregularities in the basecoat have been addressed.

D. Apply stucco finish coat to damp cement plaster basecoat.

Note: Dampen the basecoat with a mist of clean water to obtain uniform suction. Do not saturate; there should not be any visible water on the surface when the finish coat is applied.

E. Apply stucco finish coat in a nominal thickness of 1/8-inch (3 mm). (Refer to Plaster Thickness Tables, pg.123).

F. Apply stucco finish with sufficient material and pressure to ensure a tight bond with base coat (*brown coat*) or concrete surface.

G. Apply stucco finish to a uniform thickness and in a consistent finish in accordance with style of finish specified.

- Apply finish coat starting from the top of the wall surface and work down.
- Apply finish coat with no interruptions; no cold joints.
- Apply finish coat so there are no *scaffold* lines or joint stains.

H. Moist-curing of finish coat is not recommended, except in severe climatic conditions (e.g., extreme heat, strong winds and low relative humidity).

- Moist-curing of the stucco finish coat can cause discoloration.
- Smooth trowel finish is not recommended when the material is cement plaster.
- Very heavy textures may have to be applied in the basecoat because a nominal stucco finish coat is not thick enough.
- It is recommended that a sample of the finish coat be applied to a wall at the project site if possible.
- Provide style and color sample of stucco finish coat for approval before starting the application of finish coat. Delete if not applicable.
- The approved sample to be maintained on project site until the scope of stucco work is completed and approved.
- Use only enough water in stucco finish coat mix to make it workable.

Stucco with Acrylic/Elastomeric Color: Texture Finish

1. Cement: Sand basecoat consisting of a scratch coat and brown coat.
2. Texture: Color finish coat of factory mixed 100% acrylic product with integral color.

Acrylic Finish Coat

- The acrylic finish to be 100-percent acrylic polymer base.
- Acrylic finish coat and manufacturer to be recommended by TLPCA.
- Basecoat of cement plaster that is to receive an acrylic finish coat shall have been floated and/or have a stucco sand-finish.
- Do not apply finish until all irregularities in the basecoat or concrete surface have been addressed.
- Acrylic finish to be applied per the manufacturer s recommendations.
- Stucco basecoat shall be free of efflorescence. Apply acrylic finish coat only at an ambient temperature of 40°F (4°C) and rising. This temperature is recommended for a minimum of 24 hours after application.

- Acrylic finish shall maintain a wet edge at all times. The finished surface shall have no scaffold or stain lines.
- Protect finished surface from climatic conditions until dry.
- It can be difficult to achieve a uniform color using a spray-applied acrylic finish. Therefore, it is recommended that a troweled application of the acrylic finish be applied first.
- Do not moist-cure acrylic finish.

I. Apply acrylic finish coat with sufficient material to uniformly and completely cover the basecoat.

Marblecrete

System

1. Marblecrete is an exposed aggregate finish consisting of natural or integrally colored aggregate partially embedded, in a natural or colored bedding coat of Portland cement/lime/sand/plaster.
2. Marblecrete shall be applied over Portland cement basecoat, concrete or masonry surface. Total thickness of marblecrete shall be a minimum of ½".

Marblecrete Bedding Coat

Proprietary Mix:

Shall be a factory prepared Portland cement plaster finish coat material to which only water shall be added.

Job Mix:

Shall be formulated of white or regular Portland cement, white graded sand, lime and pure mineral color oxides guaranteed by the manufacturer to be lime-proof. The mix shall conform to ASTM C926 standards.

Note: Thickness of bedding coat should be determined based upon the largest size aggregate selected. Embedment of the chip shall be a minimum of ½ of the body of the chip.

Aggregate

1. Aggregate shall consist of naturally colored marble chips or pebbles. Other natural aggregates such as quartz, cinders, sea shells, or integrally colored manufactured aggregates are acceptable providing they are compatible with the materials of the bedding coat, are weather resistant, are permanent in color and have a hardness on the Moh's scale of 3 or more. Aggregate shall be clean and free from harmful amounts of dust, loam , dirt, silt, soluble salts, vegetable and other foreign matter. If washed on the job, chips should be allowed to drain until there is no free water visible before using.
2. Aggregate shall be specified to be blended by sizes (National Terrazzo and Mosaic Association Grading Standard) and percentages of graded chips.

Note: Chips larger than #4 may not be applied with rock-gun, but may be set by hand.

3. To achieve dense coverage of the bedding surface and uniformity of aggregate color distribution, aggregate must be specified by percentage of size as desired by architect. The larger the sizing of chips, the lower the percentage of bedding coat coverage. To increase the coverage the rock may be applied in two operations with the large rock applied first with the smaller rock following immediately.
4. Embedment of the chip shall be a minimum of one-half of the body of the chip.

Application

1. Apply the bedding coat over a set, cured basecoat of Portland cement plaster, concrete or masonry surface.
2. The thickness of the bedding coat shall be a minimum of 1/4" and shall be determined by the size of the largest aggregate.

Aggregate Size	Bed Coat Thickness
#0 & #1	¼"
#3 and smaller mixed	3/8"
#4 smaller mixed	½"
Larger than #4	As needed for firm aggregate embedment

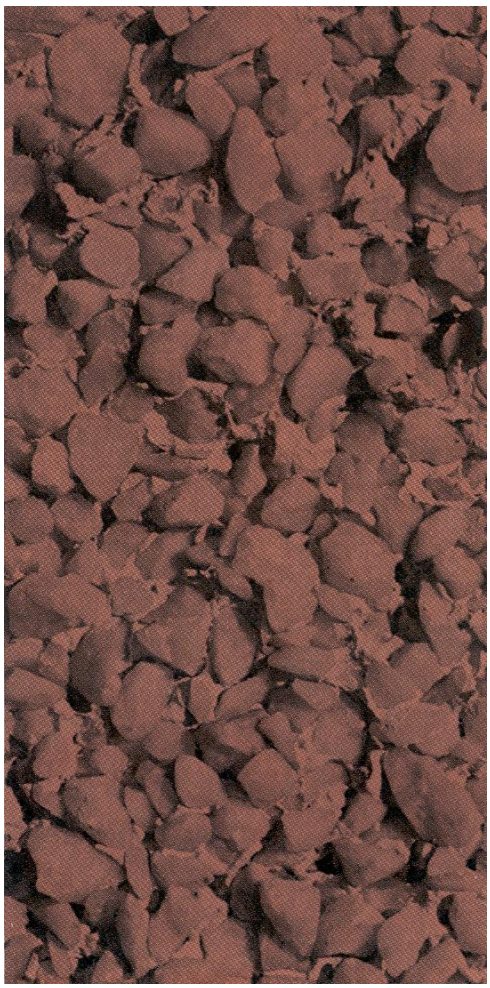
3. It is recommended that a bonding agent be applied to the set basecoat to assist in controlling suction and curing.
4. Control joints, plaster stops, separation beads and metal screeds shall define panel areas not to exceed 100 square feet.
5. Apply the bedding coat to a uniform thickness and in an area not to exceed the ability of applying the aggregate before the bed coat mix has begun to set. The bedding coat is applied by starting from the center of a panel, and working out toward its perimeter.
6. Apply the chips on the bedding coat, either by hand or a rockgun, starting at the perimeter of each panel working toward the center. The consistency of the bedding mortar at the time of chip dashing shall be such that the chips are embedded to adhere and not crater the bedding coat excessively.
7. At the option of the architect, the chips can be tamped as the bedding coat takes up. The tamping will bring the face of the chips to a level plane. The degree of tamping or embedding of the chips will depend upon the desire of the architect, and needs to match the approved sample. Tamping can be omitted if a rougher texture is desired, but if less than 1/3 of the chip is embedded, there is danger of the chips coming loose and separating.
8. At the option of the architect, either a waterproof sealer or glaze may be used over the completed marblecrete finish. Selection of the sealer or glaze should take into account the life performance and maintenance of the material selected.

Marblecrete Finishes

TM-1 Marblecrete – Untamped

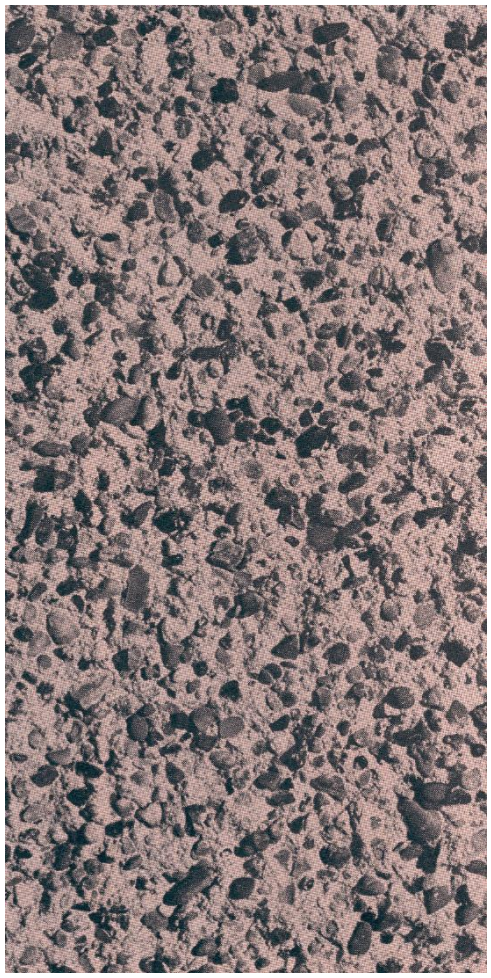
No. 3 Aggregate hand or machine placed in a matrix (3/8” thick) of job mixed Portland cement or a proprietary mix.

TM-2 Marblecrete – Untamped



No. 2 Aggregate hand or machine placed in a matrix (1/4” thick) of job mixed Portland cement or a proprietary mix.

TM-3 Marblecrete – Untamped



No. 1 Aggregate hand or machine placed in a matrix (3/16" thick) of job mixed Portland cement or a proprietary mix.

Plaster Thickness Tables

The tables that follow provide the recommended thicknesses for Vertical and Horizontal plaster coatings.

1	2	3	4	5	6	7
Type of Substrate	Method of Application	Cement Plaster Basecoat			Finish Coat	**Total**
(Vertical Walls)		1st Coat (scratch)	2nd Coat (brown)	Total Basecoat		**Thickness**
Sheathed Construction	Basic Stucco System	3/8" - 1/2"	3/8"	3/4" - 7/8"	1/8"	7/8" - 1"
Concrete Masonry Units (CMU)	Direct Applied-2 Coat	n/a	3/8" - 1/2"	3/8" - 1/2"	1/8"	1/2" - 5/8"
	Basic Stucco System	3/8"	1/4" - 3/8"	5/8" - 3/4"	1/8"	3/4" - 7/8"
Concrete	Direct Applied-Finish Coat	n/a	n/a	n/a	1/16" - 1/8"	1/16" - 1/8"
	Direct Applied-2 Coat	n/a	1/4" - 3/8"	1/4" - 3/8"	1/8"	3/8" - 1/2"
	Basic Stucco System	3/8"	1/4" - 3/8"	5/8" - 3/4"	1/8"	3/4" - 7/8"

1	2	3	4	5	6	7
Horizontal Substrates	Method of Application	Cement Plaster Basecoat			Finish Coat	**Total**
(Soffits)		1st Coat (scratch)	2nd Coat (brown)	Total Basecoat		**Thickness**
Framed/Sheathed Construction	Basic Stucco System	1/4" - 3/8"	1/4" - 3/8"	1/2" - 3/4"	1/8"	5/8" - 7/8"
Concrete	Direct Applied-Finish Coat	n/a	n/a	n/a	1/8"	1/8"
	Direct Applied-2 Coat	n/a	1/8" - 1/4"	1/8" - 1/4"	1/8"	1/4" - 3/8"
	Basic Stucco System	1/4" - 3/8"	1/4" - 3/8"	1/2" - 3/4"	1/8"	5/8" - 7/8"

Comments for Plaster Thickness Tables I & II

A. The plaster thickness is measured from the face of the substrate. For soffits, the plaster thickness is measured from back of expanded metal lath (exclusive of rib).

B. Sheathed framed construction is recommended rather than open-frame construction. The thickness of the cement plaster for these two types of construction would be the same.

C. Basic stucco system refers to a stucco assembly with lath.

D. An accepted and recommended application of the basecoat is the double-back method, which is the process of successive coats with little or no delay.

E. Basic stucco system should have a minimum thickness of 3/4 inches (19 mm), which can include a 1/8-inch (3 mm) stucco finish coat.

F. If a fire-resistance assembly is required, the minimum thickness of cement plaster must be 7/8-inch (23 mm), which can include a 1/8-inch (3-mm) stucco finish coat. If the finish is an acrylic finish coat or some other approved coating, the basecoat of cement plaster must be a minimum thickness of 7/8-inch (23 mm).

Note: Plaster thickness should conform to the applicable building codes.

G. Stucco finish coat directly over concrete is also referred to as a skim coat.

H. It is recommended that a liquid bonding agent be applied to concrete before the application of a direct cement plaster basecoat or stucco finish coat.

I. The soffit framing construction options for the basic stucco system are:

1. Direct to a joist system.
2. Suspended system.
3. Furring/sheathing system.

Direct-applied cement plaster to a concrete or concrete masonry surface that exceeds the maximum thickness requires self-furring lath.

Chapter 4

Guide Specifications for Portland Cement Plaster/Acrylic Finish

Part I-General

1.01 Purpose

Guide specifications for the minimum requirements for the system and application of Portland cement plaster (stucco) with an acrylic finish.

1.02 Scope

The contractor shall provide all materials, labor and equipment necessary to complete this system of Portland cement plaster as shown on drawings and/or as described herein.

1.03 Exclusions

Flashing, caulking, sealants, sealers, shall be furnished and installed by others.

1.04 Reference Standards

Standards: Workmanship and installation shall be performed per:

A. Texas Lathing and Plastering Contractors Association/Texas Bureau for Lath and Plaster.

B. ASTM C-1063 installations of lathing and furring for Portland cement plaster.

C. ASTM C-926 application of Portland cement plaster.

D. Where products and or systems are specified they shall be installed in accordance with the Building Codes and/or manufacturer's requirements.

1.05 Qualifications

Applicator and/or contractor must be qualified in the workmanship of plastering. Must be able to show completed work of equal scope.

1.06 Submittals

The applicator and/or contractor shall be prepared and may be required to supply mock-up finish samples.

Do not proceed with lathing or plastering until all products and/or finish samples are approved, if required.

1.07 Pre-Construction Meeting

Be prepared for a pre-job meeting with the architect, owner, and general contractor, if required, before the start of lathing and plastering procedures.

1.08 Materials

To be delivered to job in original containers with labels intact and legible.

Storage and protection of all products are the responsibility of the contractor performing the scope of the work.

1.09 Job Conditions/Environmental Requirements for Cement Plaster.

A. Cold Weather

1. Do not use frozen material.
2. Do not apply cement plaster to frozen surfaces or surfaces containing frost.
3. Do not mix materials or apply cement plaster when ambient temperature is less than
   35° F /1.6°C.

B. Hot Weather

1. Protect cement plaster from uneven and excessive evaporation during hot, windy, and dry weather.
2. Moist curing after each coat of cement plaster with water if ambient temperature is more than 75°/24°C. Moist cure for 48 hours after application of coats.
3. In hot, dry, or windy weather conditions, moisten the cement plaster down.
4. Moist curing is required at the start and end of workday.

5. When the humidity is higher than 75%, moist curing is not required.

1.10 Double-Back Method

Double-Back method -whereby the scratched and brown coats are applied and cured as one system is approved as an option to the standard 3-coat method.

The second coat (brown coat) should be applied as soon as the first coat is rigid.

1.11 Job Conditions/Environmental Requirements for Acrylic Finish

A. Do not use acrylic finish materials if they have been frozen.

B. Do not apply acrylic finish when ambient temperature is less than 40°F/4.4°C.

C. Do not apply acrylic finish unless the temperature has been 40°F/4.4°C for at least 24 hours before the application.

D. Cold Weather: If heating and tenting is required to perform the application of the acrylic finish coat, it is not the responsibility of the acrylic finish contractor to provide it.

E. Do not apply finish coat when there is any form of precipitation.

F. Protect cement plaster from all forms of precipitation during the application and the setting/curing period of finish coat. Ensure that the finish is fully set prior to removing protective covering.

1.12 Control Joints

A. It is not required to cut lath behind control points if flanges of control joint is designed to get a good key of the cement plaster.

B. Panels should be relatively square.

C. No area should exceed 18 lineal feet in length without a control joint.

D. Install control joints for surface areas of approximately 150 square feet.

E. Where dissimilar back-up materials join.

F. Control joints are recommended at surface penetrations, (windows, doors, etc) and at areas of structural stress.

Part II. Materials/Products

2.01 Building Paper

Federal Specifications UU-B-790A, Style 2, Grade D, 60 minute water resistance.

2.02 Lath

A. Expanded Metal Lath

B. Woven Wire lath: 17 gauge 1 ½" mesh

C. Welded Wire lath: 16 gauge

D. Rib Lath

2.03 Accessories

A. Shapes used as grounds, sized and dimensioned to provide for required plaster thickness.

B. All accessories manufactured of galvanized steel, zinc, aluminum, or plastic materials.

C. Configuration of casing beads and control joints to provide lip flange and/or embedment section.

D. Corner beads to be PVC or welded wire.

E. Standard trim items: control joints, casing, beads, exterior corner beads, and base screeds.

2.04 Plaster Material

A. Portland Cement: ASTM C150 Type I or II

B. Portland Cement & Pozzolanic *Fly Ash*: ASTM C 150 & ASTM C618

C. Masonry Cement: ASTM C91

D. Lime: ASTM C206-Type S

E. Sand: ASTM C144, type used for cement plaster.

F. Water: Clear and free from substances harmful to plaster.

G. ½" chopped AR (alkaline resistant) fiberglass strands.

H. Additives: may be added per manufacturer's recommendations for the aid of pumping, curing, and bonding. Do not use acrylic additives with glass in lime mixture; the ingredients will work against one another to the detriment of the layer.

2.05 Mix General

A. Accurate proportions of materials for each batch. Measuring devices of known volume for all materials.

B. Size batches for complete use within maximum of one hour after mixing.

C. Withhold 10% mixing of water until mixing is almost complete then add as needed to produce necessary consistency. Keep water to a minimum.

2.06 Mix Proportions By Volume

Selection of either A, B, or C mix only. Do not inter-mix these three sections or change volume proportions of these sections.

Mixture

- 1 Portland Cement
- 1 Masonry Cement
- 1 ½ - 2 ½ lbs. of ½" Chopped Fiberglass
- 4 - 5 Sand

Mixture

- 1 Portland Cement
- 1/2 Lime
- 1 ½ - 2 ½ lbs. of ½" Chopped Fiberglass
- 3 ½ - 4 ½ Sand
- Water

Mixture

- Type 1 P Portland Cement
- 1 Masonry Cement
- 1 ½ - 2 ½ lbs. of ½" Chopped Fiberglass
- 4 - 5 Sand
- Water

2.07 Acrylic Finish

A. Factory mixed 100% pure acrylic based integral color.

Part III. Execution

3.01 Cement Plaster Directly Over a Concrete Surface

A. Concrete surface must be clean of dust, loose particles, oil, and other foreign matter which would affect a bond of cement plaster to concrete.

B. Apply a liquid bonding agent to concrete surface per manufacturers standards.

C. Minimum thickness of cement plaster base coat 3/8", maximum thickness 5/8".

D. Test bond of cement plaster to concrete surface.

E. Cement plaster must be applied with sufficient force (by hand or machine) to develop full adhesion between plaster and the substrate.

F. Cement plaster base coat must be rodded off to a true flat plane. Even and level with screeds. Follow this by wood floating or darbying the surface. Fill all voids and dress surface for acrylic finish.

3.02 Cement Plaster Directly Over Masonry Surface

A. Masonry surfaces must have two coats of cement plaster.

B. Masonry surface to be clean and in condition for a direct bond of cement plaster. Pre-wet the wall before plastering.

C. Cement plaster must be applied with d sufficient force (by hand or machine) to develop full adhesion between plaster and the substrate.

D. Apply a ¼"-3/8" cement plaster base coat. Let cure for 48 hours before applying second base coat. Rough surface for good bond of second coat.

E. Apply second base coat so that total thickness of both coats is ½" to ¾" thick.

F. Cement plaster base coat must be rodded off to a true flat plane. Even and level with screeds. Follow this by wood floating or darbying the surface. Fill all voids and dress surface for acrylic finish.

3.03 Installation of Lath & Accessories

A. All items to be attached so that they are level, plumb, true, and create a proper screed and depth for the cement plaster.

B. Attach building paper, lath, and accessories per standards and code.

3.04 Cement Plaster Over Lath

A. Total thickness of base coats to meet code requirements for fire rated construction. (Minimum 7/8" thick for frame construction).

B. Examine wall surface to ensure proper application of lath and accessories.

C. Nominal plaster base coat thickness:

1. First Coat Scratch -3/8"-1/2"
2. Second Coat "Brown -3/8"-1/2"

D. Cement plaster must be applied with sufficient force (by hand or machine) to develop full adhesion between plaster and the substrate.

E. First Coat to completely embed lath. Cross rake slightly to provide key for second base coat. Coat must be uniform in thickness.

F. Second coat applied so that it meets the required total thickness and it must be uniform in its thickness.

G. Second coat of cement plaster must be rodded to the desired thickness and leveled to screeds. Rod off to a true flat plane. Follow this by wood floating or darbying the ~ surface. Fill all voids and dress surface for acrylic finish.

3.05 Acrylic Finish Coat

A. Must be applied continuously and in one operation to the entire wall area.

B. A wet edge must be maintained.

C. Finish to be applied so that there are no scaffold lines or other marks due to the application.

D. The mixing and application must follow the manufacturers recommendations.

E. Texture and color as selected by Architect and/or Owner.

Guide Specifications for Portland Cement Plaster/Stucco Finish

Part I-General

1.01 Purpose:

Guide specifications for the minimum requirement for the system and application of Portland cement plaster (stucco) with exterior stucco finish.

1.02 Scope

The contractor shall provide all materials, labor and equipment necessary to complete this system of Portland cement plaster as shown on drawings and / or as described herein.

1.03 Exclusions

Flashing, caulking, sealants, sealers, shall be furnished and installed by others.

1.04 Reference Standards

Workmanship and installation shall be performed per:

A. Texas Lathing and Plastering Contractors Association/Texas Bureau for Lath and Plaster.

B. ASTM C-I063 installations of lathing and furring for Portland cement plaster.

C. ASTM C-926 application of Portland cement plaster.

D. Where products and or systems are specified they shall be installed in accordance with the Building Codes and / or manufacturers requirements.

1.05 Qualifications

Applicator and / or contractor must be qualified in the workmanship of plastering. Must be able to show completed work of equal scope.

1.06 Submittals

The applicator and/or contractor shall be prepared and may be required to supply mock-up finish samples.

Do not proceed with lathing or plastering until all products and/or finish samples are approved, if required.

1.07 Pre-Construction Meeting

Be prepared for a pre-job meeting with the architect, owner, general contractor; if required, before the start of lathing and plastering procedures.

1.08 Materials

To be delivered to job in original containers with labels intact and legible.

Storage and protection of all products are the responsibility of the contractor performing the scope of the work.

1.09 Job Conditions/Environmental Requirements for Cement Plaster

A. Cold Weather

1. Do not use frozen material.
2. Do not apply cement plaster to frozen surfaces or surfaces containing frost.
3. Do not mix materials or apply cement plaster when ambient temperature is less than 35°F/1.6°C.

B. Hot Weather

1. Protect cement plaster from uneven and excessive evaporation during hot, windy, and dry weather.
2. Moist curing after each coat of cement plaster with water if ambient temperature is more than 75°F/24°C. Moist cure for 48 hours after application of coats.
3. Hot, dry, or windy weather the cement plaster should be moistened down.
4. Moist curing is required at the start and end of work day.
5. Humidity higher than 75%. Moist curing not required.

1.10 Double Back Method

Double Back method -whereby the scratched and brown coats are applied and cured as one system is approved as an option to the standard 3-coat method.

The second coat (brown) should be applied as soon as the first coat is rigid.

1.11 Job Conditions/Environmental Requirements for Stucco Finish

A. Do not apply stucco finish when ambient temperature is less than 40°F/4.4°C.

B. Do not apply stucco finish unless the temperature has been 40°F/4.4°C for at least 24 hours before the application.

C. Cold Weather:

If heating and tenting is required to performed on the application of the stucco finish coat, it is not the responsibility of the stucco finish contractor to provide it.

D. Do not apply finish coat when there is any chance of precipitation.

E. Protect cement plaster from all forms of precipitation during the application and the setting/curing period of finish coat. Ensure that the finish is fully set prior to removing protective covering.

1.12 Control Joints

A. It is not required to cut lath behind control points if flanges of control joint are designed to get a good key of the cement plaster.

B. Panels should be relatively square.

C. No area should exceed 18 lineal feet in length without a control joint.

D. Install control joints for surface areas of approximately 150 square feet.

E. Where dissimilar back-up materials join.

F. Control joints are recommended at surface penetrations, (Windows, doors, etc) and at areas of structural stress.

Part II-Materials/Products

2.01 Building Paper

Federal Specifications UU-B- 790A, Style 2, Grade D, 60 minute water resistance.

2.02 Lath

A. Expanded Metal Lath

B. Woven Wire Lath: 17 gauge 1 ½" mesh

C. Welded Wire Lath: 16 gauge

D. Rib Lath

2.03 Accessories

A. Shapes used as grounds, sized and dimensioned to provide for required plaster thickness.

B. All accessories manufactured of galvanized steel, zinc, aluminum, or plastic materials.

C. Configuration of casing beads and control joints to provide lip flange and/or embedment section.

D. Standard trim items: control joints, casing beads, exterior corner beads, and base screeds.

2.04 Plaster Material

A. Portland Cement: ASTM C150 Type I or II

B. Masonry Cement: ASTM C91

C. Lime: ASTM C206- Type S

D. Sand: ASTM C144, type used for cement plaster.

E. Water: Clear and free form substances harmful to plaster.

F. ½" chopped AR (alkaline resistant) fiberglass strands (optional).

G. Additives: may be added per manufacturers recommendations for the aid of pumping, curing, and bonding.

2.05 Mix General

A. Accurate proportions of materials for each batch. Measuring devices of known volume for all materials.

B. Size batches for complete use within maximum of one hour after mixing.

2.06 Mix Proportions By Volume

Mix proportions by volume. Selection of either A, B, or C mix only. Do not inter-mix these three sections or change volume proportions for these sections.

A. Mixture

- 1 Portland Cement
- 1 Masonry Cement
- 1 ½ -2 ½ lbs. of ½" Chopped Fiberglass (optional)
- 4 -5 Sand
- Water

B. Mixture

- 1 Portland Cement
- ½ Lime
- 1 ½ - 2 ½ lbs. of ½" Chopped Fiberglass (optional)
- 3 ½ - 4 ½ Sand
- Water

2.07 Exterior Stucco Finish

Factory mixed product with integral color.

Part III - Execution

3.01 Cement Plaster Directly Over A Concrete Surface

A. Concrete surface must be clean of dust, loose particles, oil, and other foreign matter which would affect a bond of cement plaster to concrete.

B. Apply a liquid bonding agent to concrete surface per manufacturers standards.

C. Thickness of cement plaster base coat 3/8".

D. Test bond of cement plaster to concrete surface.

E. Cement plaster must be applied with sufficient force (by hand or machine) to develop full adhesion between plaster and the substrate.

F. Cement plaster base coat must be rodded off to a true flat plane. Even and level with screed. Follow this by wood floating or varying the surface. Fill all voids and dress surface for acrylic finish.

3.02 Cement Plaster Directly Over Masonry Surface

A. Masonry surfaces must have two coats of cement plaster.

B. Masonry surfaces to be clean and in condition for a direct bond of cement plaster. Pre-wet the wall before plastering.

C. Cement plaster must be applied with sufficient force (by hand or machine) to develop full adhesion between plaster and the substrate.

D. Apply a 1/4" -3/8" cement plaster base coat. Allow the initial base coat cure for 48 hours before applying the second base coat. Rough surface for good bond of second coat.

E. Apply the second base coat so that total thickness of both coats are equivalent to a thickness of ½" to ¾".

F. Cement plaster base coat must be rodded off to a true flat plane. Even and level with screeds. Follow this by wood floating or darbying the surface. Fill all voids and dress surface for acrylic finish.

3.03 Installation or Lath & Accessories

A. All items to be attached so that they are level, plumb, true, and create a proper screed and depth for the cement plaster.

B. Attach building paper, lath, and accessories per standards and code.

3.04 Cement Plaster over Lath

A. Total thickness of base coats to meet code requirements for fire rated construction. (Minimum 7/8" thick for frame construction).

B. Examine wall surface to ensure proper application of lath and accessories.

C. Nominal plaster base coat thickness:

1. First Coat "Scratch -1/4"-3/8"
2. Second Coat "Brown -3/8"-1/2"

D. Cement plaster must be applied with sufficient force (by hand or machine) to develop full adhesion between plaster and the substrate.

E. First Coat to completely embed lath. Cross rake slightly to provide key for second base coat. Coat must be uniform in thickness.

F. Second coat applied so that it meets the required total thickness and it must be uniform in its thickness.

G. Second coat of cement plaster must be rodded to the desired thickness and leveled to screeds. Rod off to a true flat plane. Follow this by wood floating or darbying the surface. Fill all voids and dress surface for acrylic finish.

3.05 Exterior Stucco Finish Coat

A. Must be applied continuously and in one operation to the entire wall area.

B. A wet edge must be maintained.

C. Finish to be applied so that there are no scaffold lines or other marks due to the application.

D. The mixing and application must follow the manufacturers recommendations.

E. Texture and color as selected by Architect and/or Owner.

Chapter 5

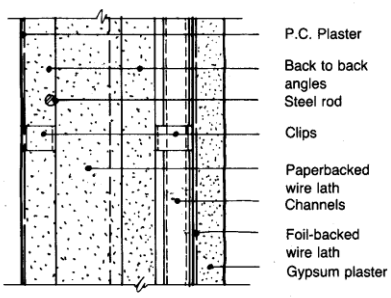
Cement Plaster Partitions

In addition to its use as an exterior cladding material, Portland cement plaster is widely used in interior partitions. If the end use requires performance factors such as moisture-resistance, fire-resistance, impact resistance or insect resistance; a cement plaster wall, ceiling/floor assembly, column or beam may be the answer.

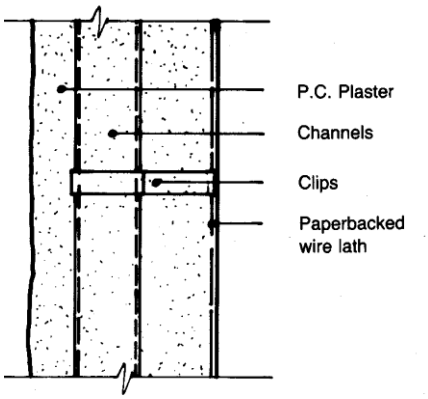
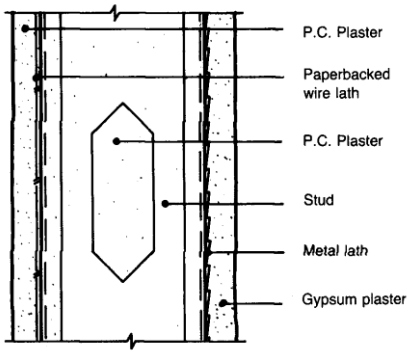
Many of the fire-rated wall and ceiling assemblies protected by Portland cement-based plaster found in historic documents are still commonly used today. These and the more recent fire-tested assemblies, are referenced in the major model building codes and in regulations published by other jurisdictions and agencies.

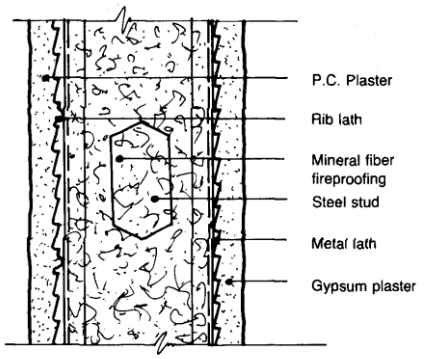
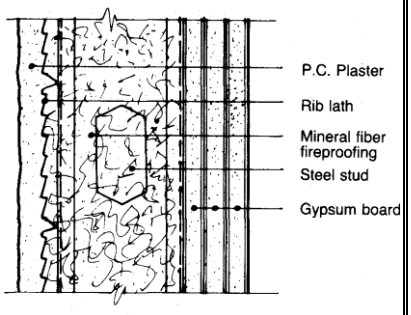
A major portion of today's construction involves retrofitting of older buildings. This work often includes a change of occupancy. In many cases, the present wall and ceiling assemblies are unnecessarily removed because the fire resistance for the construction could not be identified. The material included herein may serve as an excellent tool in making the necessary fire resistance identification.

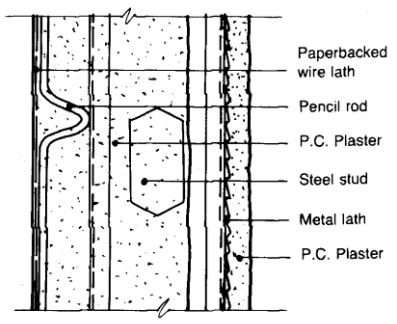
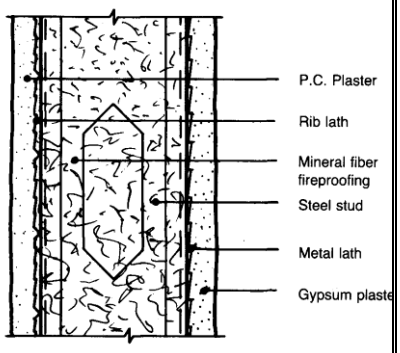
Fire-Rated Portland Cement-Based Plaster Assemblies

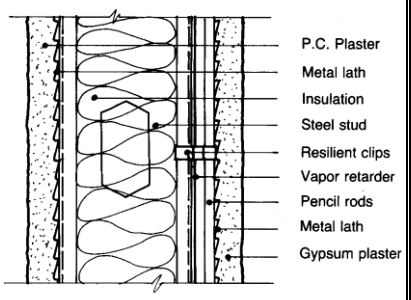
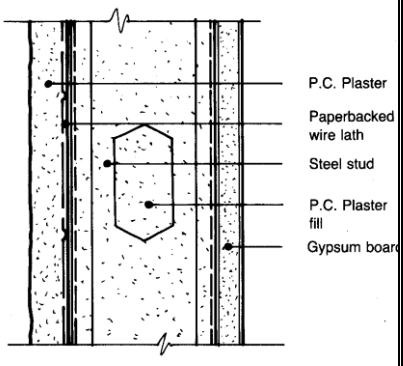
Noncombustible		
4 hr ULI U201 6" Thick NLB (f, l, m, n, o, p, q)	***Exterior Side:*** Portland cement/perlite/polybutyl fiber or alkaline resistant glass fiber and air agent stucco mix: 1:4:3# spray applied 4" thick in three coats over 2" x 2" paper-backed 16 SWG wire lath tied with 18 SWG wire to thermo-plastic clips spaced vertically 8" o/c. and to No.6 Clips SWG steel rods spaced horizontally 2 ft o/c., each wire tied with 18 SWG wire to 2" x 2" x 3/8" angles spaced 24" o/c. and bolted together back-to-back wire lath. Channels with ¼" aluminum plate between angles for attachment at weather surface. Angles wrapped with foil-backed 3.4# metal lath, paper-backed at sill and lintel anchors to clear joint. Angles bolted at steel sill and Gypsum plaster lintel anchors with 7/16" bolts in slotted expansion holes. ***Interior Side:*** Gypsum/perlite plaster mix: 1:3 ½ scratch coat ½" thick and 1:4 brown coat ½" thick, hand applied to paper and aluminum foil- backed 2" x 2" mesh No. 16 SWG wire lath secured with II SWG clips to 3/4" steel channels spaced 24" o/c Steel channels wire tied with 18 SWG wire to Z shaped thermoplastic clips nailed 4' o/c to hardened stucco. 1/8" thick lime putty finish optional.	

Noncombustible

4 hr ULI U202 4 ¼" Thick NLB	***Exterior Side:*** Proprietary Portland cement/vermiculite mix: Multiple layers of 1:4 mix spray 4 ¼ " Thick applied 4 ¼ " thick to 2" x 2" paperbacked 16 SWG '. NLB galvanized woven wire lath wire. Tied with 18 SWG; .P .C, Plaster (e, g, i, j, k) to 1 ¾" 14 gage clips snap attached to 1 ½" x 1 ½" Channels by 3/16" channels. Spaced 24" o/c. Studs bolted to runners with 5/16" bolts. (Fire exposed to lath side.) Clips. ***Interior Side:*** Finish as required.	
4 hr ULI U402 5 ¾" Thick NLB (u)	***Exterior Side:*** Portland cement/lime/sand mix: 1:1/2:5 ½" scratch coat 3/8" thick and 1:1/2:6 brown coat 3/8" thick applied to paper-backed key- mesh hexagonal 1 ½" wire lath lapped 3" and attached with 18 SWG wire 6" o/c. to 18 gage 4" steel studs spaced 16" o/c., ¾" square grounds and 3 1/8" expanded flange bent and cut at each corner to fit around the perimeter of the assembly and fastened at each stud with SWG wire. Stud cavities sprayed with 3 ½" of proprietary fireproofing to a 21 pcf density and with min. ind. density of 19 pcf. ***Interior Side:*** Gypsum/sand plaster mix: 1:2 scratch coat 3/8" thick and 1:3 brown coat 3/8" thick with finish coat of three parts lime, to two parts quick set gauging plaster by volume over 3.4# metal lath. Lapped 6" o/c. and wire tied to the studs, and wire tied or screw attached 16" o/c to floor and ceiling runners.	

Noncombustible		
4 hr ULI U431 5 ½" Thick NLB (a, d)	***Exterior Side:*** Portland cement/lime/sand stucco mix: 1:1/2:5- ½ scratch coat 3/8" thick and 1:1/2:6 brown coat 3/8" thick applied over 3/8" ribbed 3.4# metal lath. Lapped 6" and tied 6" o/c. with 18 SWG wire. Metal lath ribs against 25 gage 3 5/8" steel studs spaced 16" o/c. fastened to runners with ½" self-tapping steel screws spaced 6" o/c. and tied to studs 6" o/c. with 18 SWG wire. Stud cavities sprayed full with proprietary mineral fiber fireproofing having 12 pcf min. average density and 11 pcf min. ind. value. ***Interior Side:*** Gypsum/sand plaster mix: 1:2 scratch coat 3/8" thick and 1:3 brown coat 3/8" thick applied over 3.4# metal lath lapped 6" and tied 6" o/c. with 18 SWG wire to studs. Finish coat three parts lime to two parts quick set gauging plaster by volume.	
4 hr ULI U450 6 ¾ " Thick NLB (a)	***Exterior Side:*** Portland cement/lime/sand stucco mix: 1:1/2:5 ½ scratch coat 3/8" thick and 1:1/2:6 finish coat 3/8" thick applied over 3/8" ribbed 3.4# metal lath lapped 6" and tied 6" o/c with 18 SWG wire. Metal lath ribs against 18 gage 3 5/8" steel studs spaced 16" o/c. fastened to track with 1" Type S screws spaced 6 in. o/c. and tied to studs 6" o/c with .18 SWG wire. Stud cavities sprayed full with proprietary mineral fireproofing having 12 pcf min. average density and 11 pcf min. ind. value. ***Interior Side:*** Same as exterior or three layers of 5/8" Type X gypsum wallboard with inner layer applied vertically with 1" Type S screw spaced 8" o/c. at joints and 12" o/c. in field. Next layer applied vertically and attached with 1 5/8" Type S screws spaced 8" at joints and 12" in field with joints staggered 16" o/c. Face layer applied either vertically or horizontally with 2 ¼" Type S screws 8" o/c in field and joints staggered from inner layers.	

Noncombustible		
4 hr ICBO ES Report No. 1041 Thick* NLB**	**Exterior Side:** Portland cement/lime/sand mix 1:1:5 ½ scratch coat and 1:1/2:6 brown coat each 3/8" thick applied to No.16 gage paperbacked welded wire lath or 3.4# metal lath. Wire tied with 18 SWG 6" o/c. to ¼" pencil rods crimped 1 ½" every 16", and tack welded to flange of 16 gage steel studs spaced not to exceed 24" o/c. Portland cement/vermiculite stucco mix: 1:4 spray applied within the stud cavity in successive coats to 4" thickness. **Interior Side:** Gypsum/vermiculite stucco mix: 1:4 spray applied scratch and base coats each ½" thick to 3.4# metal lath wire tied with 18 SWG or clipped to flange of stud. * Thickness of assembly is dependent upon steel depth plus 1" for interior lath and plaster. ** See code requirements for stud gage and heights.	
4 hr ICBO ES Report No. 1244 5 ½" Thick NLB (c)	**Exterior Side:** Portland cement/lime/sand stucco mix: 1:1:5 ½ scratch coat 3/8" thick, 1:1:6 brown coat 3/8" thick applied over 3/8" ribbed metal lath. Lapped 6" o/c. and wire tied with 18 SWG wire 6" o/c. to 25 gage 3 5/8" steel studs and track. Stud cavities completely filled with sprayed mineral fiber of 12 pcf density and a min. ind. density of 11 pcf. **Interior Side:** Gypsum/sand plaster mix: 1:2 scratch coat 3/8" thick and 1:3 brown coat 3/8" thick. Finish coat three parts lime to two parts quick set gauging plaster by volume applied to 3.4# metal lath lapped 6" o/c. and wire tied with 18 SWG wire 6" o/c. to steel studs and track. **Alternate Interior Finish:**	

Noncombustible		
	Three layers of 5/8" Type X gypsum wallboard with first layer applied vertically and attached with 1" Type S screws 8" o/c. at joints and 12" o/c. in field. Second layer applied vertically and attached with 1 5/8" Type S screws 8" o/c. at joints and the top and bottom runners and 12" o/c. in the field. Top layer applied vertically or horizontally and fastened to studs with 2 ¼ " Type S screws 8" o/c. at edges and in the field. Stagger joints each layer.	
4 hr OSU T-4133 6 1/2" Thick NLB* (Fire tested from exterior side; two hours when tested from interior side.)	***Exterior Side:*** Portland cement/lime/sand stucco mix: 1:1:6 plus 20# of asbestos in scratch coat ½" thick and 1:1:7 brown coat ½" thick applied over 3.4# galvanized metal lath. Wire tied with 18 SWG wire tied 6" o/c. to 4" punched steel studs. Spaced 16" o/c. and with ¾" channel bracing wire tied horizontally at third points. ***Interior Side:*** Gypsum plaster mix: 1:2 with scratch coat ½" thick and brown coat 3/8" thick applied over 3.4# galvanized metal lath wire tied to vertically installed ¼" diameter pencil rods attached with resilient clips. 2 mil polyethylene vapor retarder on interior side of stud cavity and 3" mineral fiber 3.86 pcf friction fit in stud cavity. *Asbestos fiber used in stucco mix.	
4 hr OSU 5645 5 1/4" Thick NLB (Fire tested from exterior side.)	***Exterior Side:*** Portland cement/lime/perlite stucco mix: 1:1:6 scratch and brown coats each spray applied ½" thick over 1 ½" x 17 gage galvanized woven wire self-furring paperbacked lath. Attached to 20 gage 3 5/8" steel studs spaced 16" o/c. with 1" Type S-12 screws spaced 12" o. c. Stud cavity sprayed full with the same stucco mix.	
	Interior Side: One layer 5/8" Type X gypsum wallboard or veneer	

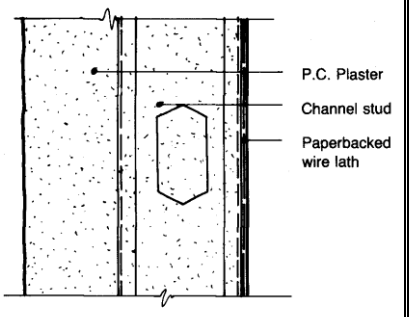
Noncombustible		
	base applied parallel to studs with 1" Type S-12 drywall screws 6" o/c.	

Archaic

4 hr. Based on unpublished test data per American Insurance Service Group. 6 ½" thick NLB

Exterior Side:

Portland cement/perlite stucco mix: 1:4 applied in multiple coats to a 6 ½" thickness over 2" x 2" x 16 gage wire lath attached to 3 5/8" steel channel studs spaced 16" o/c. Wire lath backed with two layers of Kraft paper joined with asphalt and secured to the channel studs with 2" 12 gage furring nails with heads bent over the wire lath. Channel studs formed by welding 1" x 3 5/8" channels back-to-back. Channels inserted in 3 13/16" x 1 5/8" x 16 gage runners with two sheet metal screws per stud to outside flange of 16 gage 3 5/8" steel studs spaced 16" o/c. Stud cavities completely filled.



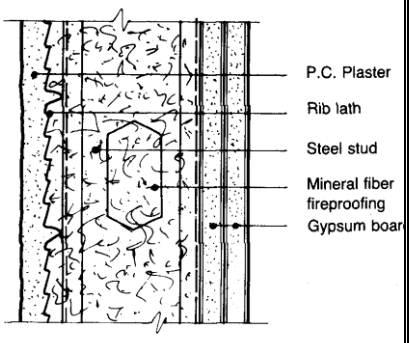
Interior Side:

Finish as required.

3 hr ULI U450 6" Thick NLB (a)

Exterior Side:

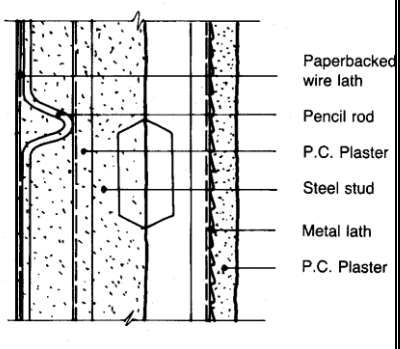
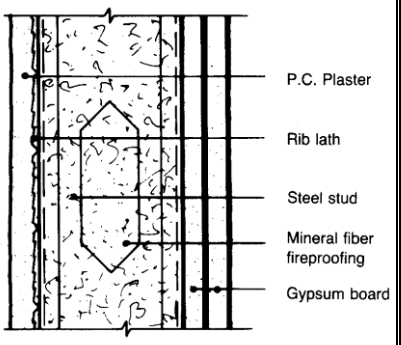
Portland cement/lime/sand stucco mix: 1:1/2:5 ½ scratch coat 3/8" thick and 1:1/2:6 brown or finish coat 3/8" thick applied over 3/8" ribbed 3.4# metal lath. Lapped 6" o/c. with ribs against 25 gage 3 5/8" steel studs. Spaced 16" o/c. Fastened to track with 1" Type S screws spaced 6" o/c. and tied to studs 6" o/c. with 18 SWG wire. Stud cavities sprayed full with proprietary mineral fireproofing having 12 pcf min. average density and 11 pcf min. ind. value.



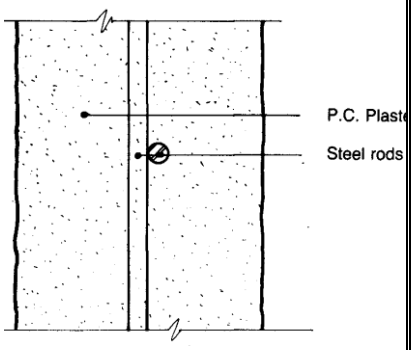
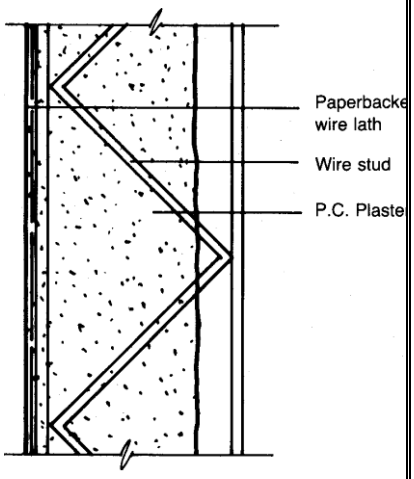
Interior Side:

Same as exterior or two layers of 5/8" Type X gypsum wallboard with inner layer applied vertically with 1" Type S screws spaced 8" o/c. at joints and 12" o/c. in field. Either next layer applied vertically or horizontally, with 1 5/8" Type S screws spaced 8" o/c. at joints, and in field with joints staggered from inner layer.

Archaic

3 hr ICBO ES Report No. 1041 Thick* NLB** (e)	***Exterior Side:*** Portland cement/lime/sand mix 1:1:5 ½ scratch coat and 1:½:6 brown coat each 3/8" thick applied to No.16 gage paperbacked welded wire lath or 3.4# metal lath wire tied with 18 SWG 6" o/c. to ¼" pencil rods crimped 1 ½" every 16" and tack welded to flange of 16 gage steel studs spaced not to exceed 24" o/c. Portland cement/vermiculite stucco mix: 1:4 spray applied within the stud cavity in successive coats to 3-¼" thickness. ***Interior Side:*** Gypsum/vermiculite stucco mix 1:4 spray applied scratch and base coats each ½" thick to 3.4# metal lath wire tied with 18 SWG or clipped to flange of stud. * Thickness of assembly is dependent upon steel depth plus 1" for interior lath and plaster. ** See code requirements for stud gage and heights.	
3 hr ICBO ES Report No. 1244 5 3/4" Thick NLB	***Exterior Side:*** Portland cement/lime/sand stucco mix: 1:1:5 ½ scratch coat 3/8" thick and 1:1:6 brown coat 3/8" thick applied over 3/8" ribbed metal lath. Lapped 6" o/c. and wire tied with 18 SWG wire 6" o/c. to 25 gage studs 3 5/8" steel studs and track. Stud cavities completely filled with sprayed mineral fiber of 12 pcf density and a min. industrial density of 11 pcf. ***Interior Side:*** Two layers of 5/8" thick Type X gypsum board applied vertically with the first layer attached with 1" Type S screws 8" o/c. at joints and 12" o/c in field. Second layer applied vertically or horizontally and attached with 1 5/8" Type S screws 8" o/c. at joints and in the field.	

Archaic

3 hr R. E. Davis Report, University of CA, 8/3/48 6" Thick NLB*	***Exterior Side:*** Portland cement/sand stucco mix spray applied: 1:4 scratch, brown, and additional coats each approximately ½" thick each layer to total of 6" thickness over ½" round bars 12" o/c. both vertically and horizontally through center of wall. ***Interior Side:*** Finish as required. * See report for additional details.	
2 hr ULI U203 3 1/8" Thick NLB (f, l, n, o, p, q)	***Exterior Side:*** Portland cement/lime/sand mix 1: 1:5 ½ scratch coat and 1:1/2:6 brown coat each 3/8" thick applied to 1 ½" No.17 paper-backed galvanized wire lath reinforced with No.17 steel wire spaced 6" o/c. Double layer of paper coated one side and edges lapped minimum of 4". Attached to wire lath with No.17 SWG spaced 6" o/c. Lath secured with 1/8" diameter by 1" long annular ring steel nails with 3/8" diameter head and diamond shaped point. Spaced vertically 6" o/c. at ribs, and located at reinforcing wires to two nailable truss-type wire studs, spot-welded together at truss members. Studs snapped in 4" wide No.24 gage painted steel 1 ¼" deep runner secured to floor and ceiling with concrete fasteners spaced 18" o/c. Portland cement/perlite stucco mix 1:3:2 spray applied within the stud cavity in multiple layers not to exceed ½" each layer. ***Interior Side:*** Finish as required.	

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2 hr ULI U418 6 ¾" Thick LB*

Exterior Side:

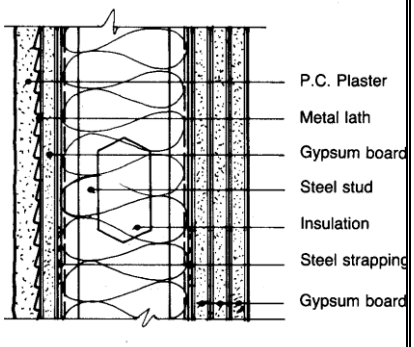
Portland cement/sand stucco - mix: 1:4 with 3/8" thick scratch coat and 3/8" thick brown coat applied over 3.4# metal lath. Attached through ½" gypsum sheathing with No.6-20 steel screws, *T-Nails*, or staples. Spaced 6" o/c. and approved by local building codes, into 18 GSG (0.051") galvanized steel studs 3 ½" or 5 ½" wide with 1 ½" flanges and ½" returns stiffening the flanges (min. yield strength 40,000 psi.). Attached to floor and ceiling with fasteners spaced 24" o/c.

Studs strapped with 2" wide flat stock fabricated from 18 GSG galvanized steel located horizontally on both sides of the stud at third points using one - No.6-20 by ½ long self-drilling steel screw at each intersection. Cavity filled with glass fiber batts.

Interior Side:

Three layers of ½" Type X gypsum wallboard applied vertically with layers staggered 24" from each other. Inner layer attached to studs and track with 1" Type S-12 screws spaced 12" o/c. Middle layer attached to inner layer with 1 ½" Type G screws spaced 12" o/c. and to end studs with 1 7/8" long Type S-12 screws spaced 12" o/c. Face layer attached to studs and track with 1- 7/8" Type S-12 screws spaced 12" o/c. and into wall- board with 1 ½" Type G screws spaced 12" o/c.

*See ULI listing for design details.



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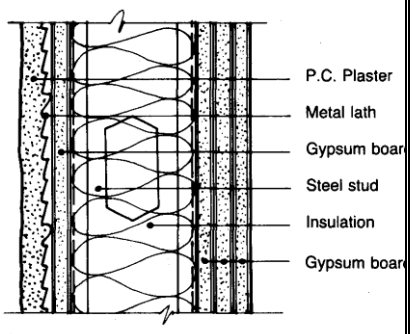
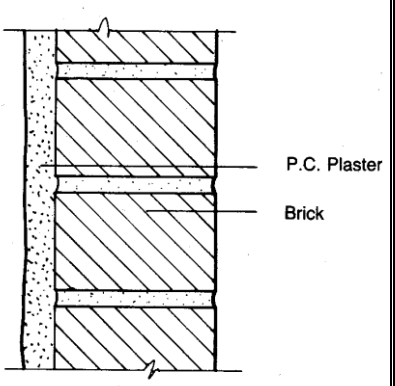
2 hr ULI U425 6 ½" Thick LB*	***Exterior Side:*** Portland cement/lime/sand stucco mix: 1:1/2:5 ½ scratch and brown coat each 3/8" thick applied to self-furring 3.4# metal lath. Tied with 18 SWG wire at 6" o/c. through ½" or 5/8" regular core gypsum sheathing applied with 1" Type S- 12 steel screws to 20 gage 3 ½" steel studs. Spaced 24" o/c., and screwed to track with ½" Type S pan head screws. Stud cavity filled with mineral fiber or glass fiber insulation batts or blankets. ***Interior Side:*** Three layers of ½" Type X gypsum wallboard with inner two layers applied vertically with 1" and 1 5/8" Type S-12 screws - spaced 8" o/c. with joints staggered. Face layer may be applied horizontally or vertically with 2 ¼" Type S-12 screws spaced 8" o/c. * Bracing required as specified in the design for the particular wall system. Three layers ½" thick will permit up to 100% of design load.	
2 hr 1988 UBC Table 43-B, Item 1-1.2 4 ¾" Thick NLB	***Each Side:*** Portland cement/sand stucco mix: 1:1 ½ scratch and brown coats each 3/8" thick applied directly to solid clay brick.	

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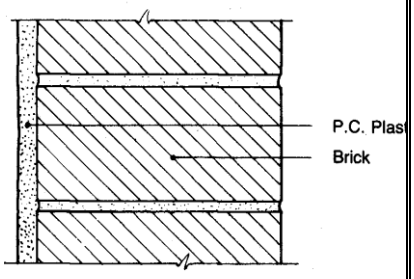
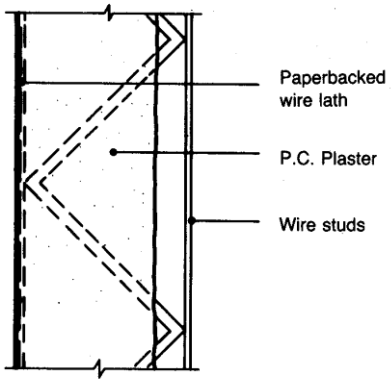
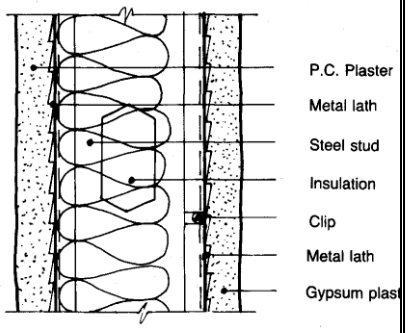
2 hr 1988 UBC Table 43-B, Item 1-3.2, 9" Thick NLB	***Each Side:*** Portland cement/sand stucco mix: 1:2 ½" in one or two coats to a total thickness of 5/8" applied directly to clay brick laid on edge with the bond broken vertically.	
2 hr 1988 UBC Table 43-B, Item 9-1.1 4" Thick NLB	***Interior Side:*** Portland cement/perlite stucco mix: 1:3 mix spray applied 3 1/8" thick in multiple layers to the inside of 1 ½" x 17 gage paperbacked woven wire mesh fabric. Wire tied with 18 SWG 6" o/c to 4" No.7 gage wire studs spaced 16" o/c. *Note: Provide code complying weather barrier on exterior side. Provide interior finish as required.*	
2 hr 1988 UBC Table 43-B, Item 17-1.9, 6 ½" Thick NLB	***Exterior Side:*** Portland cement/lime stucco mix: ½" thick scratch coat 1:1/10/4, ½" thick brown coat 1:1/10:5 applied over 3.4# metal lath. Lapped 6" o/c. and wire tied 6" o/c. to 18 gage steel studs. Spaced 16" o/c. and fastened to runners with 1" Type S screws at each stud. ***Interior Side:*** Portland cement/sand stucco mix: 1:2 scratch coat ½" thick and 1:3 brown coat ½" thick over 3.4# metal lath. Lapped 6" o/c and tied 6" o/c. with .18 SWG wire to ¼" pencil rods fastened with No.20 gage metal clips 16" o/c. to the steel studs. Stud cavities filled with 3" thick friction fit mineral insulation batts.	

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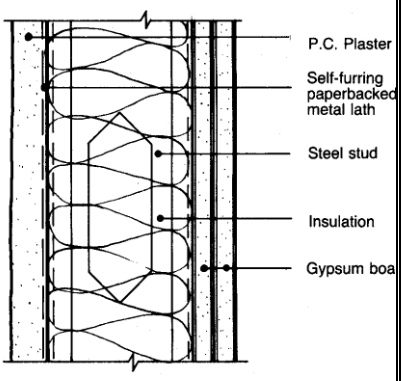
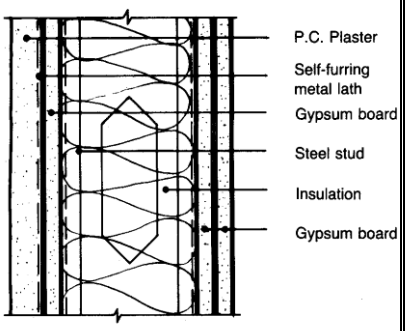
2 hr ICBO ES Report No. 1318, 1719, 2392P 5 ½" Thick NLB (u)	***Exterior Side:*** Portland cement/perlite or vermiculite stucco mix: 1:4 scratch coat 3/8" thick and 1:5 brown coat ½" thick applied over 1" No. 18 gage SFB lath attached with ½" No.8 by 3/8" head sheet metal screws at 6" o/c. directly to 3 5/8" No. 20 gage steel studs crimped to runners 16" o/c. ***Interior Side:*** The first of two layers of horizontally installed ½" Type X gypsum wall- board fastened with 1" No.6 drywall screws spaced ½" o/c. The second layer installed with 1 5/8" No. 6 drywall screws spaced 12" o/c.	
2 hr ICBO ES Report No. 1318, 1719, 2392P 6" Thick NLB (t)	***Exterior Side:*** Portland cement/sand stucco mix: 1:4 scratch coat 3/8" thick and 1:5 brown coat ½" thick applied over Type SFB self-furring lath with 1" No.6 screws at 6" o/c through one layer of ½" Type X gypsum wallboard. Attached horizontally using 1" No.6 drywall screws spaced 12" o/c to 3 5/8", 20 gage steel studs spaced 16" o/c with the studs crimped to top and bottom runners. R-11 Fiberglass noise barrier batts friction fit in stud cavities. ***Interior Side:*** The first of two layers of horizontally, installed ½" Type X gypsum wallboard fastened with 1" No.6 drywall screws spaced 12" o/c. Second (face) layer fastened with 1 5/8" No.6 drywall screws spaced 12" o/c and with joints staggered 24" o/c *Note: 26 gage studs and track may be substituted for the 20 gage for non-load bearing assemblies. See Report for additional options.*	

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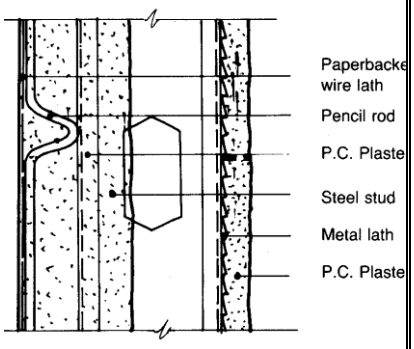
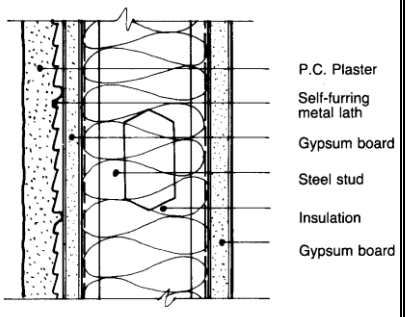
2 hr ICBO ES Report No. 1041 Thick* NLB** (e)	***Exterior Side:*** Portland cement/lime/sand mix 1:1:5 ½ scratch coat and 1:1/2:6 brown coat each 3/8" thick applied to No. 16 gage paperbacked welded wire lath or 3.4# metal lath wire. Tied with 18 SWG 6" o/c to ¼" pencil rods crimped 1 ½" every 16" and tack welded to flange of 16 gage steel studs spaced not to exceed 24" o/c. Portland cement/vermiculite stucco mix: 1:4 spray applied within the stud cavity in successive coats to 2 ¾" thickness. ***Interior Side:*** Gypsum/vermiculite stucco mix: 1:4 spray applied scratch and base coats each ½" thick to 3.4# metal lath wire tied with 18 SWG or clipped to flange of stud. * Thickness of assembly is dependent upon steel depth plus 1" for interior lath and plaster. ** See code requirements for stud gage and heights.	
2 hr Factory Mutual Design WP-288 5 ½" Thick LB	***Exterior Side:*** Portland cement/lime/sand stucco mix: 1:½:5 ½ scratch coat ½" thick and 1:½:6 brown coat ½" thick applied over 3.4# self-furring metal lath attached with No.6-20 steel screws spaced 6" o/c through ½" gypsum sheathing fastened with 1" Type S- 12 drywall screws spaced 12" o/c at joints, in the field and to the runners of 3 5/8" punched steel studs spaced 24" o/c and 3 5/8" fiberglass friction fit in stud cavities. (See report for stud description.) ***Interior Side:*** 5/8" gypsum wall board applied vertically with 1" Type S drywall screws 8" o/c at joints and 12" o/c at intermediate studs.	

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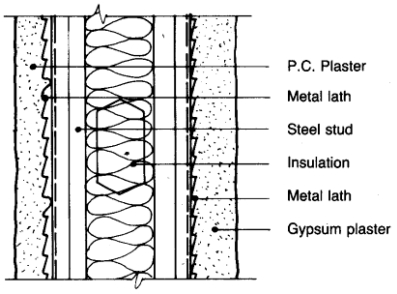
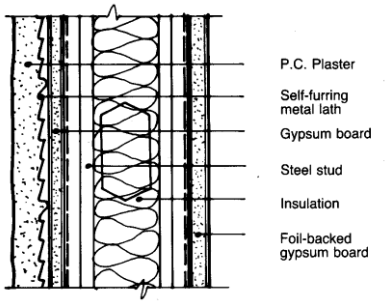
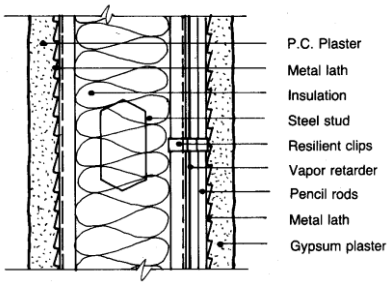
2 hr OSU T-4410 5 ¾" Thick LB	***Exterior Side:*** Portland cement/lime/sand - stucco mix: 1:2:7 ½ scratch coat ½" thick and 1:2:9 brown coat ½" thick applied over 3.4# metal lath attached with No.6-20 steel screws 6" o/c to 3 ¼" No. 18 gage punched steel studs spaced 16" o/c with 3 ¼" unpunched structural steel bridging welded to studs across webs. Friction fit 2" mineral fiber insulation in stud cavities. ***Interior Side:*** Fibered gypsum/sand plaster stucco mix: multiple coats to 1 3/8" thickness of 1:2 mix applied over 3.4# metal lath attached with No. 6-20 steel screws 6" o/c to studs. Finish coat of - lime putty-gauging plaster applied to 1/16" thickness.	
2 hr OSU T-4851 5 ¾" Thick NLB (u)	***Exterior Side:*** Portland cement/lime/sand stucco mix: 1:1:5 scratch coat ½" thick and 1:1:6 brown coat. ½" thick applied over 3.4# self-furring metal lath attached with 1- ¼" Type S drywall screws 8" o/c through ½" gypsum sheathing to 3 5/8" 20 gage steel studs spaced 161/ o/c and 3" thick 2 pcf mineral fiber insulation in stud cavities. ***Interior Side:*** One layer proprietary 5/8" Type X foil-backed gypsum wallboard or veneer base applied vertically to studs with 1" Type S dry- wall screws 8" o/c.	
2 hr OSU T-4133 6 ½" Thick NLB* (Fire tested from interior side; four hour fire resistance when tested from exterior side).	***Exterior Side:*** Portland cement/lime/sand stucco mix: 1:1:6 plus 20# asbestos scratch coat ½" thick and 1:1:7 brown coat each ½" thick applied over 3.4# galvanized metal lath wire tied with 18 SWG wire tied 6" o/c to 4" punched steel studs spaced 16" o/c and braced with 3/4" channel wire tied at third points with 18 SWG wire ties. ***Interior Side:***	

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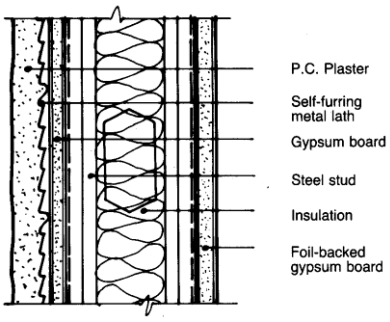
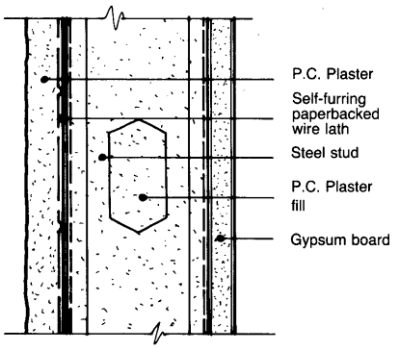
	Gypsum plaster mix: 1:2 with scratch coat ½ " thick and brown coat 3/8" thick applied over 3.4# galvanized metal lath wire tied to vertically installed ¼" diameter pencil rods attached with resilient clips. 2 mil polyethylene vapor retarder on interior side of stud cavity and 3" mineral fiber 3.86 pcf friction fit in stud cavity. * Asbestos fiber used in stucco mix.	
2 hr OSU T-4851 5 ¾" Thick NLB (u)	***Exterior Side:*** Portland cement/lime/sand stucco mix: 1:1/10:1 scratch and brown coats each ½" thick applied to 3.4# self-furring metal lath screw attached through ½" gypsum sheathing to 3 5/8", 20 gage steel studs spaced 161/ o/c with 1 ¼" Type S screws. Friction fit 2 pcf mineral fiber insulation blanket in stud cavity. ***Interior Side:*** One layer of proprietary Type X foil-backed gypsum wallboard or veneer base applied parallel with 1" Type S screws spaced 8" o/c.	
2 hr OSU 5645 5 ¼" Thick NLB (Fire tested from interior side)	***Exterior Side:*** Portland cement/lime/perlite - stucco mix: 1:1:6 scratch and brown coats each spray applied ½" thick over 1 ½" x 17 gage galvanized woven wire self-furring paperbacked lath attached to 20 gage 3 5/8" steel studs spaced 16" o/c with 1" Type S-12 screws spaced 12" o/c. Stud cavity sprayed full with the same stucco mix. ***Interior Side:*** One layer 5/8" Type X gypsum wallboard or veneer base applied parallel to studs with 1" Type S-12 drywall screws 6" o/c.	

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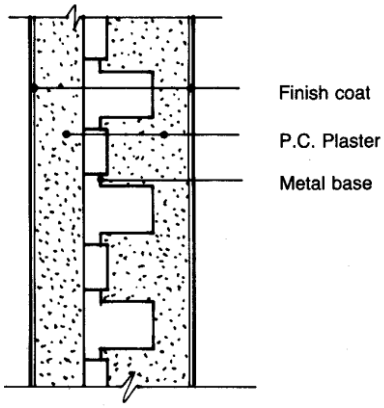
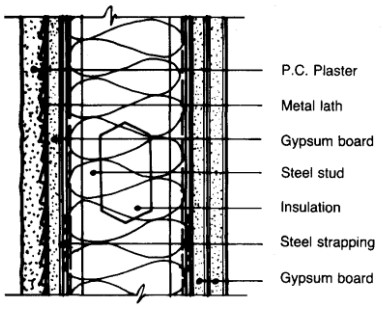
2 hr ULI U476 4" Thick NLB (u)	***Exterior Side:*** Portland cement/sand stucco - mix: 1:3 with 3/8" scratch coat and subsequent fill and brown coats to 1 ¾" plus 1/16" each side for an overall thickness of 3 ¾" plus 1/16" each side 6f 1:1/4:2 Portland cement/lime/30-40 silica sand finish coat using a 4" wide screed. Stucco mix applied to ribbed and expanded proprietary 18 MSG galvanized metal base and other metal parts installed with No.10-16 hex washer head screws ½" long. Metal stucco base installed with ribs vertical and lapped with a minimum of one rung horizontally and fastened together 7" o/c. Metal stucco base supported at ends by 4" x 1 ½" No.18 MSG galvanized perforated steel floor and ceiling runners with fasteners 7" o/c and secured to floor and ceiling with fasteners 12" o/c. *Note: Welds at every other flute at horizontal lap and 7" o/c on vertical laps may be substituted for ½" long* *No. 10-16 screw fasteners.* ***Interior Side:*** Finish as required.	
1 hr ULI U418 5 ½" Thick LB*	***Exterior Side:*** Portland cement/sand stucco mix: 1:4 with 3/8" thick scratch coat and 3/8" thick brown coat applied over 3.4# metal lath. Attached through ½" gypsum sheathing with No.6-20 steel screws, *T-Nails*, or staples spaced 6" o/c and approved by local building codes into 18 GSG galvanized steel studs 3 ½" or 5 ½" wide with 1 ½" flanges and ½" returns stiffening the flanges (min. yield strength 40,000 psi) attached to floor and ceiling with fasteners spaced 24" o/c. Studs strapped with 2" wide flat stock fabricated from 18 GSG galvanized steel located horizontally on both sides of the stud at third points using one No.6-20 by ½" long self-drilling steel screw at each intersection. Cavity filled with glass fiber batts. ***Interior Side:*** Two layers of ½" Type X gypsum wallboard applied horizontally or vertically with inner layer applied to studs and track with 1" Type S-12 screws beginning 6" from edges. Outer layer attached with joints	

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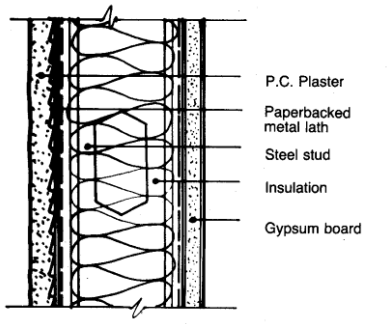
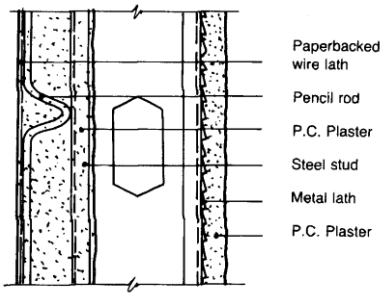
	staggered 24" o/c to studs and track with 1 5/8" Type S-12 screws 12" o/c beginning 1" from edges. Outer layer attached to inner layer at joints with 1- ½" long Type G screws spaced 24" o/c between the studs. * See ULI listing for lateral support requirements, variations and proprietary products.	
1 hr ULI U434 5 ¼" Thick LB*	***Exterior Side:*** Portland cement/sand stucco mix: 1:4 for 3/8" thick scratch coat and 1:5 for 3/8" thick brown coat applied .over paperbacked 3.4# metal lath attached with 1" No.8-18 steel Phillips flat head screws spaced 6" o/c to 3 ½" 20 gage steel studs spaced 24" o/c attached to runners. (Maximum 3 5/8" thick insulation batts may be placed in stud cavities.) ***Interior Side:*** One layer 5/8" Type X gypsum wallboard applied vertically with joints fastened with 1" Type S-12 drywall screws spaced 12" o/c. Joints finished with 2 coats of joint compound. * See ULI listing for lateral support requirements, variations and proprietary products.	
1 hr ICBO ES Report No. 1041 Thick* NLB** (e)	***Exterior Side:*** Portland cement/lime/sand mix 1:1:5 ½ scratch coat and 1:1/2:6 brown coat each 3/8" thick applied to No.16 gage paperbacked welded wire lath or 3.4# metal lath wire tied with 18 SWG 6" o/c to ¼" pencil rods crimped 1 ½" every 16" and tack welded to flange of 16 gage steel studs spaced not to exceed 24" o/c. Portland cement/vermiculite stucco mix: 1:4 spray applied within the stud cavity in successive coats to 2" thickness. ***Interior Side:*** Gypsum/vermiculite stucco mix: 1:4 spray applied scratch and base coats each ½" thick to 3.4# metal lath wire tied with 18 SWG or clipped to flange of	 ** See code requirements for stud gage and heights.

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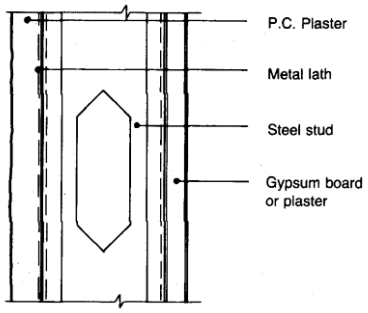
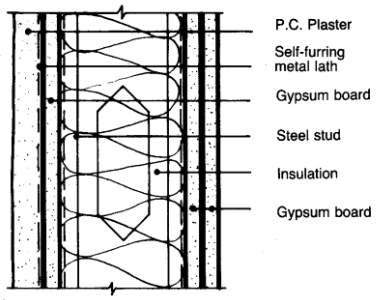
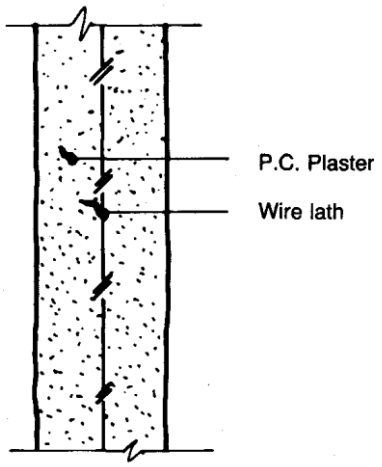
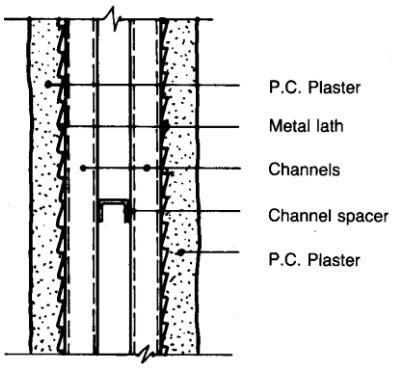
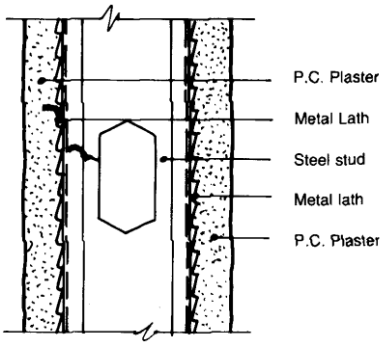
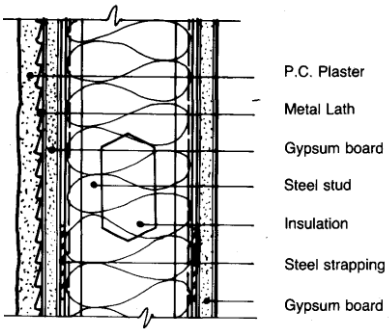
	stud. * Thickness of assembly is dependent upon steel depth plus 1" for interior lath and plaster.	
1 hr 1988 UBC Table 43-B, Item 17-1.4 Thickness varies NLB	***Exterior Side:*** Portland cement/sand stucco mix: 1:4 scratch coat 3/8" thick and 1:5 brown coat ½" thick applied over 3.4# metal lath attached with 1" No.6-20 steel screws spaced 6" o/c or double strands 18 SWG wire tied 6" o/c to 3 5/8" 16 gage steel studs spaced 16" o/c ***Interior Side:*** Finish as required.	
1 hr ICBO ES Report No. 1318, 1719, 2392P 6" Thick LB* (u)	***Exterior Side:*** Portland cement/sand stucco mix: 1:4 scratch coat 3/8" thick and 1:5 brown coat ½" thick applied over the SFB self-furring lath with 1" No.6 drywall screws at 6" o/c through one layer of ½" Type X gypsum wallboard. Attached horizontally using 1" No.6 drywall screws spaced 12" o/c to 3 5/8" No.20 gage steel studs spaced 16" o/c with the studs crimped to top and bottom runners. R-11 Fiberglass noise barrier batts friction fix in stud cavities. ***Interior Side:*** The first of two layers of horizontally installed ½" Type X gypsum wallboard fastened with 1" No.6 drywall screws spaced 12" o/c, second (face) layer fastened with 1 5/8" No.6 drywall screws spaced 12" o/c and with joints staggered 24" o/c. *Note: 26 gage studs may be substituted for the 20 gage studs for non-load bearing assemblies. See Report for additional options.* * See ULI listing for lateral support requirements, variations and proprietary products.	

Archaic

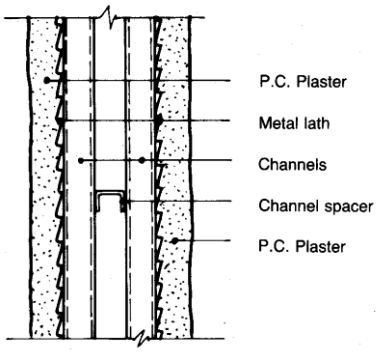
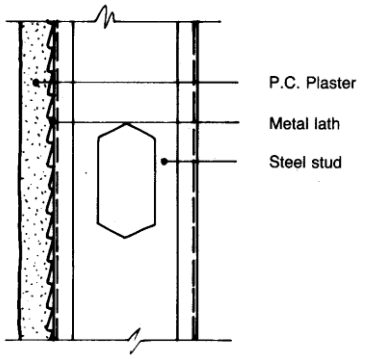
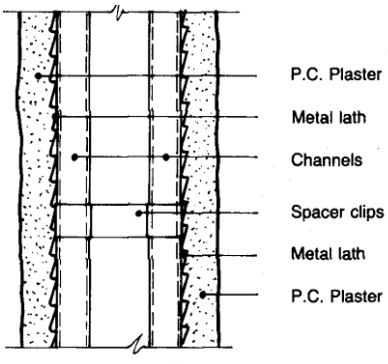
Editors Note: The following three assemblies were fire tested prior to 1942 by the U .S .Department of Commerce, National Bureau of Standards (NBS), Building Materials Structures (BMS) Division, Subcommittee on Fire-Resistance Classifications of the Central Housing Committee on Research, Design and Construction. The assembly results shown here should be used with caution. These descriptions will serve best in evaluating existing constructions.

1 hr NBS BMS Report 92, Table 32 2 ½" Thick NLB	Portland cement/sawdust/sand stucco mix: 4 1/2:1:7 spray applied in multiple layers 1 ¼" thick to No. 6, 4" x 4" welded wire lath backed with plywood. When first side is set, plywood is removed and 1 ½" stucco mix is spray applied to opposite side.	
1 hr NBS BMS Report 92, Table 31 3 5/8" Thick NLB*	***Exterior Side:*** Portland cement/asbestos fiber/sand stucco mix: 1:1/30:2 scratch coat 3/8" thick and 1:1/30:3 brown coat ½" thick applied to 3.4# metal lath. Wire tied with double strand 18 SWG to either ¾" or 1" steel channel with spacers of the same material spot welded or wire tied with 18 SWG at third points of the assembly, and spaced 16" o/c. ***Interior Side:*** Portland cement/asbestos fiber/sand stucco mix: 1:1/30:2 scratch coat 3/8" thick and 1:1/30:3 brown coat ½" thick applied to 3.4# metal lath wire tied with double strand 18 gage SWG to steel channels 6" o/c. *Asbestos fiber used in stucco mix.	

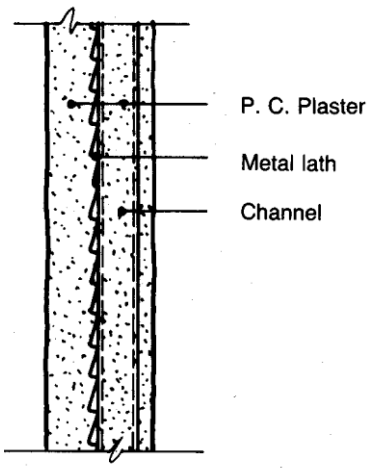
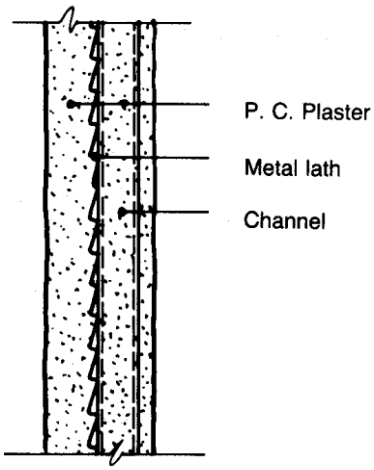
Archaic

1 hr NBS BMS Report 71, Test 98, 4 ½" Thick NLB*	***Exterior Side:*** Portland cement/sand stucco mix: 1:1/30:2 scratch coat 3/8" thick and 1:1/30:3 brown coat 3/8" thick applied to 3.4# metal lath. Wire tied with double strand 18 SWG to either ¾" or 1" steel channel with spacers of the same material spot welded or wire tied with 18 SWG at third points of the assembly and spaced 16" o/c. ***Interior Side:*** Same as exterior side. *Note: The same stucco mix applied to ¾" thickness each side achieved a 3/4 hr rating.*	
¾ hr ULI U418 4 ¾" Thick LB*	***Exterior Side:*** Portland cement/sand stucco mix: 1:4 with 3/8" thick scratch coat and 3/8" thick brown coat applied over 3.4# metal lath attached through ½" gypsum sheathing with No.6-20 steel screws, "T-Nails," or staples. Spaced 6" o/c and approved by local building codes into 18 GSG galvanized steel studs 3 ½" or 5½" wide with 1 ½" flanges and ½" returns stiffening the flanges (min. yield strength 40,000 psi.). Attached to floor and ceiling with fasteners spaced 24" o/c. Studs strapped with 2" wide flat stock fabricated from 18 GSG galvanized steel located horizontally on both sides of the stud at third points using one No.6-20 by ½" long self-drilling steel screw at each intersection. Cavity filled with glass fiber batts. ***Interior Side:*** One layer 5/8" Type X gypsum wallboard applied vertically or horizontally to studs with 1" Type S-12 screws spaced 12" o/c beginning 6" from edges.	

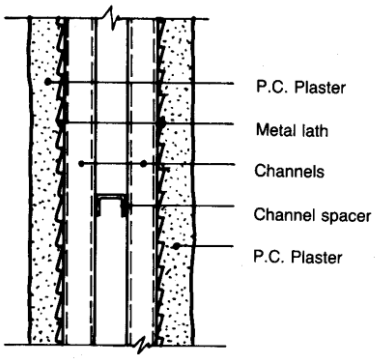
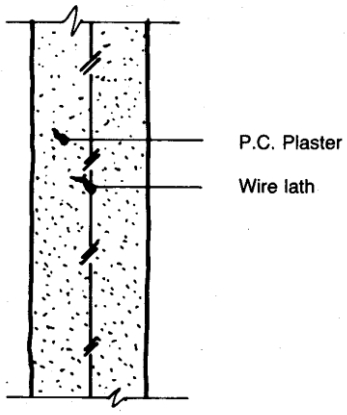
Archaic

¾ hr NBS BMS Report 92, Table 31 3 5/8" Thick NLB	***Exterior Side:*** Portland cement/sand stucco mix: 1:2 scratch coat 3/8" thick and 1:3 brown coat 3/8" thick applied to 3.4# metal lath. Wire tied with double strand 18 SWG to either ¾" or 1" steel channel with spacers of the same material spot welded or wire tied with 18 SWG at third points of the assembly and spaced 16" o/c. ***Interior Side:*** Same as exterior	
¾ hr TRBM-44 4 ½" Thick NLB*	***Exterior Side:*** Portland cement/lime/sand stucco mix: 1:1:1 scratch coat ½" thick with 25 lbs. of lime putty and 25 lbs. asbestos and 1:1:6 base coat 3/8" thick with 25 lbs. lime putty and 37 ½ lbs. asbestos applied to 3.5# metal lath nailed with No. 6 common wire nails 6" o/c into the grooves of 3 5/8" steel studs formed by welding two 3 3/8" x 1" channels back-to-back. Studs spaced 24" o/c and attached to 16 gage bearing plates with 1" self -tapping screws. ***Interior Side:*** Finish as Required *Asbestos fiber used in stucco mix.	
½ hr TRBM-44, 4 ½" Thick NLB	***Exterior Side:*** Portland cement/sand stucco mix: 1:2 scratch coat ½" thick, 1:3 brown coat 3/8" thick applied to 2.5# metal lath wire tied 6" o/c with 18 SWG wire to ¾" channels held with spacer clips so as to provide 3" air space between the laths. ***Interior Side:*** Portland cement/sand stucco mix same as exterior side.	

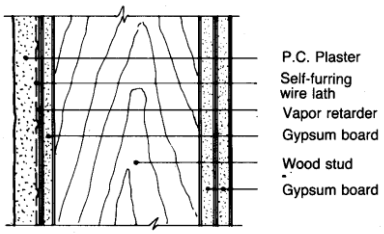
Archaic

½ hr NBS BMS Report 92, Table 32 2" Thick NLB	***Exterior Side:*** Portland cement/sand stucco - mix: 1:2 scratch coat 1" thick and 1:3 brown coat 1" thick spray applied to each side of 2.2# expanded metal lath. Lapped 6" o/c and wire tied with double strand 18 SWG 6" o/c to ¾" or 1" 16 gage steel channels spaced 12" o/c. ***Interior Side:*** Finish as required.	
½ hr NBS BMS Report 92 2" Thick NLB	***Exterior/Interior Side:*** Portland cement/lime/sand stucco mix: 1:1:4 scratch and brown coat each spray applied 1" thick to each side of 2.2# expanded metal lath. Lapped 6" o/c and wire tied with double strand 18 SWG 6" o/c to ¾" or 1", 16 gage steel channels spaced 12" o/c.	

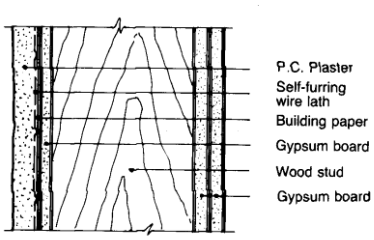
Archaic

½ hr NBS BMS Report 71 2" Thick NLB	***Exterior Side:*** Portland cement/lime/sand - stucco mix: 1:2:1 scratch coat ½" thick, 1:3:2 brown coat 3/8" thick applied to 2.2# metal lath wire tied with 18 SWG to ¾" channels spaced 16" o/c. Horizontally placed ¾" channels wire tied to vertical channels with 18 SWG at top, bottom and mid height. ***Interior Side:*** Portland cement/lime/sand stucco mix: 1:2:1 scratch coat ½" thick, 1:3:2 brown coat 3/8" thick applied to 2.2# metal lath. Wire tied with 18 SWG wire to ¾" vertically placed channels spaced 16" o/c that were wire tied with 18 SWG wire to the horizontal ¾" channels already in place.	
25 Min. NBS BMS Report 71 2 ½" Thick NLB	***Exterior Side:*** Portland cement/sand stucco mix: 1:4 scratch and brown coats each spray applied 1 ¼" thick to No.6 4" x 4" welded wire lath backed with plywood. ***Interior Side:*** After Portland cement stucco has set, backing is removed and stucco mixed 1:4 scratch and brown coats each spray applied 1 ¼" thick to back face of exterior side.	

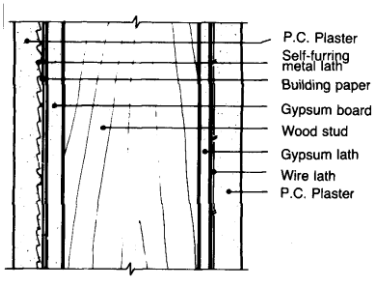
Wood Walls

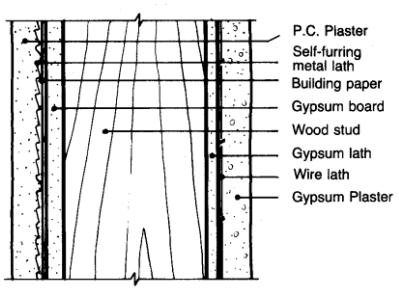
2 hr University of CA 12/21/67, GA File No. WP 8420 8 5/8" Thick LB*	**Exterior Side:** Portland cement/sand stucco mix: 1:4 scratch coat ½" thick. Applied over bonding agent on ½" thick 1:4 base coat and self- furring galvanized wire lath. Nailed with 8d galvanized roofing nails, 2 3/8" long, 0.113 shank, 9/32" heads, 6" o/c through one layer of fire resistant weather retarder building paper. Stapled along each edge at 16" o/c to one layer 5/8" Type X gypsum sheathing. Applied vertically to 2x6 fire retardant treated wood studs 16" o/c with 6d coated nails 1 7/8" long, 0.0915 shank, ¼" head, 12" o/c on edges and to intermediate studs. **Interior Side:** Base layer of 5/8" Type X gypsum wallboard or veneer base applied vertically to studs with 6d coated nails 1 7/8" long, 0.0915 shank, ¼" heads, 12" o/c on edges and to intermediate studs. Face layer 5/8" Type X gypsum wall- board or veneer base applied horizontally with 8d coated nails 2 3/8" long, 0.1131" shank, 9/32 heads, 8" along edges and 12" o/c to intermediate studs. *See listing for additional details.	

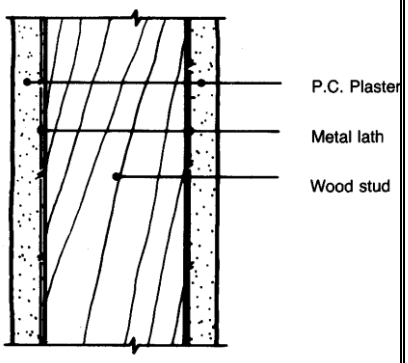
Wood Walls

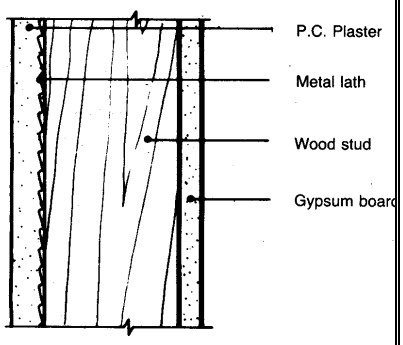
2 hr 1988 UBC Table 43-B, Item 17-1.6, 8 ¼" Thick LB*	***Exterior Side:*** Portland cement/lime/sand plus admixture stucco mix: 1:1/10:3 and 3# of ad- mixture scratch and brown coats each ½" thick. Applied over self-furring wire lath. Lapped and wire tied with 18 SWG 6" o/c. Nailed with 12 gage roofing nails with a 3/8" diameter head. Spaced 16" o/c through approved building paper and 5/8" thick Type X gypsum sheathing. Applied vertically with 6d box nails 8" o/c at joints and 12" o/c in the field to 2" x 6" fire-retardant treated wood studs spaced 16" o/c. ***Interior Side:*** Two layers of 5/8" Type X gypsum wallboard with the base layer applied vertically with 6d box nails 12" o/c. Face layer applied horizontally with 8d box nails 8" o/c at joints and 12" in the field to the wood framing. *Plywood may be installed between the fire protection and the wood studs on either the interior or exterior side of the wood frame assemblies, provided the length of the fasteners used to attach the fire protection is increased by an amount at least equal to the thickness of the plywood.	

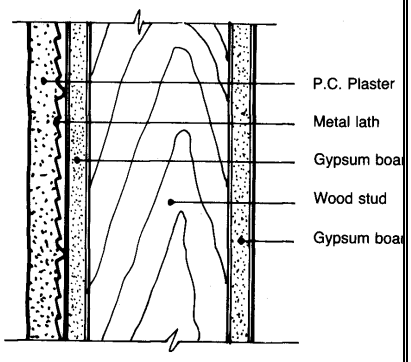
Wood Walls

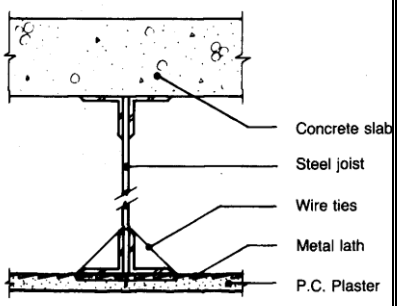
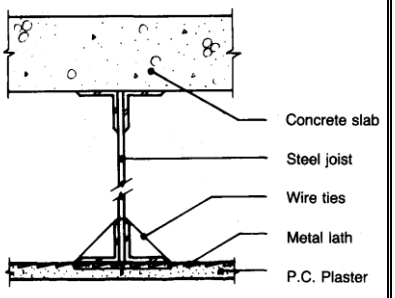
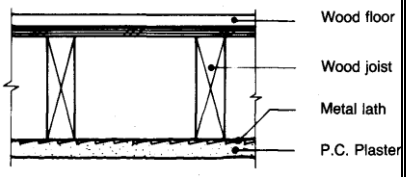
2 hr 1988 UBC Table 43-B, Item 17-1.7, 8 3/8" Thick LB*	***Exterior Side:*** Portland cement/lime/sand plus admixture stucco mix: 1:1/10:3 and 3# additives scratch coat ½" thick. A coat of bonding plaster, 1:1/10:4 plus 3# additives brown coat ½" thick applied over 1" by 18 gage self-furring metal lath. Fastened with 8d x 2 ½" roofing nails spaced 6" o/c through approved building paper and one layer of 5/8" Type X gypsum wallboard. Nailed into each 2" x 6" wood studs spaced 16" o/c with 6d box nails 8" o/c. ***Interior Side:*** Gypsum/perlite or vermiculite stucco mix: 1:2 ½ scratch brown coats each ½" thick applied over 1" hexagonal mesh of 20 gage woven wire lath furred out 5/16" with 1 ¾" No. 12 gage nails with 19/64" heads spaced 8" o/c through 3/8" gypsum lath. Gypsum lath fastened with 1 1/8" blued plaster board nails with 19/16" heads with furring 3/8" spaced 5" o/c. *Plywood may be installed between the fire protection and the wood studs on either the interior or exterior side of the wood frame assemblies, provided the length of the fasteners used to attach the fire protection is increased by an amount at least equal to the thickness of the plywood.	

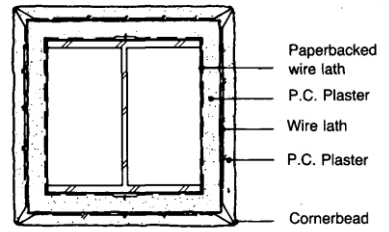
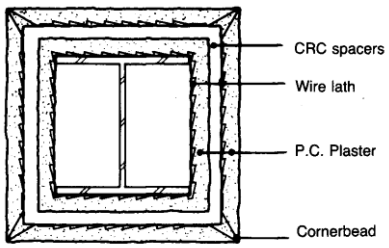
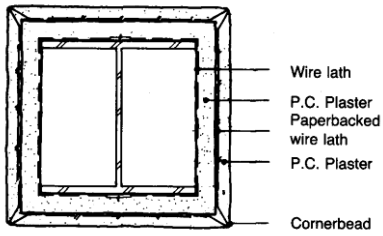
Wood Walls		
2 hr 1988 UBC Table 43-B, Item 17-1.8, 8 3/8" Thick LB*	***Exterior Side:*** Portland plastic/cement/sand stucco mix: 1:4 scratch coat ½" thick and 1:5 brown coat ½" thick. Hand or machine applied over 1 ½" No. 17 gage self-furred exterior lath. Attached with 8d by 2 ½" long galvanized roofing nails. Spaced 6" o/c through a layer of approved building paper and a layer of 5/8" Type X gypsum wallboard. Placed vertically with 6d box nails 8" o/c at joints, and 12" o/c in the field to 2" x 6" wood studs spaced 16" o/c.	
	Interior Side: Gypsum/perlite or vermiculite stucco mix: 1:2 ½ scratch and brown coats each ½" thick applied over 1" hexagonal mesh of 20 gage woven wire lath. Furred out 5/16" with 1 ¾" No. 12 gage nails with 19/64" heads spaced 8" o/c. through 3/8 Gypsum lath. Nail the gypsum lath with 1-1/8" blued plasterboard nails with furring 3/8" spaced 5" o/c. *Plywood may be installed between the fire protection and the wood studs on either the interior or exterior side of the wood frame assemblies, provided the length of the fasteners used to attach the fire protection is increased by an amount at least equal to the thickness of the plywood.	

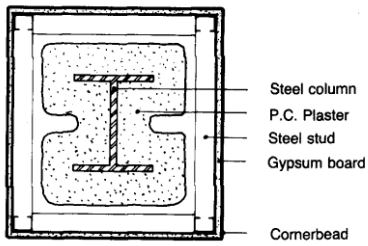
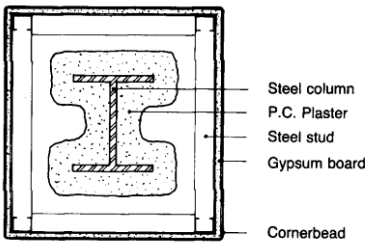
Wood Walls		
1 hr 1988 U8C Table 43-8, Item 17-1.2 5 ¼" Thick L8* (Fire tested from exterior side.)	***Exterior Side:*** Portland cement/sand stucco mix: 1:4 scratch coat 3/8" thick and 1:5 brown coat ½" thick applied over 3.4# metal lath attached with 6d common nails 7" o/c. driven to 1" maximum penetration and bent over the lath into 2" x 4" wood studs spaced 16" o/c.	
	Interior Side: Portland cement/sand stucco mix: 1:4 scratch coat 3/8" thick and 1:5 brown coat ½" thick applied over 3.4# metal lath attached with 6d common nails 7" o/c. driven to 1" maximum penetration and bent over the lath into the 2" x 4" studs. *Plywood may be installed between the fire protection and the wood studs on either the interior or exterior side of the wood frame assemblies, provided the length of the fasteners used to attach the fire protection is increased by an amount at least equal to the thickness of the plywood.	

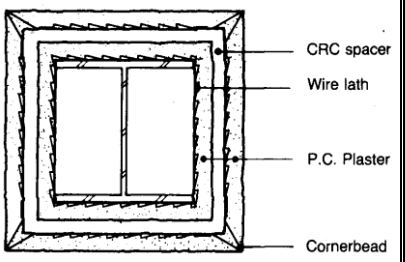
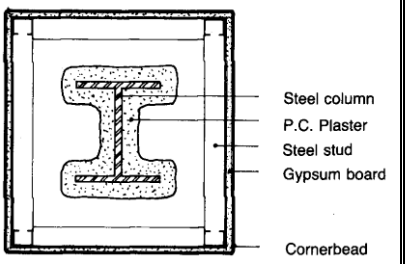
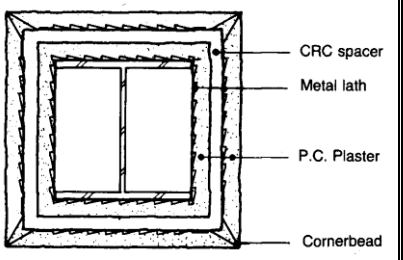
Wood Walls		
1 hr 1988 U8C Table 43-8, Item 17-1.3 5 ¼" Thick L8*	**Exterior Side:** Portland cement/sand stucco mix: 1:4 scratch coat ½" thick, 1:5 base coat 3/8" thick applied over 3.4# metal lath nailed with 6d nails spaced 7" o/c. driven to I" inch and bent over into 2 x 4 studs spaced 16" o/c.	
	Interior Side: Finish as required. *Plywood may be installed between the fire protection and the wood studs on either the interior or exterior side of the wood frame assemblies, provided the length of the fasteners used to attach the fire protection is increased by an amount at least equal to the thickness of the plywood.	

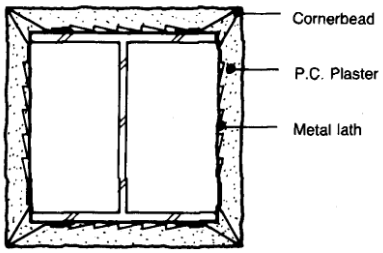
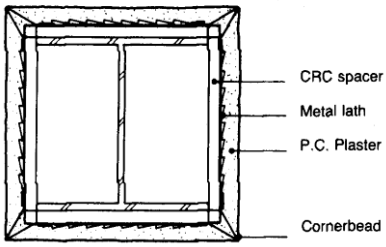
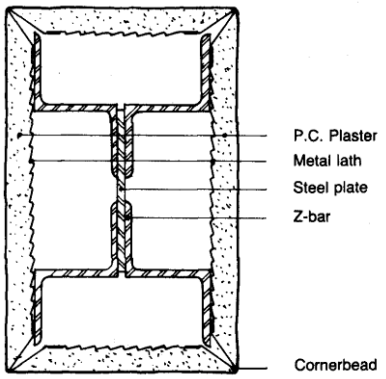
Wood Walls		
	Exterior Side: Portland cement/sand stucco mix: 1:2 each 3/8" thick layer over self-furring 3.4# metal lath. Fastened through one layer 5/8" gypsum sheathing applied parallel to or at right angles with 1 ½" roofing nails spaced 6" o/c into 2" x 4" wood studs spaced 16" o/c.	
	Interior Side: One layer 5/8" Type X gypsum wallboard or veneer base applied parallel or at right angles to wood studs with or without insulation in stud cavity. *Plywood may be installed between the fire protection and the wood studs on either the interior or exterior side of the wood frame assemblies, provided the length of the fasteners used to attach the fire protection is increased by an amount at least equal to the thickness of the plywood.	

Floor/Ceiling-Roof/Ceiling Assemblies		
2 hr 1988 UBC Table 43-C, Item 6-3.1 5/8" Thick*	Portland cement/lime/sand and approved additives stucco mix: 1:15#:1:3# scratch coat 3/8" thick, 1:15: 1 ½: 3# brown coat ¼" thick to 3.4# metal lath wire tied with 18 SWG 6" o/c attached to the bottom cord of steel joists with No.16 gage or double 18 gage wire ties spaced 6" o/c under min. 2 ¼" thick concrete slab. *Reinforced slab on metal pan or lath. See plans and specifications for details. Membrane Protection for floor/ceiling joists spaced not to exceed 16" o/c with concrete floor or roof.	
1 hr 1988 UBC Table 43-C, Item 6-3.1 5/8" Thick*	Portland cement/lime/sand and approved additives stucco mix: 1:15#: 1:3# scratch coat 3/8" thick, 1:15:1-½ :3# brown coat ¼" thick to 3.4# metal lath wire tied with 18 SWG 6" o/c attached to the bottom cord of steel joists with No.16 gage or double 18 gage wire ties spaced 6" o/c under min. 2 ¼" thick concrete slab. *Membrane Protection for floor/ceiling joists spaced not to exceed 16" o/c and with double wood floor or equal.	
1 hr 1988 UBC Table 43-C, Item 13-1.2 5/8" Thick	***Ceiling:*** Portland cement/sand stucco mix: 1:2 scratch coat 3/8" thick and 1:3 brown coat ¼" thick applied to 3.4# metal lath nailed with 1 ½" by 11 gage by 7/16" head barbed shank roofing nails spaced 5" o/c to wood joists not to exceed 16" o/c. ***Floor/Roof:*** Double layer wood floor or deck or equal. *Membrane Protection for floor/ceiling joists spaced not to exceed 16" o/c and with double wood floor or equal.	

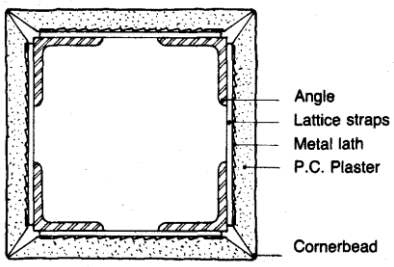
Columns		
	Portland cement/perlite aggregate/calcium aluminate cement stucco mix: 1:3-½:1# in three coats of ½", 3/8" and 3/8" thicknesses over paperbacked wire lath O.OIO thick absorptive paper backing on 2" o/c squares of l6 SWG with alternate squares divided by a vertical wire into 1" spaces. Sheets covering web openings tied with l8 SWG wire 6" o/c. Allow to dry. Welded wire lath, 2 x 2 6/16 SWG, applied over Portland cement mix, tied at one corner with l8 SWG wire 6" o/c and covered with 3 coats, ½" thick and one coat 5/8" thick. ALL PLASTER HAND APPLIED. Portland cement/vermiculite stucco mix: 1:4 for ½" thick scratch and brown coats applied to each of two layers of 2" x 2" No. l6/l6 wire lath lapped and wire tied with l8 SWG wire spaced 6" o/c for inner layer and 2" o/c for outer layer. Outlayer formed using wire tied ¾" CRC spacers between inner stucco layer and outer layer of wire lath.	 
4 hr W10X49 Column Section ULI X408 3 ¼" Thick (e, f, g, h, i, j)	Portland cement/vermiculite/air-entraining agent stucco mix: 1:4:5 oz, applied in ½" and ¾" thicknesses over paperbacked wire lath. 0.010" thick absorptive paper backing on 2" squares of 16 SWG wire with alternate squares divided by a vertical wire into 1" spaces. Sheets covering web openings tied with 18 SWG wire. Tied at one corner with 18 SWG wire 2" o/c. Welded wire lath 2" 2" -16/16 SWG wire, wire tied around dried plaster at corner with 18 SWG wire 2" o/c and covered with at least two coats of 1" thick 1:4:5 oz stucco mix.	

Columns		
4 hr W8X28 Column Section ULI X527 2 ¾" Thick (e, f, g, i, j, v, w) (Outside dimensions 8" x 6 ½", flange thickness 7/16" web thickness 5/16", cross sectional area of 8.23 sq. in.)	Portland cement/vermiculite stucco mix: Spray applied directly to steel column in one or more coats 2 ¾" thick. Apply 1 5/8" drywall track with studs at each corner. Attached min. ¾" from spray applied plaster and covered with 5/8" Type X gypsum wallboard. Attached with 1" Type S-12 screws spaced 12" o/c vertically and one screw at the center of each floor and ceiling channel. Drywall cornerbead applied at each corner by crimping or with 1" Type S-12 drywall screws 6" o/c	
3 hr W8X28 Min. Column Section X527 2" Thick (e, f, g, i, j, v, w) (Outside dimensions 8" x 6 ½", flange thickness 7/16" web thickness 5/16", cross sectional area of 8.23 sq. in.)	Portland cement/vermiculite stucco mix: Spray applied directly to steel column in one or more coats 2" thick. (1 ¼" for 2 hr). Apply 1 5/8" drywall track with studs at each corner. Attached min. ¾" from spray applied plaster and covered with 5/8" Type X gypsum wallboard. Attached with 1" Type S-12 screws spaced 12" o/c vertically and one screw at the center of each floor and ceiling channel. Drywall cornerbead applied at each corner by crimping or with 1" Type S-12 drywall screws 6" o/c.	

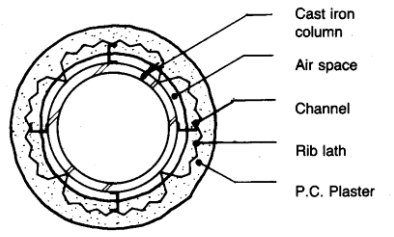
Columns		
2 ½ hr W8X31 Column Section NBS BMS Report 92, 2 ¾" Thick	Portland cement/lime/sand stucco mix: 1:1/10/2 ½ for ½" thick scratch coat and ½" thick brown coat applied to each of two layers of 3.4# metal lath or 3/8" mesh woven wire lath. Lapped 2" and tied 6" o/c with 18 SWG wire and spaced ¾" apart measured from the face of the inner layer of stucco to the backside of the outer layer of lath. Inner layer of metal lath wire tied with 18 SWG wire to column 6" o/c. Outer layer formed using wire tied ¾" CRC spacers between face of stucco on inner layer and back of outer layer of metal lath. Cornerbeads at each exterior corner.	
2 hr ULI X527 W8X28 Min. Column Section W8X28 1 ¼" Thick (e, f, g, i, j, v, w) (Outside dimensions 8" x 6 ½", flange thickness 7/16" web thickness 5/16", a cross sectional area of 8.23 sq. in.)	Portland cement/vermiculite stucco mix: Spray applied directly to steel column in one or more coats 1 ¼" thick. Apply 1 5/8" drywall track with studs at each corner. Attached minimum ¾" from spray applied stucco and covered with 5/8" Type X gypsum wallboard attached with 1" Type S-12 screws. Spaced 12" o/c vertically and one screw at the center of each floor and ceiling channel. Drywall Cornerbead applied at each corner by crimping or with 1" Type S-12 drywall screws 6" o/c	
2 hr W8X31 Column Section NBS BMS Report 2 ½" Thick	Portland cement/lime/sand stucco mix: 1:1/10:2 ½ for ½" thick scratch coat and 3/8" thick brown coat applied to each of two layers of 3.4# metal lath. Lapped 2" and tied 6" o/c with 18 SWG wire and spaced ¾" apart measured from the face of the inner layer of stucco to the back side of the outer layer lath. Inner layer of metal lath wire tied with 18 SWG wire to column 6" o/c. Outer layer formed using wire tied ¾" CRC spacers between face of stucco on inner layer, and back of outer layer of metal lath. Cornerbeads at each exterior corner.	

Columns		
1 hr W8X31 Column Section NBS BMS Report 92 1" Thick	Portland cement/lime/sand stucco mix: 1:1/10:2 ½ for ½" thick scratch coat and ½" thick brown coat applied to 3.4# metal lath or 3.2# 3/8" woven wire lath of 0.046 diameter lapped 2" around column and wire tied with 18 SWG wire 6" o/c. Cornerbeads at each exterior corner.	
1 hr Column Section not less than 120 in^2 NBS BMS Report 92 1 ¾" Thick	Portland cement/lime/sand stucco mix: ½" scratch coat 1:1/10:2 ½ and base coat ½" thick 1:1/10:2 ½ applied to 3.4# metal lath held ¾" away from column with CRC spacers. Metal lath wrapped around the column and wire tied with 18 SWG 6" o/c horizontally and vertically. Cornerbeads at each exterior corner.	
1 hr Z-Bar and Plate Column Section, 11 3/16" x 6 ¼ minimum column dimensions Load sustained during test 105,000 lbs. NBS Technologic Paper #184	Portland cement/lime/sand stucco mix: 1:4:1 scratch and brown coats each ½" thick applied over 3.4# metal lath lapped not less than 2" o/c and wire tied with 18 gage SWG wire 3" to 6" o/c around column constructed of 5_3/4" wide by ¼" thick steel plate bolted to 3" x ¼" Z-Bars with 7/8" bolts forming an "H" shape.	

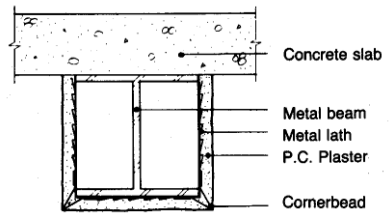
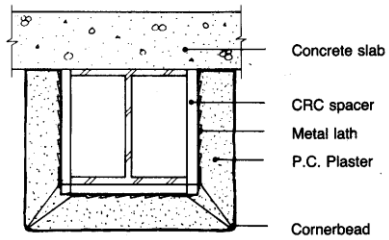
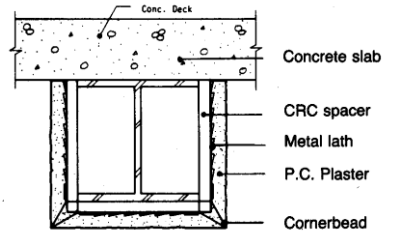
Columns

1 hr Lattice and Angle Column Section, 9" x 9" minimum column dimensions Load sustained during test 122,500 lbs. NBS Technologic Paper #184	Portland cement/lime/sand stucco mix: 1:4:1 scratch and brown coats each ½" thick applied over 3.4# metal lath. Lapped not less than 2" and wire tied with 18 gage SWG wire 3" to 6" o/c around column constructed of four 3" x 3" x 3/8" angles. Bolted together with 7/8" bolts and interlocked with *latticed* straps ¼" thick by 2 ¼" wide forming column channels 9" x 9" as detailed. Cornerbeads at each exterior corner.	

Cast Iron Columns, Round

3 hr NBS BMS Report 92 7" minimum O.D. and 0.6" min. thickness	Portland cement/sand stucco mix: 1:1/10:2 ½ applied in not less than three ½" thick coats over ¾" high ribbed metal lath weighing 7.9#. Lapped 3" and wire tied with l8 SGW wire 6" o/c vertically and 4" o/c horizontally. Lath wire tied to 3/8" x ¾" channels and to column with l8 SGW wire 6" o/c 8 SWG wire tied at one corner with 18 SWG wire 2" o/c. Welded wire fabric 2" 2" -1.	

Beams and Membrane Ceiling Protection (Webs or Flanges of Steel Beams and Girder)

3 hr 1988 UBC Table 43-A, Item 2-3.1 7/8" Thick	Portland cement/vermiculite stucco mix 1:4 applied with ½" scratch coat and 3/8" brown coat over 3.4# metal lath. Wire tied to No.8 steel wire hangers wrapped around beam, and spaced 16" o/c. Metal lath ties spaced 5" o/c at sides and bottom. Cornerbead at each exterior corner.	
2 hr 1988 UBC Table 43-A, Item 2-2.1 2 ½" Thick	Portland cement/sand stucco mix: 1:2 ½ applied with ½" scratch coat and four additional ½" coats applied to 3.4# metal lath. Attached to ¾" cold- rolled channels with 18 SWG wire. Tied and spaced 3" to 6" o/c along the webs or flanges of steel beams or girders. Cornerbead at each exterior corner.	
1 hr 1988 UBC Table 43-A, Item 2-2.1 ¾" Thick	Portland cement/sand stucco mix: 1:2 ½ applied with ½" scratch coat and 3/8". Brown coat over 3.4# metal lath attached to ¾" cold rolled channels with 18 SWG wire tied and spaced 3" to 6" o/c along the webs or flanges of steel beams or girders. Cornerbead at each exterior corner.	

The following alphabetical designations have been used throughout this manual to refer to authorities cited as sources for fire resistance and sound transmission loss ratings:

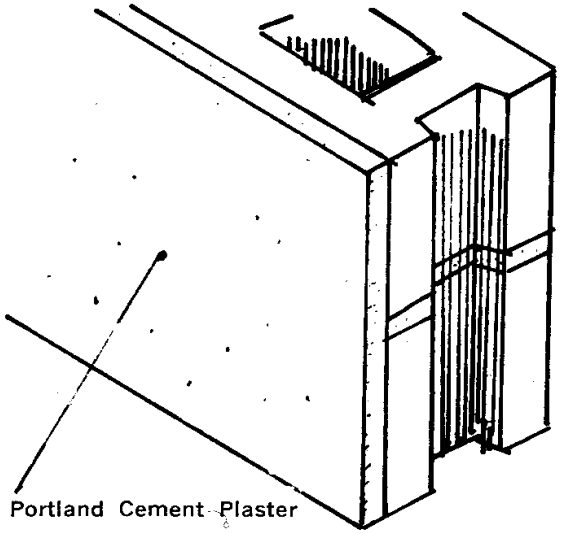
Abbreviation	*Testing Authority*
C	University of California
N	National Bureau of Standards
NBFU	National Board of Fire Underwriters "Fire Resistive Ratings".
OSU	Ohio State University
R	Riverbank Acoustical Laboratories of Armour Research Foundation
UL	Underwriters Laboratories, Inc.
E	In the absence of specific test or rating data, rating shown is publisher's estimate based on test of similar assembly.

The sponsors and its Member Contractors make no warranties or other representations regarding these assemblies or their use because of varying situations under which they may be constructed.

Masonry Units

Thickness			Plaster Agg.	Mix Proportions Cement Plaster	Approx. Weight	Sound Transmission Class		Fire Resistance	
Total	**Masonry**	**Plaster One Side**		**Aggregate**	**Per Sq. Ft.**	**STC**	**Authority**	**Hr.**	**Authority**
8 3/8"	7 5/8"	¾"	Sand	1:3	37	46	E(N:144)	4.5	UL:U-901
	7 5/8"	¾"	Sand	1:3	32	45	E(N:145)	3.5	UL:U-904
	7 5/8"	¾"	Sand	1:3	27	40	E(N:137A)	2.5	UL:U-905
12 ¼"		¾"	Sand	1:3	36	46	E(N:144)	4.5	UL:U-903
6 3/8"		¾"	Sand	1:3	20	35	E(N:173B)	2.5	UL:U-906

The following diagram depicts the *Cinder & Concrete Block* view for this table.



CINDER & CONCRETE BLOCKS

Chapter 6

Maintenance and Cleaning of Stucco

Minimal care will keep a Portland cement plaster (stucco) building attractive for many years. The simple act of washing will keep the surface clean and the color bright; washing stucco wall surfaces is done in three or four steps:

1. Pre-wet the wall, saturating the wall. start at the bottom and work to the top.
2. Use a garden hose to direct a pressure stream of water against the wall to loosen the dirt. Start at the top and wash the dirt down the wall. Caked on dirt may require light brushing.
3. Mild cleaners may be used to remove stains. Choose water-soluble cleaners that will not attack Portland cement, lime or oxide pigment colors.
4. Flush remaining dirt off the wall with a follow-up rinse.

Pre-wetting the wall will overcome absorption and prevent dirty wash water from being absorbed to dull the finish. A jet nozzle on a garden hose will clean effectively. Do not hold the nozzle too close to the surface because the high-pressure stream may erode some finishes.

Chipped corners and spalls can be patched. Premixed mortar can do the job. It will require only the addition of water, mixing to a doughy consistency, then toweling into the area to be patched and finishing the area to match the texture of the surrounding surface. The area around the patch and the patched area should be dampened before patching.

In the event uncleanable staining is encountered, a bright new color may be achieved by refinishing, fog coating, or brush coating.

Color fog coating is recommended as a good economical way to achieve to restore color and cover uncleanable stains on existing stucco. Color brush coating provides uniform color and can fill fine hairline cracks, surface scratches, and scrapes. Brush application may affect the texture.

5. Brush clean dirty surfaces three days before application. Do not apply over stucco surfaces that have been painted or sealed.

6. During warm weather, the surface should be dampened about an hour before application. Do not saturate. Use a Hudson type sprayer. Do not dampen during damp, cool weather. Do not apply during rain or if walls are wet.
7. Factory prepared or job mixes may be used. Job Mix - 1 part Portland cement; 1 part lime; oxide pigment color as needed to match.
8. Mix materials by adding water slowly and stirring until a thick paste is formed. Allow to stand for 10 minutes. Mix again until no lumps remain. Add more water to obtain a smooth flowable mixture, thicker than milk for hand application, add more water for spray application. Water proportion must remain constant to produce uniform color. Strain mix through a nylon stocking three times before putting into the sprayer.
9. Fog Coat Application: Apply sparingly with a Hudson type sprayer. Adjust the nozzle to a fine spray. Stir continuously while spraying. Avoid runs. A second coat may be applied the same day to insure even coverage. Spray in a circular motion.
10. Brush Coat Application: Simply brush on properly mixed cement paint thick enough to hide fine cracks and other blemishes.
11. Curing: Natural curing will occur during cool, damp weather. During hot, dry weather, the fog coat or brush coat should be dampened lightly the day or evening after application. Do not dampen under a hot sun. Curing may take several days. The surface may appear slightly chalky until the cure is complete.

Chapter 7

Technical Bulletins

There are few sources of independent information, material reports, technical bulletins, and problem-solving publications. Following is a list of some of the ones available. Please contact the *Texas Bureau for Lathing & Plastering* for information on these and other items for stucco.

Portland Cement Plaster/Stucco Resource Guide

Northwest Wall & Ceiling Bureau, Texas Lathing & Plastering Contractors Association, Texas Bureau for Lath & Plaster

Techniques & Comments

By John Bucholtz, P.E.; an ongoing series of newsletters containing articles of information directly related to stucco matters.

Water Leaks and Water Traps in Stucco Buildings

By John Bucholtz, P.E.

The Eight Deadly Sins of Metal lath Installation for Application of Stucco

Association of the Wall & Ceiling Industries-International

The Consumer's Stucco Handbook

By John Bucholtz, P.E.

Single Source Document: Fire-Rated Portland Cement-Based Plaster Assemblies

The Foundation of the Wall & Ceiling Industry.

Cracking in Portland Cement Plaster

By James J. Rose, Plastering Consultant

Fire Resistance Ratings

Engineering and Safety Service of the American Insurance Services Group

Evaluation of Three-Coat Portland Cement Plaster (Stucco)

AWCI

Section IV

One Coat Stucco

The term *One Coat Stucco* refers to a blend of Portland cement, sand, fibers, special proprietary chemicals and water. One Coat Stucco combines the *scratch* and *brown coats* into a single application of 3/8" to ½" thick.

This section is designed to give you an understanding and overview of the description, design considerations, materials, details and standards associated with the use of *One Coat Stucco* as an exterior cladding material.

One Coat Stucco

One Coat Stucco assemblies are code-approved proprietary systems that must be specified and installed per the manufacturer's approved specifications and details. The information contained herein is to be considered for information only and does not supercede the manufacturer's recommendations.

There are many reasons for the use of *One Coat Stucco*, which include:

- One Coat application for reduced labor costs
- Fiber reinforced which resists cracking and provides high flexural strength
- Versatility of design and aesthetic appeal
- Variety of finish styles and color
- Water resistance
- Performance in a variety of climates
- Enduring of wet/dry and freeze/thaw cycles
- Fire-resistive properties
- Low maintenance and life-cycle cost ratio
- Speed of application
- High abuse and impact resistance.

Note: One Coat Stucco cannot achieve the finish tolerances achieved with traditional three-coat *stucco due to the limitations on rodding the basecoat and the inability to straighten uneven substrates by the nature of its 3/8" – ½" thickness.*

Properties of One Coat Stucco Basecoat

General Physical Properties

Tensile strength	325 psi (28 days)
Flexural Strength	1070 psi (28 days)

Weight per Square Foot (Metal Lath And Cement Plaster Only)

3/8" thick	5 - 6 lbs./sf.

Fire Resistance

Noncombustible

Flame spread

Class I exterior cladding	0
Smoke	0

Framing & Substrates

A. Framing Systems and Substrates

1. Over wood and steel stud framing: Stud selection, spacing, bracing, weather barrier, and sheathing shall be engineered to withstand all applicable loads, including live, dead, positive and negative wind, seismic, and be in compliance with all applicable building codes.
2. Approved substrates for *One Coat Stucco* include:
   a. Exterior Grade Gypsum sheathing
   b. Glass Mat Faced sheathing
   c. Fiberboard sheathing
   d. Plywood
   e. Oriented Strand Board (OSB)
   f. Expanded Polystyrene (EPS)
   g. Extruded Polystyrene (XEPS)
   h. Concrete Masonry Units (CMU)
   i. Concrete

3. When using tongue and groove insulation board, the tongue and groove board is installed horizontally with the tongue up, and the vertical joints are staggered. Joints must be over a framing member.
4. EPS and XEPS must be a minimum density of 1.5 lbs/cubic foot. All boards must have an evaluation report issued by ICBO ES or the NES National Evaluation Service.
5. All plywood and OSB panels *must* be installed with a minimum 1/8" gap along all panel edges and ends.
6. It is recommended that standard or better grade of framing lumber be used.
7. The building structure should be carrying 90% or more of the dead load and the interior gypsum board be installed on the inside of the exterior walls before plastering starts.
8. All flashing and water-resistant barriers must be installed in weatherboard fashion. All flashing must terminate in the daylight.
9. The Uniform Building Code requires two layers of Grade D (minimum 10-minute) water-resistant barrier (paper) over wood based sheathing.
10. Concrete surface to be straight and true in accordance with tolerance standards, and to be cured for thirty days.
11. Concrete surfaces to be clean, no form release agents, no curing compounds or other elements on concrete surface preventing a proper bond.
12. Concrete should be in good condition and have uniform absorption rate over entire surface.
13. Concrete in poor condition (spalling, delamination, voids) requires repair before plastering.
14. CMU surface to be clean with no substances on the surface or in the block and/or joints which would prevent a proper bond with the stucco basecoat.
15. Coated (painted) CMU surfaces require self-furring metal lath attached in accordance with standards or removal of the coating.
16. Do not tool the mortar joints; leave mortar joints struck flush with the face of the block.

Metal Lath & Stucco Accessories

A. Lath - Types & Uses

1. Wire Fabric Lath: A minimum of No. 20 gauge, 1" galvanized steel woven wire fabric complying with ASTM C 1032 or welded wire lath complying with ASTM C 933. Lath must be self-furred or furred when applied over all substrates except unbacked polystyrene board.
2. Metal Lath: The lath shall comply with ASTM C847. The minimum weight is 1.75 #/sy. Lath must be self-furred or furred when applied over all substrates except unbacked polystyrene board.
3. The metal reinforcing shall be applied straight without buckling or sagging, and shall be stapled or screwed 6" on center.
4. Fasteners for the lath must penetrate 1" minimum into wood studs. When applying metal lath and *One Coat Stucco* to soffits, the fastener length shall be increased by the thickness of the substrate.

B. Stucco Accessories

1. Accessories shall be fabricated from galvanized steel, zinc alloy, PVC, or anodized aluminum.
2. Accessories of PVC plastic or zinc alloy are recommended if corrosion is a concern because of environmental conditions.
3. Weep screeds are installed at the bottom of the wall a minimum of *one*-inch below the plate line and shall comply with applicable code requirements. The screed shall be located a minimum of 4 inches above grade.
4. Control Joints shall be installed as specified by the architect, designer or builder, in that order. In the absence of details control joints conforming with conventional three-coat plaster details shall be used, or joints shall be installed per the applicable code. Generally, control joints shall be installed in walls to delineate areas not more than 144 square feet and at all horizontal floor lines.

One Coat Stucco Mixing and Application

A. Basecoat

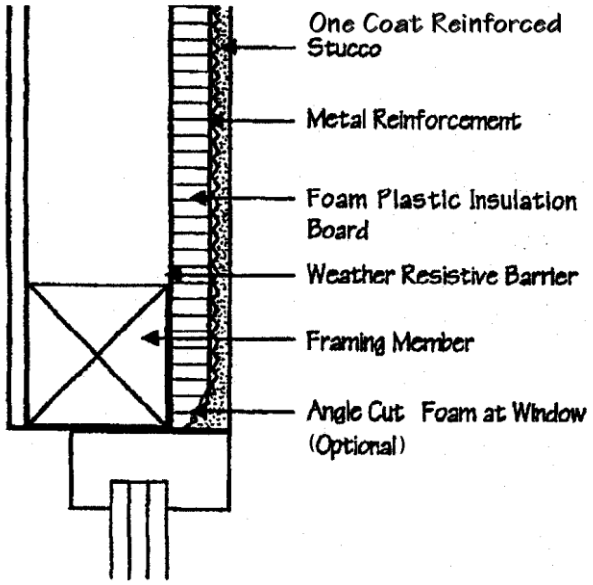
1. One Coat Stucco Basecoat: Take an 80 lb bag on *One Coat Stucco* concentrate and mix with 5-7 gallons of potable water and 180-220 pounds or a maximum of 2½ cubic feet of ASTM C-144 plaster sand. Allow to mix for about 5 minutes to a maximum of 10 minutes to obtain a workable mortar. Do not over mix or retemper.
2. Basecoat shall be a minimum of 3/8" thickness and a maximum of ½". This cementious coating is applied by hand troweling or machine spraying. The lath must be imbedded in the minimum coating thickness and cannot be exposed. Level the stucco surface with a darby or stainless steel trowel. *One Coat Stucco* cannot be rodded like conventional three-coat stucco. The basecoat should cover all surfaces uniformly. Moist curing should be done to insure total cement hydration.
3. The basecoat is not to be left unfinished. Some cracking and efflorescence are inherent in Portland cement stuccos. These are not product defects.
4. For non-cementious finishes, the basecoat should be allowed to cure a until the pH has been lowered below 10 (refer to pH requirements of particular finish chosen for project) as to not effect the performance of the finish coat, unless a primer or sealer is used prior to installing the finish coat.
5. Follow manufacturer's evaluation reports and specifications with regard to product handling, environmental conditions, and other application instructions not listed here.

B. Finish Coat

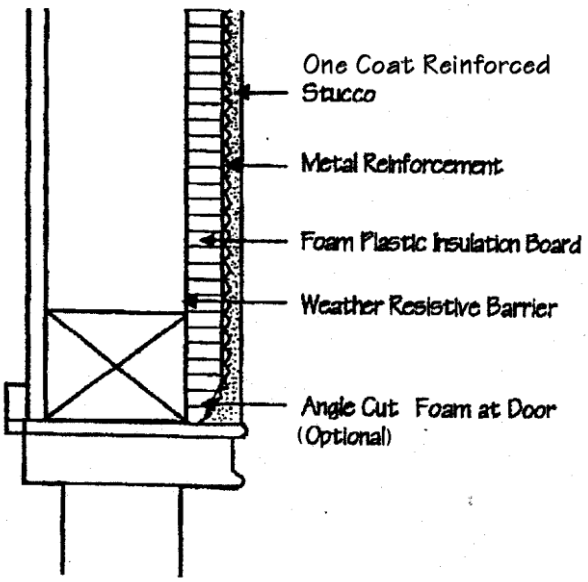
1. A finish texture and color coat or a combination texture/color coat finish needs to be applied over the basecoat. Any texture from dashed to sand finish is possible. Smooth finishes are not recommended.
2. Finish texture can be achieved by using a Portland cement based texture coat or an integral colored cement stucco or an acrylic/elastomeric texture/colored finish.
3. Color coat may be an exterior acrylic or latex paint, an elastomeric coating, a colored cement stucco or an acrylic textured/colored finish.

Typical Installation Details

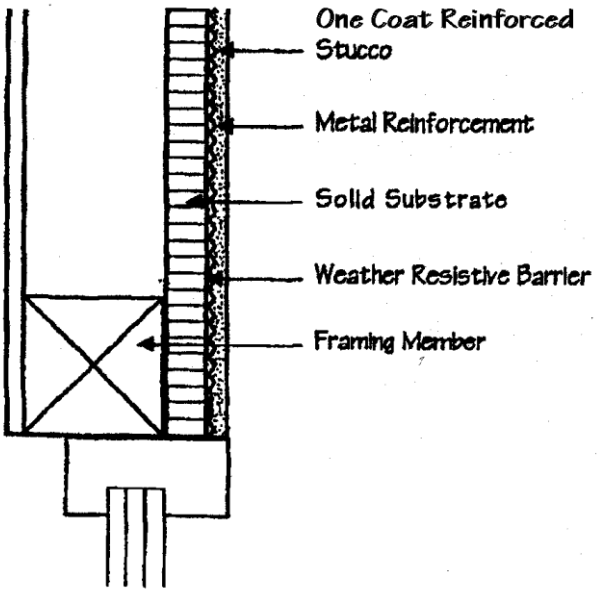
Typical Window Foam Substrate



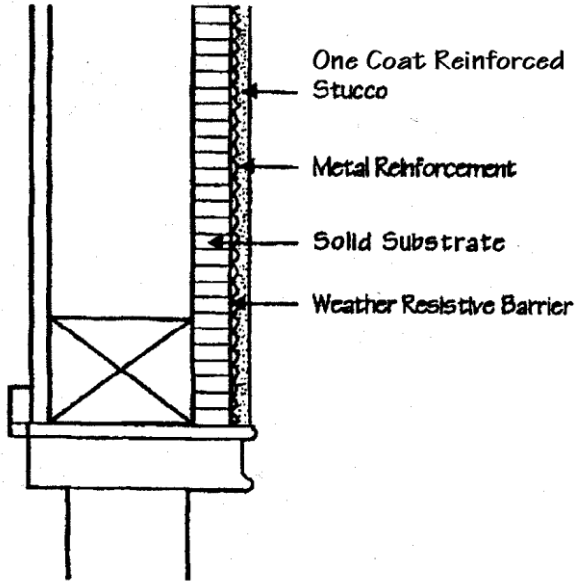
Typical Door Foam Substrate



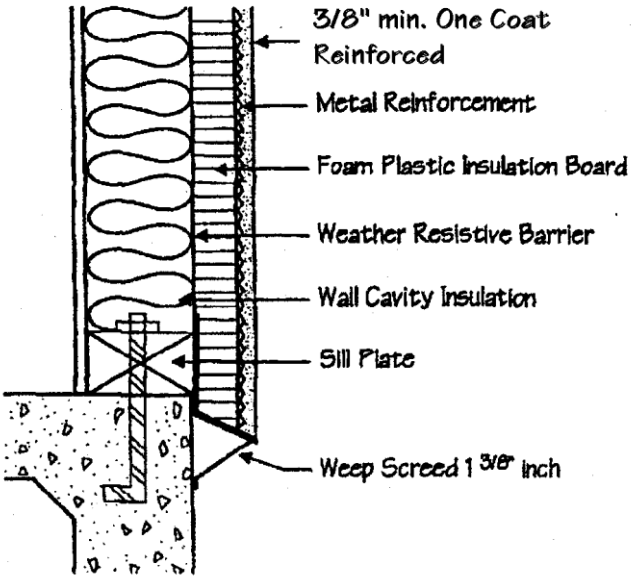
Typical Window Solid Substrate

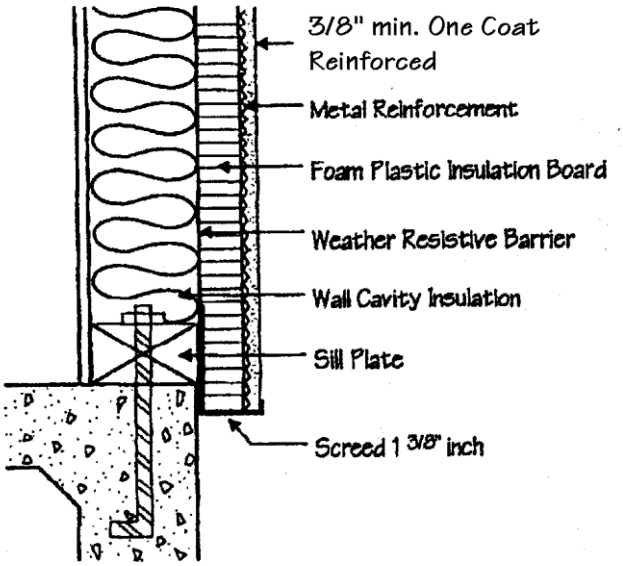


Typical Door Solid Substrate

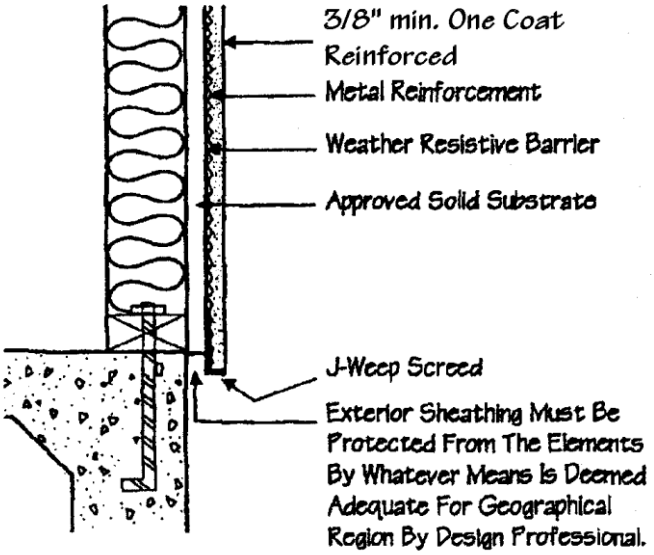


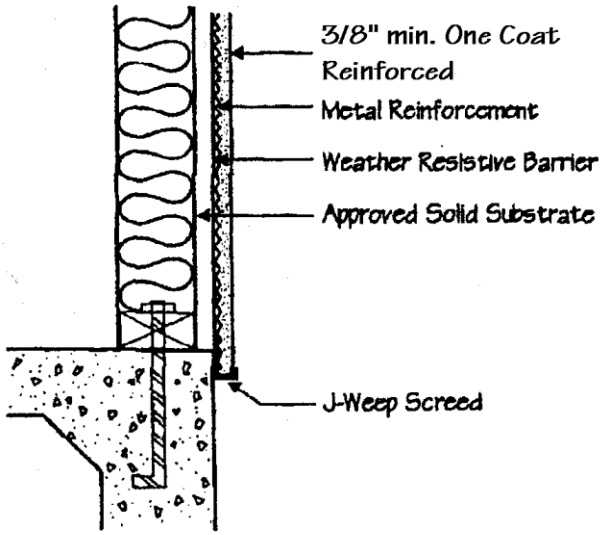
Weep Screed – Foam Substrate



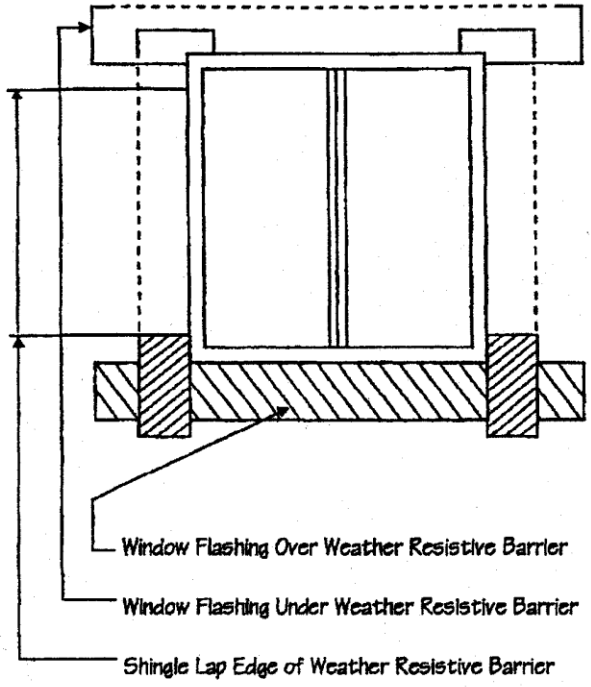


Weep Screed – Solid Substrate



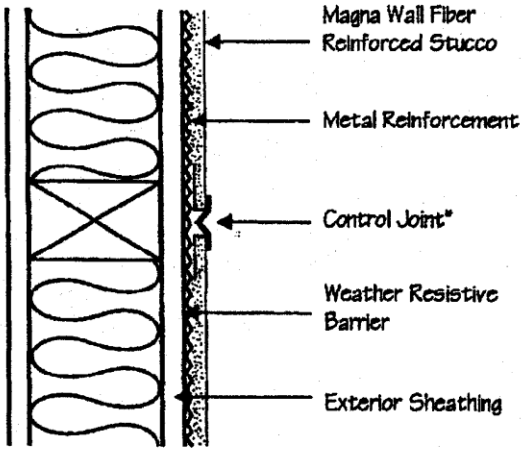


Window/Door Flashing



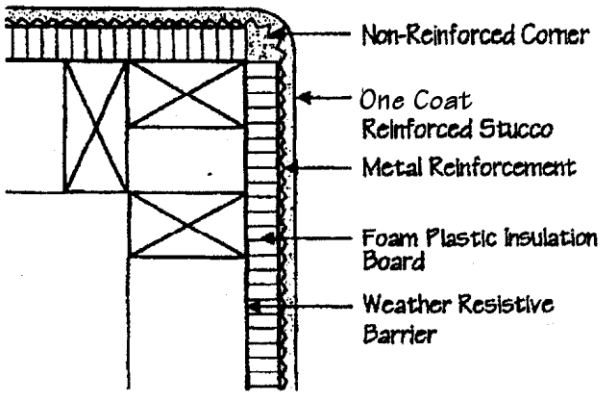
Note: At windows and doors, flashing materials and installation of those materials must be in accordance with section 1402.2 of the UBC.

Control Joint

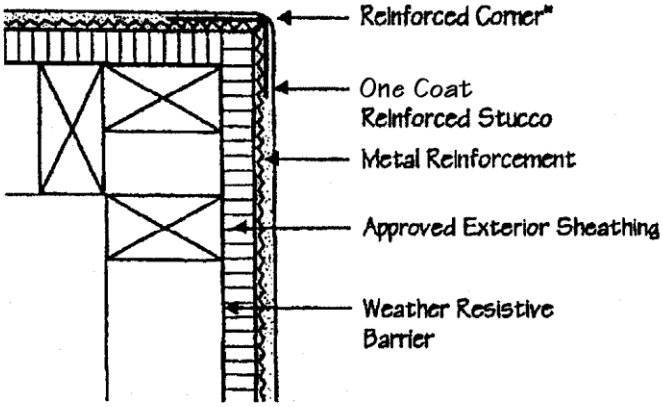


*Control joint may be wired to metal reinforcement

Non-reinforced Rounded Corners – Foam Substrate

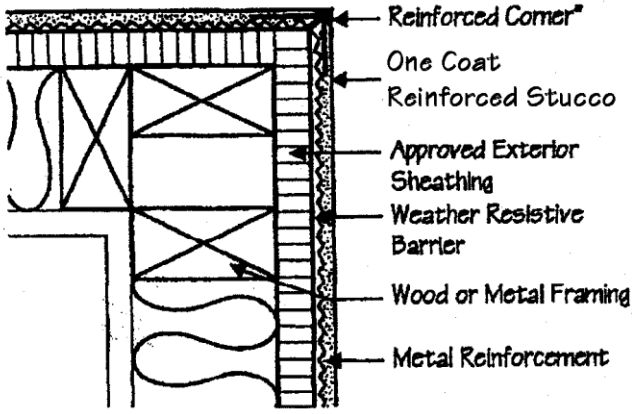


Reinforced Rounded Corners – Foam or Solid Substrate



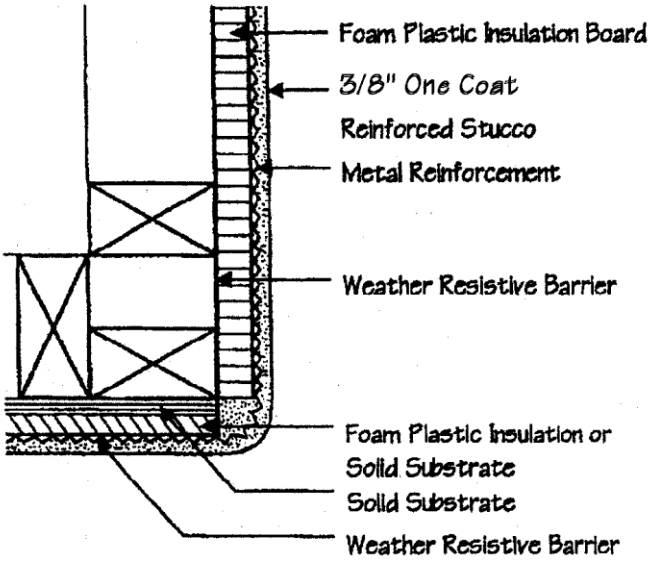
*Reinforced corner may be a second layer of woven wire lath or expanded metal lath with a two inch leg (min) or a galvanized metal or plastic corner bead.

Square Corner – Foam or Solid Substrate

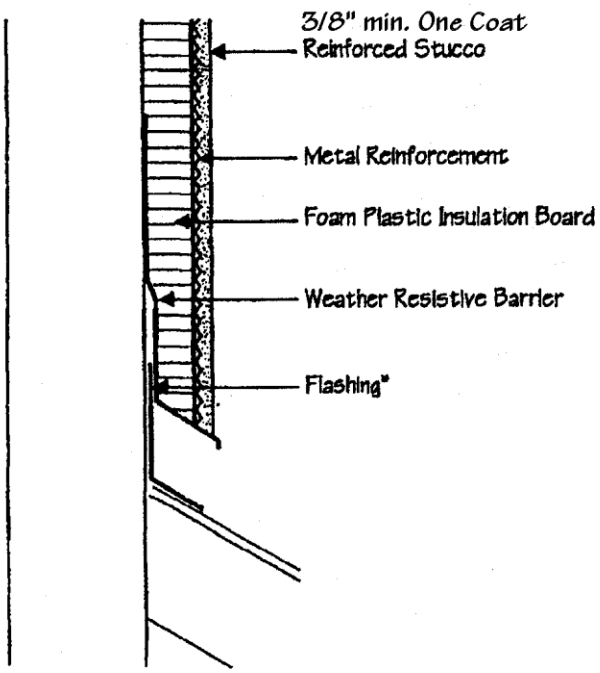


*Reinforced corner may be a second layer of woven wire lath or expanded metal lath with a two inch leg (min) or a galvanized metal or plastic corner bead.

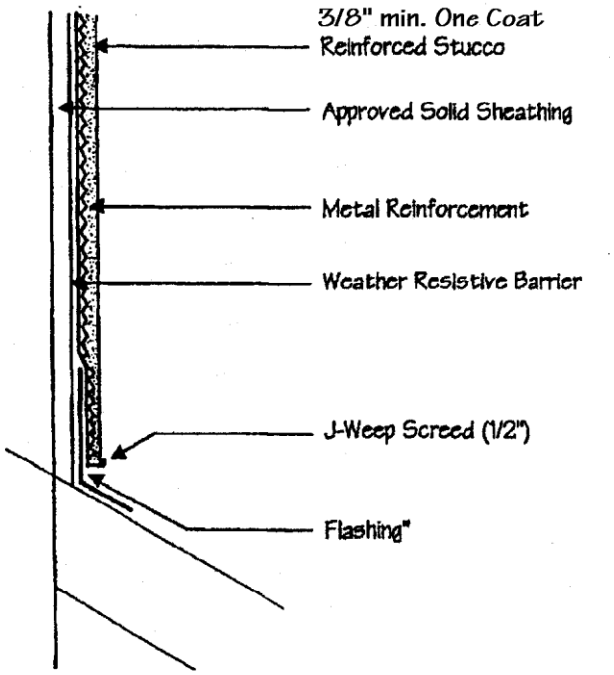
Non-Reinforced Corner Detail at Transition from Open Framing to Solid Substrate



Termination at Flashing on Roof

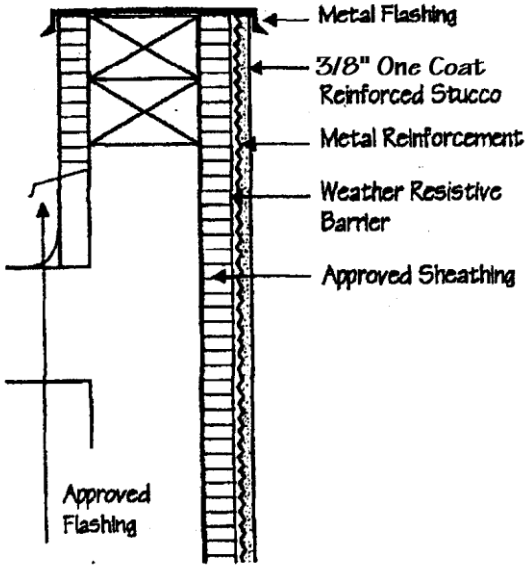


Termination at Flashing on Roof – Solid Substrate

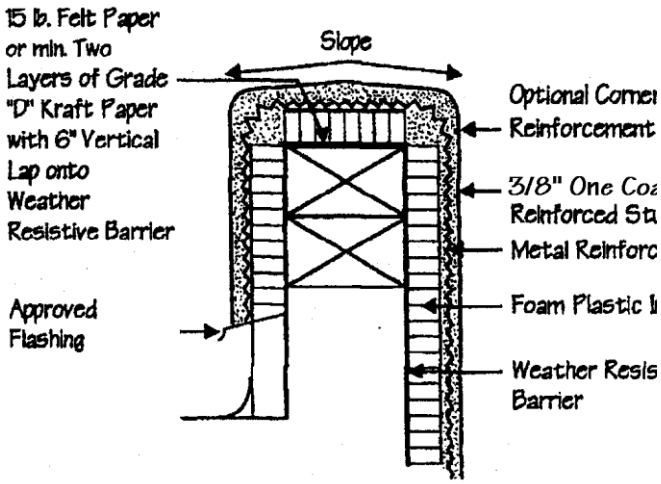


*Flashing is installed by others. Installation requires only shingle lap of the weather resistive barrier onto the approved flashing. Flashing materials and installation should be in accordance with the code.

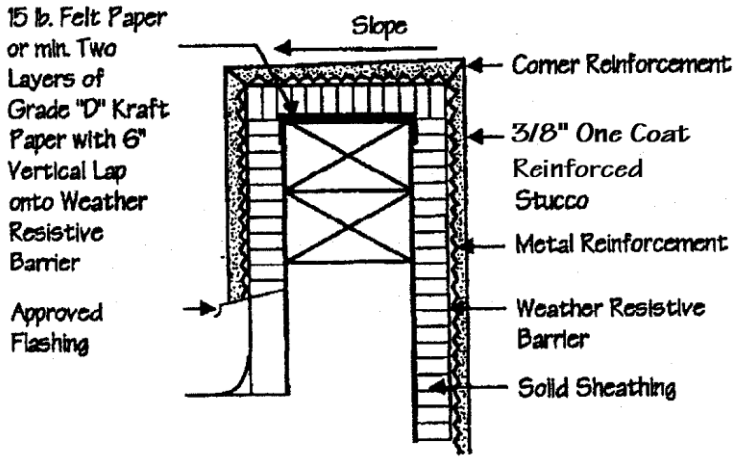
Parapet with Metal Cap Foam or Solid Substrate



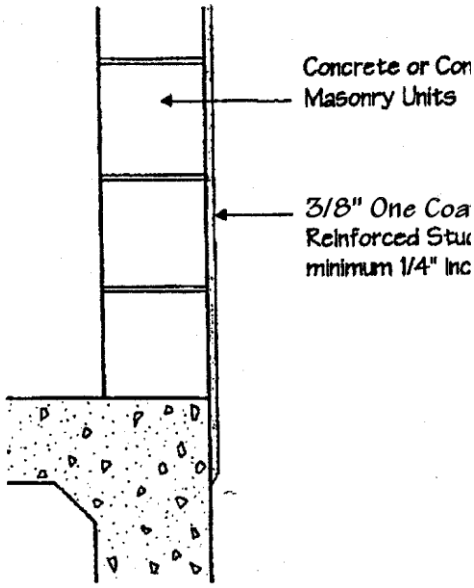
Parapet without Metal Cap Foam or Substrate



Parapet without Metal Cap Solid Substrate



Direct Application to Concrete or Concrete Masonry Units



Section V

Gypsum Plaster

Most interior plaster is in the form of gypsum plaster. Gypsum is a natural mineral mined in many places around the world. Gypsum plaster has been used for centuries and there is a wide range of systems and applications ranging from simple and functional to ornamental and aesthetic.

Gypsum Plaster

Introduction

One of the major and unique benefits of gypsum plaster is the fire protection provided by a gypsum plaster membrane. Building codes dating back to the Roman Empire cite the use of gypsum plaster as a requirement in the preservation of life in case of fire.

Today, most interior walls and ceilings are covered with improved economical gypsum in the form of wallboard (drywall). However, there are several types of interior gypsum plaster systems that are still in use today. Gypsum plaster provides the ultimate in interior wall and ceiling finish for long-term performance, durability and a truly monolithic surface.

History of Lath

The function of the lath is to span the open spaces between structural framing members and provide a surface for the plasterer to apply his mortar. Lath must be able to receive and support wet plaster.

Wood Lath

Wood lath dates back to prehistoric daub and wattle huts. Wood lath was universally used for much of the twentieth century until metal and gypsum laths took hold beginning in the 1940's. Their great advantages over sawed wood lath are incombustibility, ease of application, stability, uniformity of units, availability and generally improved results.

Expanded Metal Lath

Metal lath was originally invented by an American in 1839, but a lack of industrial manufacturing practices prevented its widespread use until the 1930's. Today there are several types of metal lath manufactured for specific purposes. A variety of weights are available and can come painted or galvanized.

Gypsum Lath

Gypsum lath consists of a core of gypsum plaster sandwiched between two sheets of fibrous, absorbent paper. Gypsum lath was invented in 1910, and in the 1930's, several variation, such as foil-backed and perforated lath were developed. Originally, holes were punched into gypsum lath to lighten shipping weight. It was commonly thought that the perforations were there to create a mechanical key. However, the basic bond of gypsum plaster to gypsum lath is the inter-locking of the long, needle-like crystals of gypsum into the fiber strands of the lath paper.

Veneer Plaster Base

Gypsum veneer plaster base is a typical sheet of gypsum drywall, regular or fire-rated, with a special blue face paper. The special face paper provides for a strong bond between the plaster and the veneer baseboard and does not deteriorate due to the moisture of the veneer plaster.

Gypsum Plaster Variations

Gypsum plaster is suitable for all interior-plastering uses except where the surfaces are exposed to free water or severe moisture conditions. Gypsum plaster systems can range in thickness from several inches down to 3/32" depending upon the system and the characteristics desired.

Conventional Plaster System

Conventional plaster systems are the ultimate in interior wall and ceiling finishes. Skilled craftsmen generally install this system in two or three coats. The basecoat is used to level and correct any irregularities in the lath or masonry substrate or achieve the necessary thickness for fire or acoustical ratings. Gypsum basecoat plasters for conventional systems come in a wide variety from neat (no sand), mill-mixed with lightweight aggregate, to a special high strength gypsum plaster. Finish coats are generally made of gypsum plaster, lime, or gauging plaster depending upon the desired texture.

Veneer Plaster System

A veneer plaster system is made up of a thin coat (3/32" to 1/8") of specially formulated plaster trowel over a veneer gypsum base. These are generally complete proprietary systems. Advantages of a veneer plaster system are faster application time; hard, dense surface; may be painted in as little as 24 hours; and can be integrally colored (pastels recommended).

Ornamental Plaster

Ornamental plaster is the term used for all types of molds, cornices and other decorative trim shapes made of plaster. Ornamental plaster is one of the oldest forms of plaster. The traditional method of ornamental plaster is *run-mold* on the site with a casting or molding plaster. Today there are companies that pre-manufacture shapes such as pilasters, columns, domes, troughs, coffers, etc. that use several types of materials. Some of these are done with plaster and some are done with other materials that achieve a similar look to ornamental plaster.

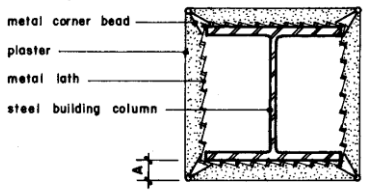
The following chart identifies the lab, university, etc., which conducted the test reports contained in the pages that follow:

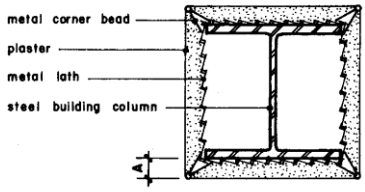
Testing Facility	***Full Name***
UL	Underwriters Laboratory
NBFU	National Board of Fire Underwriters
OH	Ohio State University
NYBSA	New York Board of Standards and Appeals

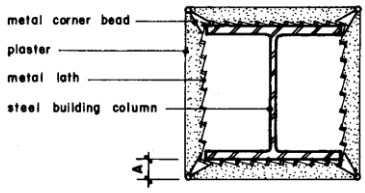
Partitions & Columns

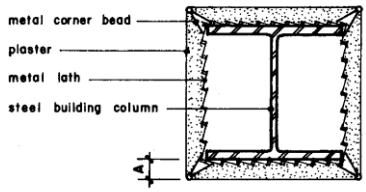
Gypsum plaster partitions and column enclosures can take many different configurations to fit the desired architectural, fire-resistive or sound requirements. Some of the most common configurations are as follows:

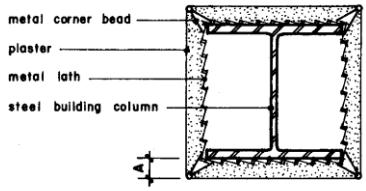
Lath and Plaster Columns

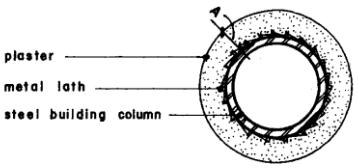
UL X402	Notes	4 Hour Fire
1 ¾" 1:2-1:3 gypsum-perlite plaster over 3.4 lb. self-furring expanded diamond mesh metal lath and 2 ¼" wide flanged expanded metal corner beads wire tied with 18 gage galvanized wire 6" o/c. W10x49 column.		

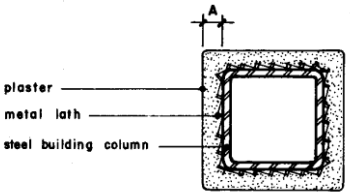
UL X403	Notes	4 Hour Fire
1 ¾" 1:2-1:3 vermiculite-gypsum plaster over 3.4 lb. self-furring expanded diamond mesh metal lath and 2 ¼" wide flanged expanded metal corner beads wire tied with 18 gage galvanized wire 6" o/c. W10x49 column. Bead to scratch coat.		

UL X402	Notes	3 Hour Fire
1 3/8" 1:2-1:3 gypsum-perlite plaster over 3.4 lb. self-furring expanded diamond mesh metal lath and 2 ¼" wide flanged expanded metal corner beads wire tied with 18 gage galvanized wire 6" o/c. W10x49 column.		

UL X402	Notes	3 Hour Fire
	1 3/8" 1:2-1:3 vermiculite-gypsum plaster over 3.4 lb. self-furring expanded diamond mesh metal lath and 2 ¼" wide flanged expanded metal corner beads wire tied with 18 gage galvanized wire 6" o/c. W10x49 column. Bead to scratch coat.	

UL X402	Notes	2 Hour Fire
	1 3/8" 1:2-1:3 gypsum-perlite plaster over 3.4 lb. self-furring expanded diamond mesh metal lath and 2 ¼" wide flanged expanded metal corner beads wire tied with 18 gage galvanized wire 6" o/c. W10x49 column.	

UL X413	Notes	2 Hour Fire
	1 13/16" 1:2-1:3 vermiculite-gypsum plaster over 3.4 lb. self-furring expanded diamond mesh metal lath wire tied with 18 gage galvanized wire 6" o/c. Minimum standard 3" pipe column.	

UL X413	Notes	2 Hour Fire
	1 13/16" 1:2-1:3 vermiculite-gypsum plaster over 3.4 lb. self-furring expanded diamond mesh metal lath and 2 ¼" wide flanged expanded metal corner beads wire tied with 18 gage galvanized wire 6" o/c. Minimum 0.250 column wall thickness, 10.50lb/ft., perimeter of 14".	

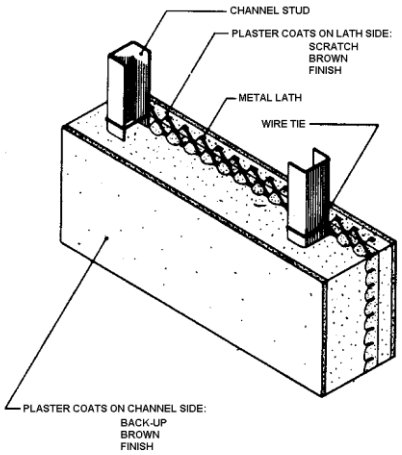
Channel and Metal Lath

Total Thickness	Stud Width	Stud Spacing	Maximum Limits Height in ft.	Maximum Limits Length in ft.	Plaster Aggregate	Mix Proportions Gypsum Plaster Aggregate	Approx. Weight Per Sq. Ft.	Sound Trans. Class		Fire Resistance Hr.	Fire Resistance Authority
1 ½	¾ (flat)	12 22	8 ½ ft.	No Limit	Sand Perlite	1:2, 1:3 100:2, 100:3	14.0 lb. 7.5 lb.	34 31	E (N:525) N:525	1	Oh:147
2	¾	11 16 16 11	12 10	24 No Limit	Sand Sand Vermiculite Perlite	1:2, 1:2 1:2, 1:2 100: 2 ½ , 100: 2 ½ 100: 2 ½ , 100: 2 ½	19.0 lb. 18.0 lb. 8.8 lb. 9.6 lb.	36 37 29 31	N:518 N:523 N:501 N:519	1 1 1 1	E (Oh :129) Oh :129 E (Oh :147) E (Oh :147)
2 ¼	¾	16 11	14 10	28 No Limit	Sand Lightweight	1:2, 1:2 100: 2 ½ , 100: 2 ½	20.0 lb. 10.5 lb.	37 31	E (N:523) E (N:519)	1 1	E (Oh :129) E (Oh :147)
2 ½	¾	12 16	16 14 10	24 28 No Limit	Sand Lightweight	1:2, 1:2 100: 2 ½ , 100: 2 ½	22.4 lb. 11.5 lb.	39 33	N:172 E (N:519)	1 2	E (Oh :129) E (UL :U413) NBFU
2 ¾	1 ½	16	18 14 10	27 28 No Limit	Sand Lightweight	1:2, 1:2 100:2, 100:3	24.0 lb. 12.5 lb.	39 34	E (N:172) E (N:519)	1 2	E (Oh :129) E (UL :U413)
3	1 ½	16	20 18 14 10	20 27 28 No Limit	Sand Lightweight	1:2, 1:2 100:2, 100:3	26.0 lb. 13.5 lb.	40 35	E (N:572) E (N:519)	1 2	E (Oh :129) E (UL :U413)
3 ¼	1 ½	16	24 18 14 10	24 27 28 No Limit	Sand Lightweight	1:2, 1:2 100:2, 100:3	28.0 lb. 14.5 lb.	40 36	E (N:572) E (N:519)	1 2	E (Oh :129) E (UL :U413)

Solid Partitions

* Length between columns, or walls, shall not be greater than 2 times the partition height when the latter exceeds 16'-0"; nor greater than the height when it is 24'-0" or more, otherwise no limitations.

Impact Resistance: 2" gypsum-sand partition successfully withstood 50 repeated blows of a 60 lb. sand bag on 48" radius, swung through 0 90° arc. Accepted by New York Board of Standards and Appeals.

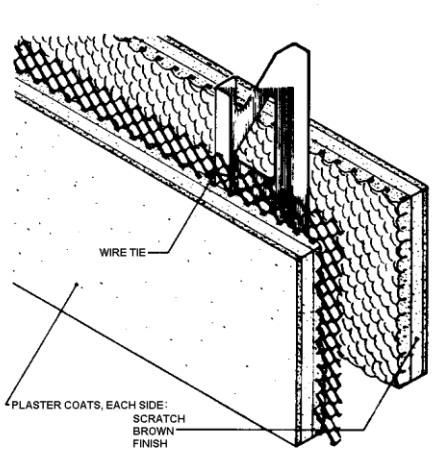


Metal Studs – 16" O/C

Total Thickness	Stud Width	Lath & Plaster Each Side	Maximum Limits Height in ft.	Plaster Aggregate	Mix Proportions Gypsum Plaster Aggregate	Approx. Weight Per Sq. Ft.	Sound Trans. Class STC	Authority	Fire Resistance Hr.	Authority
3 1/8	1 5/8	¾	9	Sand Lightweight		18.0 lb. 10.5 lb.	41 37	E (R:TR 57-36) E (R:TR 57-36)		
3 ½	2	¾	10	Sand Lightweight	1:2, 1:2 100:2, 100:3	18.0 lb. 10.5 lb.	42 37	R:TR 57-36 E (R:TR 57-36)	1 1	E (NBFU) E (C)
4	2 ½	¾	15	Sand Lightweight	1:2, 1:2 100:2, 100:3	18.0 lb. 10.5 lb.	41 37	E (N:229) E (N:229)	1 1	NBFU E (C)
4 ¾	3 ¼	¾	21	Sand Lightweight	1:2, 1:2 100:2, 100:3	18.0 lb. 10.5 lb.	41 37	N:229 E (N:229)	1 1	NBFU E (C)
5 ½	4	¾	22	Sand Lightweight	1:2, 1:2 100:2, 100:3	18.0 lb. 10.5 lb.	41 37	E (N:229) E (N:229)	1 1	NBFU E (C)
7 ½	6	¾	26	Sand Lightweight	1:2, 1:2 100:2, 100:3	18.0 lb. 10.5 lb.	41 39	E (N:229) E (N:229)	1 1	E (NBFU) E (C)

Metal Lath

For partition lengths exceeding 1 – 1 ½ x height, reduce allowable heights 20%.



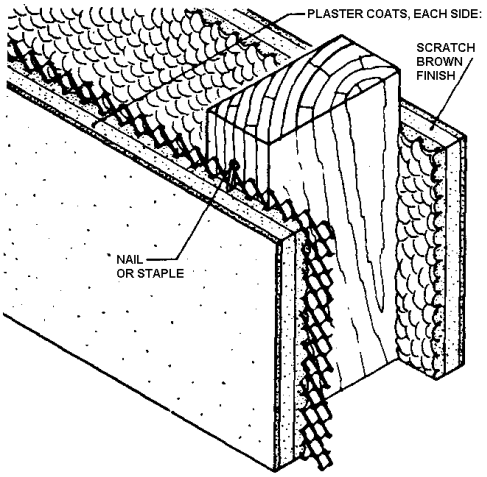
Wood Studs, 16" O/C

Total Thickness	Stud Width	Lath & Plaster Each Side	Plaster Aggregate	Mix Proportions Gypsum Plaster Aggregate	Approx. Weight Per Sq. Ft.	Sound Trans. Class STC	Authority	Fire Resistance Hr.	Authority
5 1/8	3 5/8	3/4 *	Sand	1:2, 1:2	18.0 lb.	36	N:174	1	UL:U 315
5 3/8	3 5/8	7/8	Sand Vermiculite	1:2, 1:2 100:2, 100:3	18.1 lb. 9.5 lb.	41 38	N:228 E (N:228)	1 1	NBFU UL:U 315
5 5/8	3 5/8	1	Sand	Lime-Sand	19.0 lb.	45	N:164		

Metal Lath

* Paper-backed wire plaster base.

Fire resistance ratings shown require studs fire-stopped when partition is load bearing.

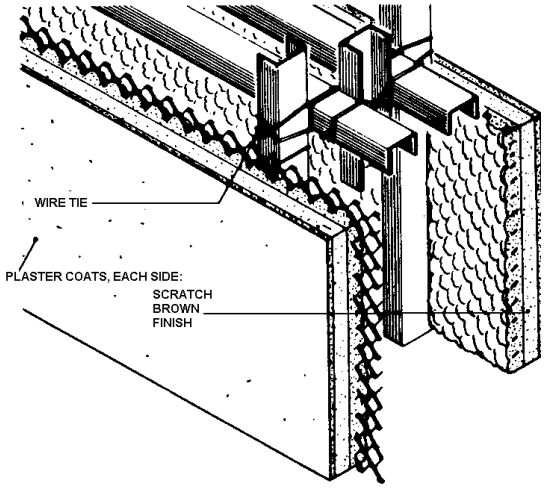


Channel Studs, 16” O/C

Total Thickness	Stud Width	Lath & Plaster Each Side	Maximum Limits Height in ft.	Plaster Aggregate	Mix Proportions Gypsum Plaster Aggregate	Approx. Weight Per Sq. Ft.	Sound Trans. Class STC	Authority	Fire Resistance Hr.	Authority
3 1/4	¾	¾	14	Sand	1:2, 1:2	17.0 lb.	46	E (N:160H)	1	E (NBFU)
4	¾	¾	16	Sand	1:2, 1:2	17.0 lb.	46	E (N:160H)	1	E (NBFU)
4 1/2	¾	¾	18	Sand	1:2, 1:2	17.0 lb.	47	N:160I	1	E (NBFU)
5	¾	¾	20	Sand	1:2, 1:2	17.0 lb.	47	E (N:160I)	1	E (NBFU)

Metal Lath

Each pair ¾" channel studs cross-tied 4'-0" o/c vertically. For partition lengths exceeding 1 ½ x height, reduce allowable heights 20%. For partitions exceeding 9 ft. In height, provide ¾ channel horizontal stiffeners spaced no more than 6' o/c.

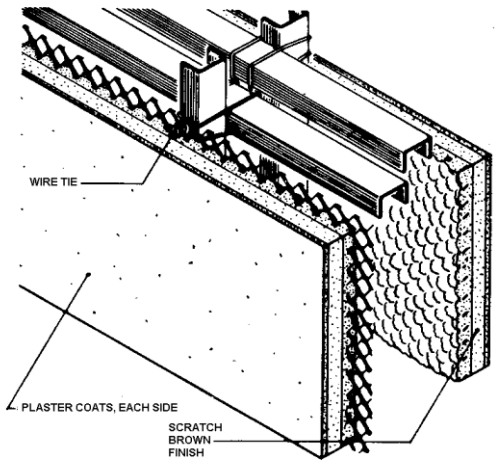


Metal Studs Staggered: Metal Lath

Total Thick.	Stud Type	Lath & Plaster	Max. Height	Plaster Agg.	Mix Proport.	Approx Weight	Sound Trans. Class						Fire Resistance	
	Channel	Each Side			Gypsum Plaster Aggregate	Per Sq. Ft.	STC	Authority	STC	Authority	STC	Authority	Hr.	Authority
4 3/8 4 ½ 5 ½ 7 8 ½ 10	¾	¾	8	Sand Sand Sand Sand Sand Sand	1:2, 1:2 1:2, 1:2 1:2, 1:2 1:2, 1:2 1:2, 1:2 1:2, 1:2	17.2 lb. 17.2 lb. 17.2 lb. 17.2 lb. 17.2 lb. 17.2 lb.	47 47 47 50 50 51	N:160I N:160H E (N:160H) E (N:160C) E (N:160B) E (N:160A)	48 50 50 53 53 54	N:160I N:160H E (N:160H) E (N:160C) E (N:160B) E (N:160A)	50** 51 52 55 55 56	E (N:160F) N:160G E (N:160D) E (N:160C) E (N:160B) E (N:160A)	1 1 1 1 1 1	E (NBFU) E (NBFU) E (NBFU) E (NBFU) E (NBFU) E (NBFU)
5 ½ min.	1 ½	¾	10	Sand	1:2, 1:2	17.5 lb.	47	E (N:160H)	50	E (N:160G)	52	E (N:160D)	1	E (NBFU)
5 ½ min.	2	¾	11	Sand	1:2, 1:2	17.5 lb.	47	E (N:160H)	50	E (N:160G)	52	E (N:160D)	1	E (NBFU)
5 ½ min.	2 ½		12	Sand	1:2, 1:2	17.5 lb.	47	E (N:160H)	50	E (N:160G)	52	E (N:160D)	1	E (NBFU)
6 ¼ min.	3 ¾	¾	17	Sand	1:2, 1:2	17.5 lb.	46	E (N:160H)	51	E (N:160G)	53	E (N:160D)	1	E (NBFU)

*All sound transmission tests made with sound chamber open at the top of partition unless other specified. All sound test panels constructed with studs 12" o/c and one horizontal stiffener.

**N:160F sound transmission tests made with panels in contact at top and bottom of partition. ¾" channel stiffeners, 4' o/c, required for each panel. One additional stud per panel required exceeding 9 ½' high.



In addition to the partitions shown here, there are others that have been compiled into the Gypsum Associations *Fire Resistive Design Manual*. Please refer to the latest edition of this document for complete details and other pertinent information when selecting these partitions for use in your project.

GA FILE NO. WP 1085		Proprietary		1 Hr Fire	45 – 49 STC Sound

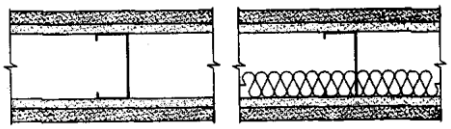
GYPSUM PLASTER, GYPSUM LATH, STEEL STUDS

7/16" proprietary 1:2 gypsum-sand basecoat plaster and 1/16" lime gauging plaster finish applied over one layer 3/8" proprietary Type X gypsum lath applied perpendicular to each side of 2 ½" steel studs 16" o/c. with 1" Type S drywall screws 8" o/c.

Sound tested with 1" mineral fiber insulation stapled to one side in stud space. (NLB).

PROPRIETARY GYPSUM LATH

United States Gypsum Company 3/8" ROCKLATH@ Plaster Base, FIRECODE@ Core

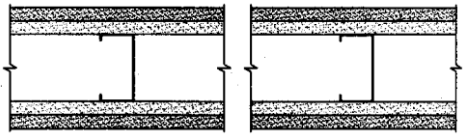


Fire Test	UL R1319, 12-12-90, UL Design U488
Sound Test	CK 664-18, 4-6-66
	Thickness: 4 ¼". Limiting Height: Refer to manufacturer Approx. Weight: 15 psf.

GA FILE NO. WP 1290		Generic		1 Hr Fire	40 – 44 STC Sound

GYPSUM PLASTER, GYPSUM LATH, STEEL STUDS

½" 1:2 gypsum-sand plaster applied over ½" plain gypsum lath applied at right angles to each side of 2 ½" steel studs 24" o/c. with 1" Type S screws, 3 per stud per lath width, or 12 gage wire clips. End joint clips at lath corners. (NLB)

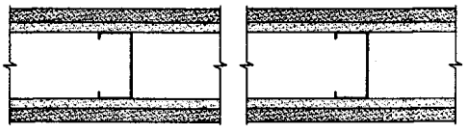


Fire Test	FM WP-53, 11-29-66
Sound Test	NGC 2061 .10-24-66
	Thickness: 4 ½". Limiting Height: Approx. Weight: 15 psf.

GA FILE NO. WP 1370		Generic		1 Hr Fire	40 – 44 STC Sound

GYPSUM PLASTER, GYPSUM LATH, STEEL STUDS

½" 1:2 gypsum-sand plaster applied over 3/8" Type X gypsum lath applied at right angles to each side of 2 ½" steel studs 24" o/c. with two 1" Type S drywall screws at each stud and two butt joint clips per lath at lath ends. (NLB)



Fire Test	UG, 12-21-65
Sound Test	RAL TL63-268, 6-4-63 Thickness: 4 ¼". Limiting Height: Refer to Section V Approx. Weight: 14 psf.

GA FILE No. WP 1380		Generic		1 Hr Fire	35 – 39 STC Sound

SOLID GYPSUM PLASTER, METAL LATH, METAL CHANNEL

2" solid 1:1 ½ gypsum-sand plaster applied over 2.5 lb. metal lath wire tied 6" o/c. to one side of ¾" cold rolled channel studs 16" o/c. embedded in the plaster. (NLB)

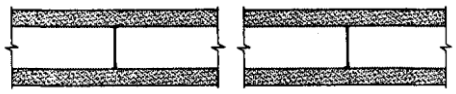
Fire Test	OSUT-129,3-16-48
Sound Test	BMS 144/523, 2-25-55; NBS Monograph 77, 11-30-64 Thickness: 2". Limiting Height: 12'-6". Approx. Weight: 18 psf.

GA FILE No. WP 1390		Generic		1 Hr Fire	35 – 39 STC Sound
SOLID GYPSUM PLASTER, METAL LATH 100 1:2 gypsum-sand plaster applied over each side of 3/8" rib metal lath to form 2" solid stud less wall. (NLB)					
			Fire Test	OSU T-162, 4-26-51	
			Sound Test	BMS 144/527, 2-25-55; NBS Monograph 77, 11-30-64 Thickness: 2". Limiting Height: 10'-0". Approx. Weight: 18 psf.	

GA FILE No. WP 1400	Generic	1 Hr Fire	35 – 39 STC Sound

GYPSUM PLASTER, METAL LATH, STEEL STUDS

5/8" 1:2-1:3 gypsum-sand plaster applied over 3.4 lb. metal lath wire tied 6" o/c. to each side of 1 5/8" open or punched web steel studs 16" o/c. {NLB)



Fire Test	OSUT-1511,9-23-60
Sound Test	RAL TL61-2, 9-8-60
	Thickness: 3 1/8". Limiting Height: Refer to Section V Approx. Weight: 18 psf.

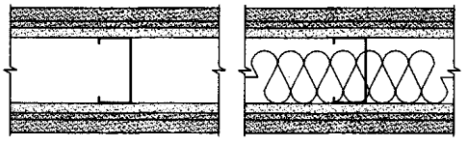
GA FILE No. WP 1625	Proprietary	2 Hr Fire	45 – 49 STC Sound

GYPSUM PLASTER, GYPSUM LATH, METAL LATH, STEEL STUDS

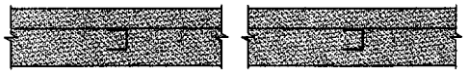
One layer 3/8" thick proprietary gypsum lath applied at right angles to each side of 2 ½" 20 gage steel studs 16" o/c. with l" Type S drywall screws 8" o/c. Mineral fiber batts (optional) in stud space. 3.4 lb. self-furring diamond mesh metal lath applied to each side over gypsum lath with l" Type S screws. ¾" 1:2 gypsum-sand plaster with a lime gauging plaster finish applied over each side.

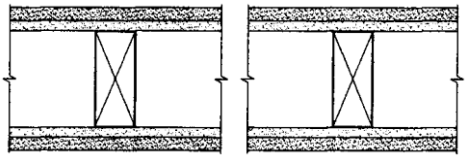
Sound tested with 2" mineral fiber stapled in stud space. (NLB)

PROPRIETARY GYPSUM LATH United States Gypsum Company 3/8" ROCKLATH@ Plaster Base, FIRECODE@ Core



Fire Test	UL R1319, 2-28-90, UL Design U484
Sound Test	CK 664-17, 4-1-66; CK 664-18, 4-6-66
	Thickness: 4 ¾". Limiting Height: Refer to manufacturer. Approx. Weight: 16 psf.

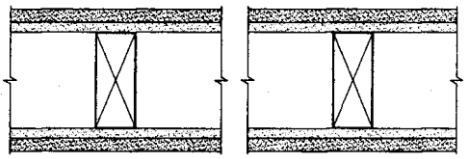
GA FILE No. WP 1930		Generic		2 Hr Fire	30 – 34 STC Sound
SOLID GYPSUM PLASTER, METAL CHANNEL, METAL LATH 2 ½" solid 1:2 or 1:3 gypsum-perlite plaster applied over 3.4 lb. metal lath wire tied 6" o/c. to one side of ¾" cold rolled channel studs 16" o/c. embedded in the plaster. (NLB)					
			Fire Test	WHI7-14-94; See WP 1548 (WHI-495-0236, 1-30-80 Thickness: 4 ¾". Limiting Height: Refer to Section V Approx. Weight: 9 psf.	

GA FILE No. WP 3430		Generic		1 Hr Fire	40 – 44 STC Sound
GYPSUM LATH, GYPSUM PLASTER, WOOD STUDS ½ 1:2 gypsum-sand plaster applied over 3/8" plain gypsum lath applied at right angles to each side of 2 x 4 wood studs 16" o/c. with 13 gage blued lath nails, 1 1/8" long, 0.0915" shank, 19/64" heads, 4" o/c. (LOAD-BEARING)					
			Fire Test Sound Test	OSU T-948, 7-17-58; OSU T-1380, 7-5-60 Approx. Weight: 15 psi. RAL TL58-60, 8-7-58 Thickness: 5 3/8"	

GA FILE No. WP 3431		Generic		1 Hr Fire	40 – 44 STC Sound

GYPSUM LATH, GYPSUM PLASTER, WOOD STUDS

½" 1:2 gypsum-sand plaster applied over 3/8" Type X gypsum lath applied at right angles to each side of 2 x 4 wood studs 16" o/c. with 13 gage blued lath nails, 1 1/8" long, 0.0915" shank, 19/64" heads, 5" o/c.
Load-Bearing.



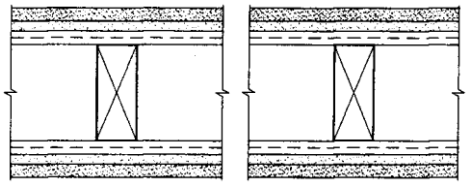
Fire Test	OSU T -1488, 12-60
Sound Test	RAL TL58-60, 8-7-58
	Thickness; 5 3/8". Approx. Weight: 15 psi.

GA FILE No. WP 3436	Generic	1 Hr Fire	45 – 49 STC Sound

GYPSUM LATH, GYPSUM PLASTER, RESILIENT CHANNELS, WOOD STUDS

Resilient channels 16" o/c. attached at right angles to each side of 2 x 4 wood studs 16" o/c. with 5d coated nails, 1 5/8" long, 0.072" shank, 7/32" heads. ½" x 3" strips of gypsum wallboard applied on each side at top plate and at mid-height with 5d nails. ½" 1:2 or 1:3 gypsum-sand plaster applied over 3/8" Type X gypsum lath attached at right angles to channels with ¾" Type S drywall screws, 3 per lath at each channel, and 5d coated nails, 1 5/8" long, 0.072" shank, 7/32" heads, 3 per lath at top plate.

Horizontal joints staggered 16" and vertical joints 6" on opposite sides. (LOAD-BEARING).



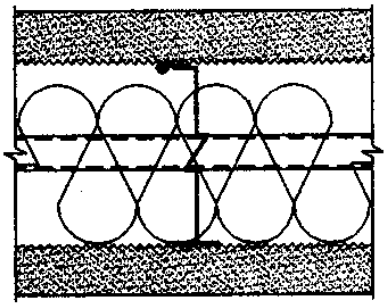
Fire Test	UG, 2-15-66
Sound Test	RAL TL66-299, 8-24-66
	Thickness: 5 7/8". Approx. Weight; 15 psi.

GA FILE No. WP 8310	Generic	2 Hr Fire	

STEEL STUDS, METAL LATH, GYPSUM PLASTER, MINERAL FIBER INSULATION

EXTERIOR SIDE: 1" Portland cement-lime plaster applied over 3.4 lb. galvanized metal lath wire tied with 18 gage steel wire to 4" punched steel studs 16" o/c. with ¾" channel bridging at third points.

INTERIOR SIDE: 1" 1:2 gypsum-sand plaster applied over 3.4 lb. metal lath wire tied to vertically installed ¼" diameter pencil rods attached to studs with resilient clips. Two mil polyethylene vapor retarder on interior side of stud cavity. 3" mineral fiber insulation, 3.86 pcf, friction fit in stud space. (NLB)



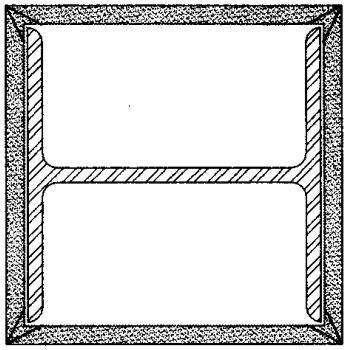
FIRE SIDE

Fire Test	OSU T-4133, 1-17-68 Thickness: 6 ½".

GA FILE No. CM 1300	Generic	1 Hr Fire

METAL LATH, GYPSUM PLASTER

5/8" 1:3 gypsum-sand plaster applied over 3.4 lb. metal lath applied around and wire tied to W10x49 column with 18 gage wire 6" o/c.

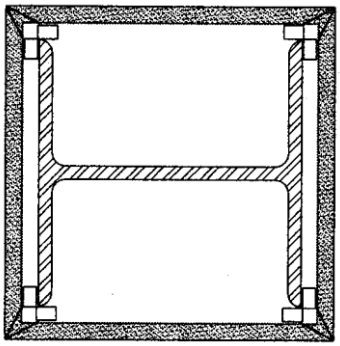


Fire Test	BMS 92/40, 10-7-42

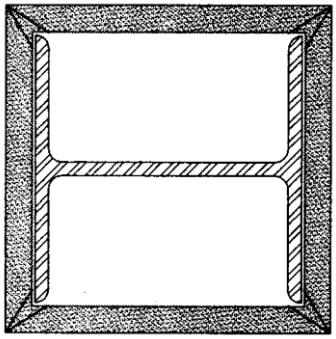
GA FILE No. CM 2310	Generic	2 Hr fire

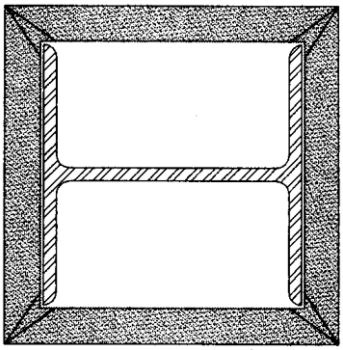
METAL LATH, GYPSUM PLASTER

1 5/8" 1: 1-1: 1 wood-fibered gypsum-sand plaster applied over 3.4 lb. diamond mesh expanded metal lath wire tied with 18 gage wire 6" o/c. at seams applied over ½" X ¾" spacers 40" o/c. Spacers made of ¾" furring channel with 2" legs bent around each corner of W10x49 column.



Fire Test	UL R4024-10, 1-5-67

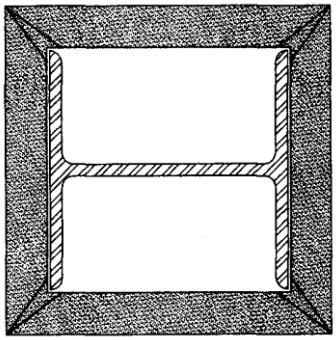
GA FILE No. CM 2320		Generic			
METAL LATH, GYPSUM PLASTER 1" 1:2-1:3 gypsum-perlite plaster applied over 3.4 lb. self-furring expanded diamond mesh metal lath and 2 ½" wide flanged expanded metal corner beads wire tied to W10x49 column with 18 gage galvanized wire 6" o/c.					
			Fire Test	UL R3187-4, -5, -7,7-30-52, UL Design X402	

GA FILE No. CM 3310		Generic			
METAL LATH, GYPSUM PLASTER 1 3/8" 1:2-1:3 gypsum-perlite plaster applied over 3.4 lb. self-furring expanded diamond mesh metal lath and 2 ½" wide flanged expanded metal corner beads wire tied to W10x49 column with 18 gage galvanized wire 6" o/c.					
			Fire Test	UL R3187-4, -5, -7; 7-30-52, UL Design X402	

GA FILE No. CM 4410	Generic	4 Hr Fire

GYPSUM PLASTER, METAL LATH

1 ¾" 1:2-1:3 gypsum-perlite plaster applied over 3.4 lb. self-furring expanded diamond mesh metal lath and 2 ¼" wide flanged expanded metal corner beads wire tied to W10x49 column with 18 gage galvanized wire 6" o/c.

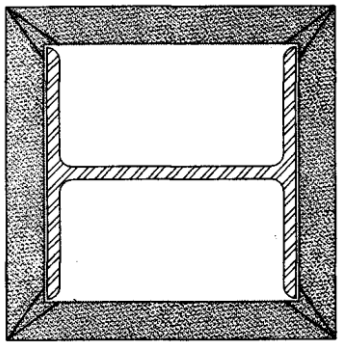


Fire Test	UL R3187-4, -5, -7, 7-30-52, UL Design X402

GA File No. CM 4420	Generic	4 Hr Fire

GYPSUM PLASTER, METAL LATH

1 ½" 1:2-1:3 gypsum-perlite plaster applied over 3.4 lb. metal lath wire tied to W10x49 column with 18 gage wire 24" o/c. Lath spaced 7/16" away from column with ¾" cold rolled channels.



Fire Test	UL R3187-6, 8-7-52, UL Design X406

Ceilings & Beams

Gypsum plaster ceilings can take many different configurations to fit the desired architectural, fire-resistive or sound requirements. Gypsum plaster ceiling systems are divided into three basic categories:

Contact Ceilings

Consist of a lath and plaster membrane attached directly to the structure above.

Furred Ceilings

Ceilings separated from the structure by furring channel, rods, or other devices.

Suspended ceilings

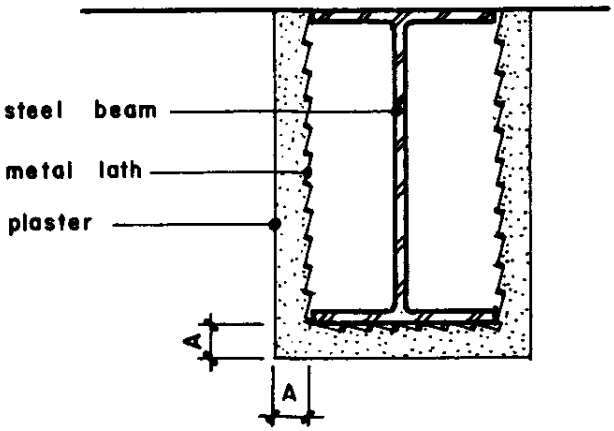
Ceilings in which the lath and plaster membranes are combined with an integral-supporting framework suspended below the main structure by hangers.

Beams: Lath and Plaster

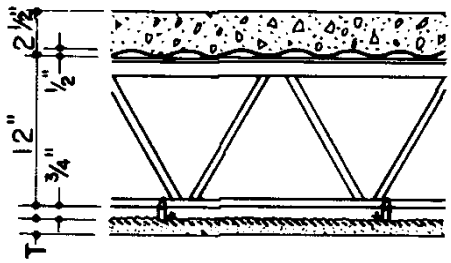
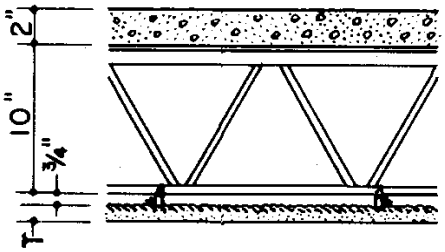
Hourly Rating	Dimension "A"	UL Design Number	Material	Notes
4	1 ½"	D 404	Perlite and Gypsum	Self-furring lath is to clear steel by ¼".
4	1 ½"	A 406	Perlite and Gypsum	Rib lath tied 4" o/c to floor units and 6" o/c to lath hangers.
4	7/8"	D 723	Vermiculite and Gypsum	No. 8 wire lath hangers.
2	1"	D 911	Vermiculite and Gypsum	
2	7/8"	D 910		No. 8 wire lath hangers.

Additional Notes:

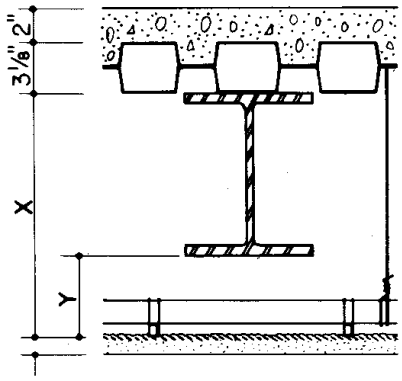
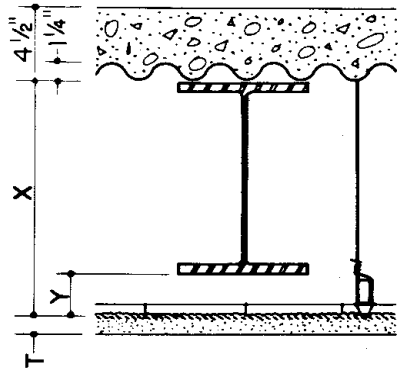
- No. 11 gage lath clips at 9" o/c.
- W8 x 24 minimum size beam.
- Plaster to be mill mixed.



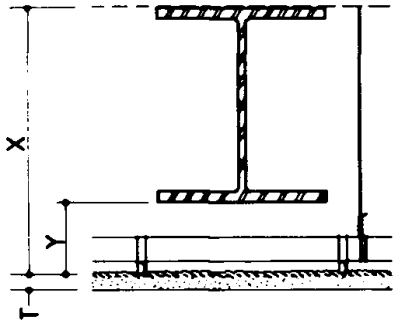
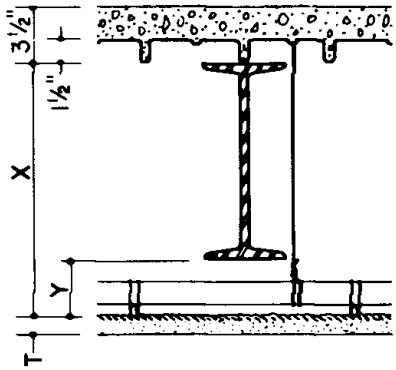
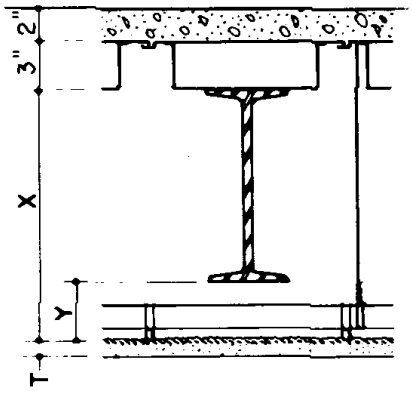
Ceilings – Furred: Metal Lath

Membrane Thickness	Furring ¾" Channels	Materials	Mix proportions Plaster, Aggregate	Deck	Bar Joists	Fire Resistance	Lath Assembly
¾"	13 ½" o/c	Gypsum - Vermiculite	100:2, 100:3		24" o/c	4 Hr. UL:G 401	3.4 # 3/8" diamond mesh lath attached to furring channels with wire ties spaced a maximum of 6" o/c.
Measured from back face of lath to finish surface.							
¾"	12" o/c	Gypsum - Perlite	100:2, 100:3	Tectum	36" o/c	4 Hr. UL:G 401	
Measured from back face of lath to finish surface.							

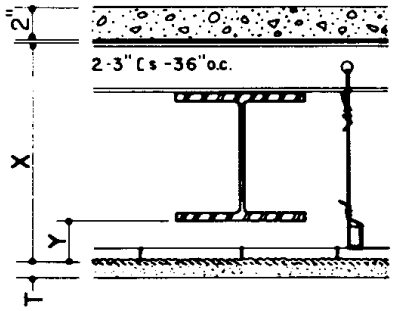
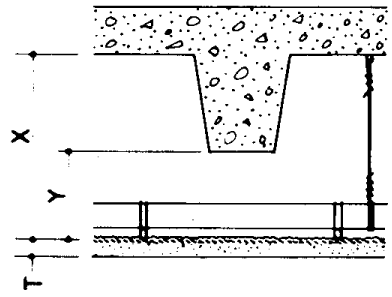
Ceilings – Suspended: Metal Lath

Dimensions					Fire Resistance		
Membrane Thickness	Y	X	Materials	Mix proportions Plaster, Aggregate	Hour	Authority	Note
1 ¼		4 ½"	Fiber (Thermoacoustic)		4 Hr	UL B4 6	
1 1/8	2"	4 ¼"	Fiber (Type 1102)		3 Hr	UL C3 2	
1		2 3/8"	Gypsum – Vermiculite	100:2, 100:3	4 Hr	UL B4 1	
1		2"	Gypsum – Vermiculite	100:2, 100:3	4 Hr	N BMS 92, Tab 45	
1	3 ½"	15 3/8"	Gypsum – Vermiculite	100:2, 100:3	3 Hr	UL A 409	
1 ¼	2 ½"	7 ¼"	Gypsum – Vermiculite	100:2, 100:3	4 Hr	UL B4 4	
1 1/8	3"	3"	Gypsum – Vermiculite	100:2, 100:3	4 Hr	UL A 401	
7/8	3 ½"	15 ½"	Fireproofing Plaster (Type "R")		3 Hr	UL A 403	
							
1 1/8	2 ½"	14 ½"	Gypsum – Vermiculite	100:2, 100:3	4 Hr	UL D 405	
							

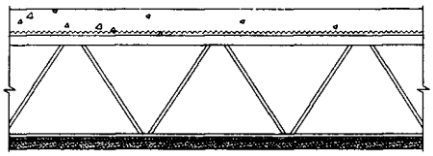
Ceilings – Suspended: Metal Lath

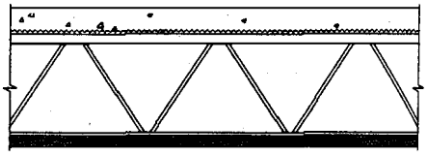
Dimensions (inches)				Plaster Type or -	Fire Resistance		
Membrane Thickness	Y	X	Materials	Mix proportions Plaster, Aggregate	Hour	Authority	Note
13/16	3 ½	15 ½	Fireproofing Plaster	Type “R”	3 Hr	UL A 402	
							
1 1/16	3 ½	15 ½	Fireproofing Plaster	Type “S”	4 Hr	UL D 401	
							
1 1	3 ½ 2 ¾	15 ½ 14 ¾	Gypsum – Perlite Gypsum – Perlite	100:2, 100:3 100:2, 100:3	4 Hr 5 Hr	UL D 405 UL D 407	
							

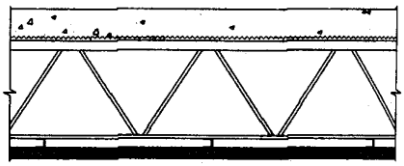
Ceilings – Suspended: Metal Lath

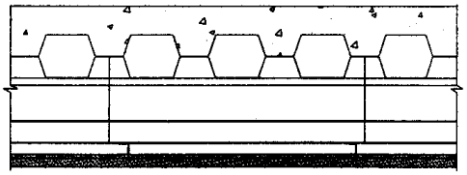
Dimensions (inches)			Slab	Materials	Mix proportions Plaster, Aggregate	Fire Resistance	
Membrane Thickness	Y	X				Hour	Authority
¾				Gypsum – Vermiculite	100:2, 100:3	3 Hr	N:BMS 92 – tab. 44
							
1 1/8 7/8	5 ½ 5 ½	11 ½ 11 ½	3 2	Gypsum – Vermiculite Gypsum – Vermiculite	100:2, 100:3 100:2, 100:3	4 Hr 3 Hr	UL Ref #3390 – 13 UL Ref #3390 – 11
							

In addition to the beams and ceilings shown here, there are others that have been compiled into the Gypsum Associations *Fire Resistive Design Manual*. Please refer to the latest edition of this document for complete details and other pertinent information when selecting ceilings for use in your project. Review for possible duplication.

GA FILE No. FC 1180		Generic			
STEEL JOISTS, CONCRETE SLAB, METAL LATH, GYPSUM PLASTER 5/8" 1:2-1:3 gypsum-sand plaster applied over 3/8" rib metal lath wire tied with 18 gage wire 5" o/c. to open web steel joists 24" o/c. supporting 3/8" rib metal lath and 2" concrete slab. (Passed 90 minute fire test.)					
			Fire Test	BMS 92/43, 10-7-42 Approx. Ceiling Weight: 4 psf	

GA FILE No. FC 2160		Generic		1 Hr Fire	40 – 44 STC Sound
STEEL JOISTS, CONCRETE SLAB, METAL LATH, GYPSUM PLASTER 5/8" gypsum-vermiculite plaster or 7/8 " gypsum-wood fiber plaster applied over 3/8" rib metal lath wire tied with 18 gage wire 5" o/c. to open web steel joists 24" o/c. supporting 3/8" rib metal lath and 2" concrete slab.					
			Fire Test	BMS 92-43, 10-7-42 Approx. Ceiling Weight: 3 psf	

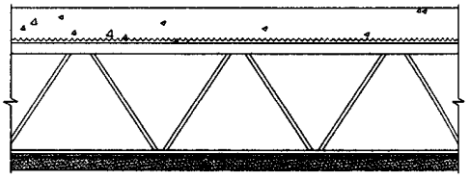
GA FILE No. FC 2170		Generic		1 Hr Fire	40 – 44 STC Sound
STEEL JOISTS, CONCRETE SLAB, METAL LATH, GYPSUM PLASTER ¾" 1:1 gypsum-sand wood-fibered plaster applied over 3.4 lb. metal lath. Wire tied 6" o/c. with 18 gage wire 6" o/c. to ¾" cold rolled channels 13 ½" o/c. Channels wire tied with 18 gage wire to open web steel joists 24" o/c. supporting 3/8" rib metal lath and 2 ½" concrete slab.					
			Fire Test	UL R5429-1, 9-23-66 Approx. Ceiling Weight: 4 psf	

GA FILE No. FC 3150		Generic		1 Hr Fire	40 – 44 STC Sound
CONCRETE SLAB, CELLULAR STEEL DECK, METAL LATH, GYPSUM PLASTER 5/8" thick mill-mixed gypsum-perlite plaster applied over 3.4 lb. metal lath wire tied to ¾" cold rolled channels 12" o/c. Wire tied to 1 ½ " cold rolled channels 48" o/c. suspended 16" with 8 gage steel wire 36" o/c. from 2" concrete slab over 3" cellular steel deck supported by steel beam. (Three hour restrained and unrestrained.)					
			Fire Test	UL R3574-6, 7-25-57, UL Design A403 Approx. Ceiling Weight: 2.5 psf	

GA FILE No. FC 4120		Generic		1 Hr Fire	40 – 44 STC Sound

STEEL JOISTS, CONCRETE SLAB, METAL LATH, GYPSUM PLASTER

7/8" 1:2- 1:3 gypsum-vermiculite plaster applied over 3/8" rib metal lath wire tied 5" o/c. to open web steel joists 24" o/c. supporting 3{8" rib metal lath and 2 ½" concrete slab.



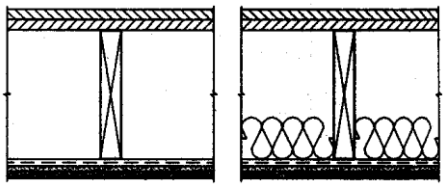
Fire Test	BMS 92/43, 10-7-42 Approx. Ceiling Weight: 5 psf

GA FILE No. FC 5110		Generic		1 Hr Fire	40 – 44 STC Sound

WOOD JOISTS, GYPSUM LATH, GYPSUM PLASTER, RESILIENT CHANNELS

½" 1:2-1:3 gypsum-sand plaster applied over 3/8" Type X gypsum lath applied at right angles to resilient furring channels 16" o/c with three ¾" Type S drywall screws at each furring channel 3" wide woven wire strips applied over gypsum lath and parallel to and directly over resilient channels with 7/8" Type S drywall screws with diamond washers 16" o/c. Resilient channels applied at right angles to 2 x 10 wood joists 16" o/c. with 6d coated nails, 1 7/8" long, 0.0915" shank, ¼" heads. Wood joists supporting 1" nominal wood sub floor and 1" nominal wood finish floor.

Sound tested with 3" glass fiber insulation batts in joist space, sound deadening felt, and carpet and pad.

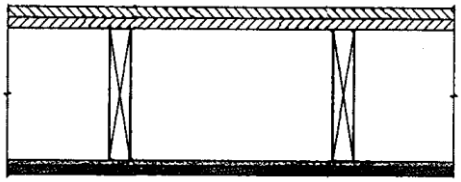


Fire Test	SFT -42, 5-7-66
Sound Test	CK 6712-5, 6-9-67 IIC & Test: (68 C & P) CK 6712-5, 6-9-67 Approx. Ceiling Weight: 6.25 psf

GA FILE No. FC 5470		Generic		1 Hr Fire	40 – 44 STC Sound

WOOD JOISTS, GYPSUM LATH, GYPSUM PLASTER

5/8" 1:2 gypsum-perlite plaster applied over 3/8" Type X gypsum lath applied at right angles to 2 x 10 wood joists 16" o/c. with either blued lath nails, 1 ¼" long, 13 gage shank, 9/32" heads or 16 gage staples, 1 ½" long, 7/18" crown, four fasteners per lath at each joist. Wood joists supporting 1" nominal T & G wood sub floor and 1" nominal wood finish floor.



Fire Test	OSU T -2134-1,4-23-63
Sound Test	Estimated
	Approx. Ceiling Weight: 4 psf

GA FILE No. FC 5490		Generic		1 Hr Fire	40 – 44 STC Sound

WOOD JOISTS, GYPSUM LATH, GYPSUM PLASTER

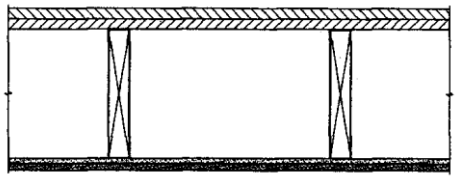
½" 1:2 gypsum-sand plaster applied over 3/8" Type X gypsum lath applied at right angles to 2 x 10 wood joists 16" o/c. with blued lath nails, 1 1/8" long, 0.0915" shank, 19/64" heads, 4 nails per lath at each joist. Continuous stripping supporting gypsum lath under each joist with 2.5 lb. steel strip lath or equivalent wire lath. Nailed with 11 gage, 1 ½" long, 7/18" heads roofing nails, 6" o/c. Wood joists supporting 1" nominal T & G wood sub floor and 1" nominal wood finish floor.

Fire Test	SFT -6, 2-6-60; SFT -8, 4-9-60; SFT-11, 10-4-60; SFT-12, 10-22-60; SFT-13, 1-7-61
Sound Test	Estimated
	Approx. Ceiling Weight: 6 psf.

GA FILE No. FC 5510		Generic		1 Hr Fire	40 – 44 STC Sound

WOOD JOISTS, METAL LATH, GYPSUM PLASTER

5/8" 1:2-1:3 gypsum-sand plaster applied over 3.4 lb. metal lath applied to 2 x 10 wood joists 16" o/c. with barbed roofing nails, 1 ½" long, 0.120" shank, 7/16" heads, 6" o/c. Wood joists supporting 1" nominal T & G wood sub floor and 1" nominal wood finish floor.



Fire Test	BMS 92/42, 10-7-42 Approx. Ceiling Weight: 9 psf

GA FILE No. FC 5610		Generic		1 Hr Fire	40 – 44 STC Sound

WOOD JOISTS, METAL LATH, GYPSUM PLASTER

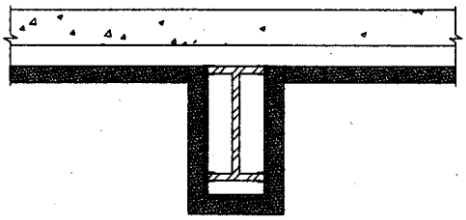
5/8" 1:2-1:3 gypsum-vermiculite plaster applied over 3.4 lb. metal lath applied to 2 x 10 wood joists 16" o/c. with barbed roofing nails, 1 ½ long, 0.120" shank, 7/16" heads 5" o/c. Wood joists supporting 1" nominal T & G wood sub floor and 1" nominal wood finish floor.

Fire Test	NBS 272, 12-15-50 Approx. Ceiling Weight: 4 psf

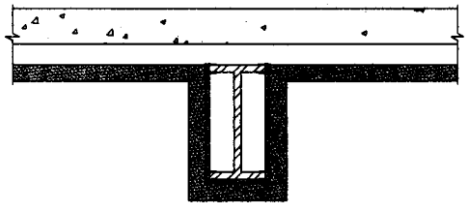
GA FILE No. BM 2221		Generic		1 Hr Fire	40 – 44 STC Sound

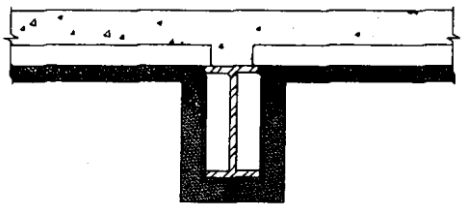
METAL LATH, GYPSUM PLASTER

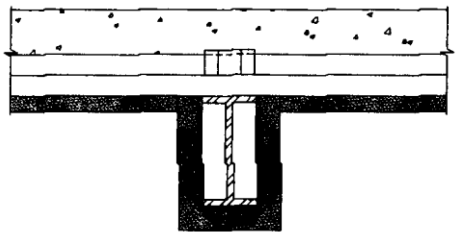
1 1/8" 1:2 mil-mixed gypsum-perlite plaster applied over 3.4-lb. diamond mesh metal lath attached to beam flange with 11-gage steel clips 9" o/c. 1" space between beam bottom flange and lath. Minimum beam size WBx24. (Two-hour restrained beam.)



Fire Test	ULR4197-1,1-29-59

GA FILE No. BM 3110		Generic		1 Hr Fire	40 – 44 STC Sound
METAL LATH, GYPSUM PLASTER 1 ¼" 1:2 mill-mixed gypsum-perlite plaster applied over 3.4 lb. diamond mesh metal lath attached to beam flange with 11 gage steel clips 9" o/c. Minimum beam size WBx24. (Three hour restrained beam.)					
			Fire Test	ULR4197-1,1-29-59	

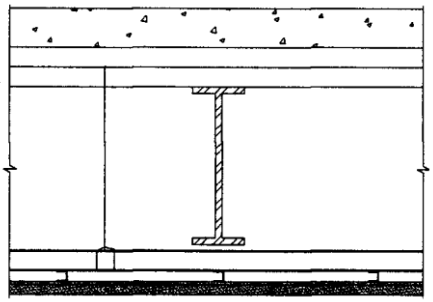
GA FILE No. BM 4310		Generic		1 Hr Fire	40 – 44 STC Sound
GYPSUM PLASTER, METAL LATH 1 ½" 1:2 gypsum-perlite plaster applied over 3.4 Ib. self-furring diamond mesh metal lath tied with 18 gage wire 6" o/c. and held ¼" from steel. Minimum beam size W12x58. (Four hour unrestrained beam.)					
			Fire Test	UL R3413-4, 7-1-53. UL Design D404	

GA FILE No. BM 4320		Generic		1 Hr Fire	40 – 44 STC Sound
GYPSUM PLASTER, METAL LATH 1 ½" 1:2 ½ gypsum-perlite plaster applied over 3.4-lb. diamond mesh metal lath. Tied with 18 gage galvanized wire 4" o/c. to floor units and 6" o/c. to No.6 gage lath hangers 22" to 28" o/c. wrapped completely around beam. Minimum beam size W12x27. (Four hour unrestrained beam.)					
			Fire Test	UL R3789-1 , 10-3-56. UL Design A406	

GA FILE No. BM 4410		Generic		1 Hr Fire	40 – 44 STC Sound

GYPSUM PLASTER, METAL LATH

¾" 1:2 mill-mixed gypsum-perlite plaster applied over 3.4 lb. diamond mesh metal lath wire tied to ¾" cold rolled channels 12" o/c. with 18 gage wire. Channels wire tied with 8-gage wire to 1 ½" cold rolled carrying channels 48" o/c. suspended from steel deck and 2" concrete slab. 3 ½" minimum clearance from lower beam flange to top of ceiling. Minimum beam size W12x27. (Four hour unrestrained beam.)

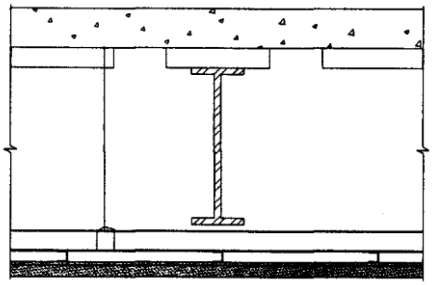


Fire Test	UL R3574-6, 7-25-57, UL Design A403

GA FILE No. BM 4420		Generic		1 Hr Fire	40 – 44 STC Sound

GYPSUM PLASTER, METAL LATH

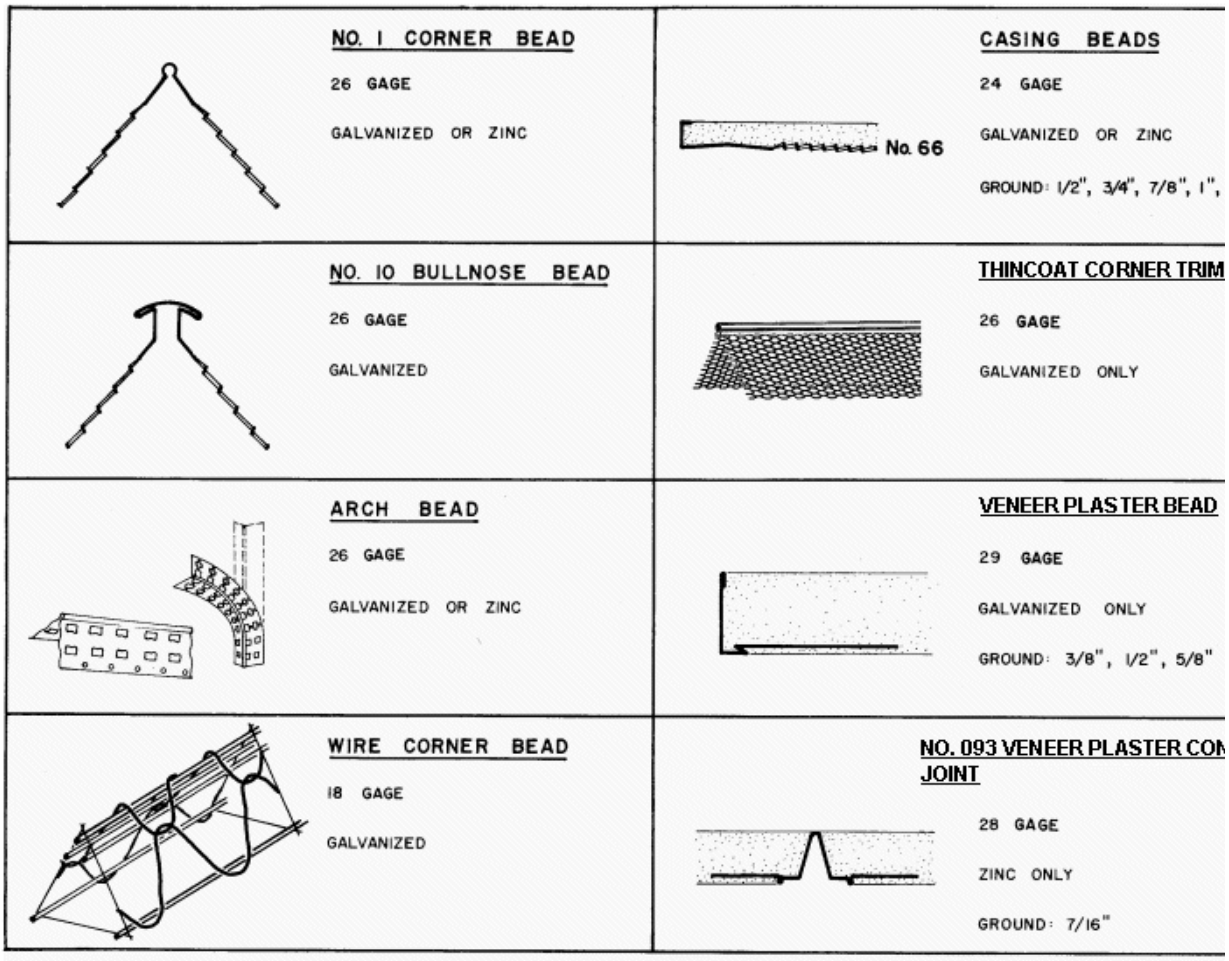
7/8" 1:2-1:3 gypsum-perlite plaster applied over 3.4 lb. diamond mesh metal lath tied to ¾" cold rolled channels 12" o/c. with 18 gage wire. Channels wire tied to 1 ½" cold rolled carrying channels 36" o/c. suspended with 8-gage hanger wire 48" o/c. from cellular steel deck and 2" concrete slab. Minimum clearance 3 ½" from lower beam flange to top of ceiling. Minimum beam size W12x27. (Four hour unrestrained beam.)



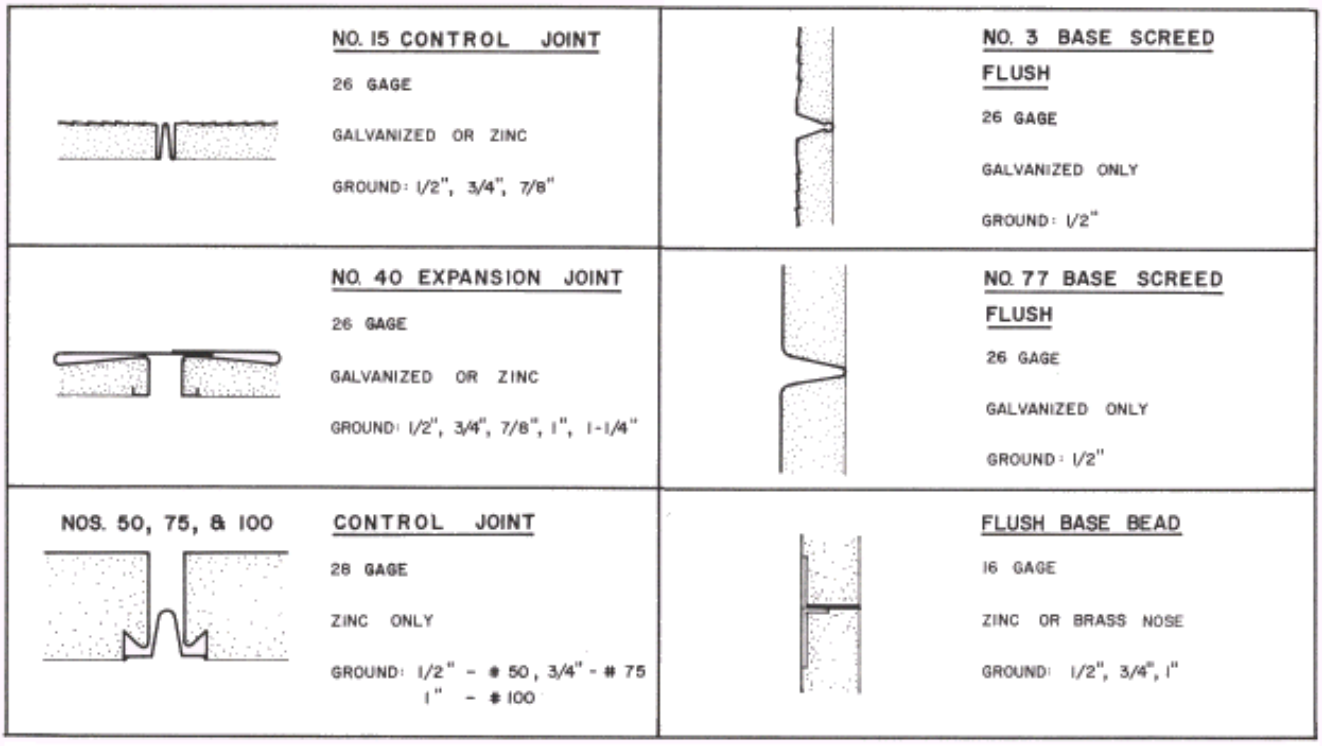
Fire Test	UL R33.55-1. 4-30-5 UL Design A40S

Metal Lath & Plaster Accessories Components

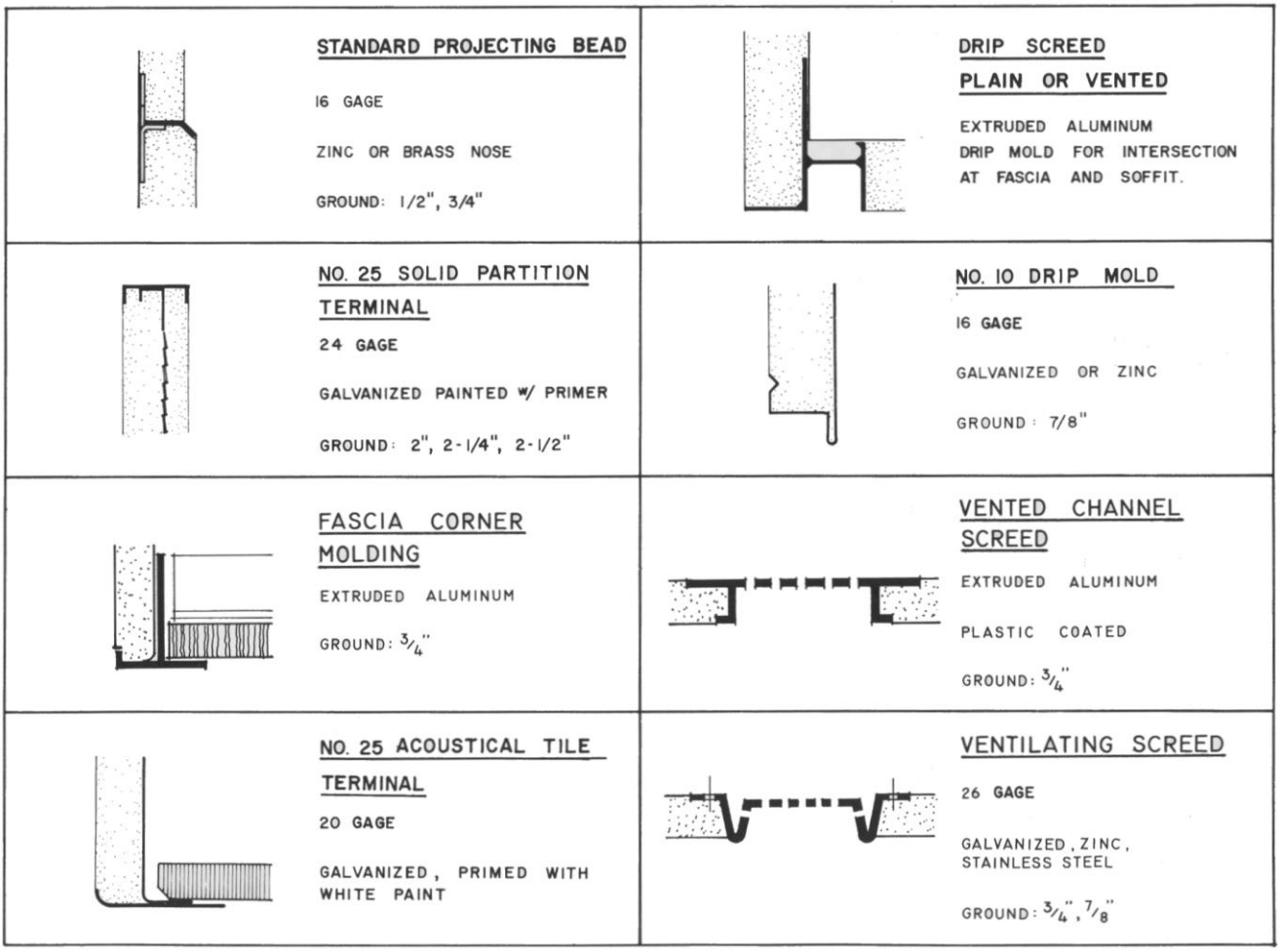
The following drawings depict various components used in *Metal Lath and Plaster* assemblies.



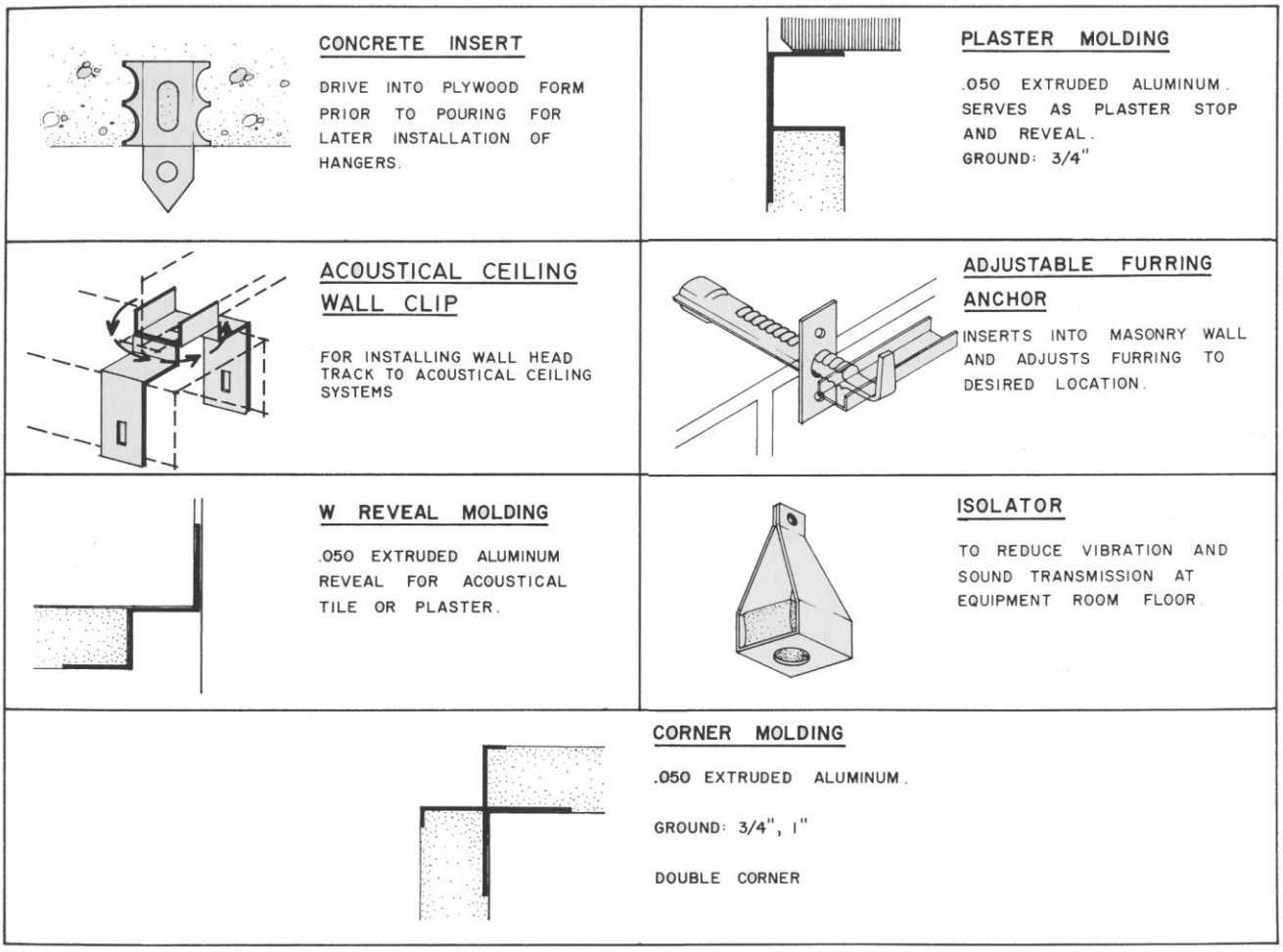
Metal Lath & Plaster Accessories Components



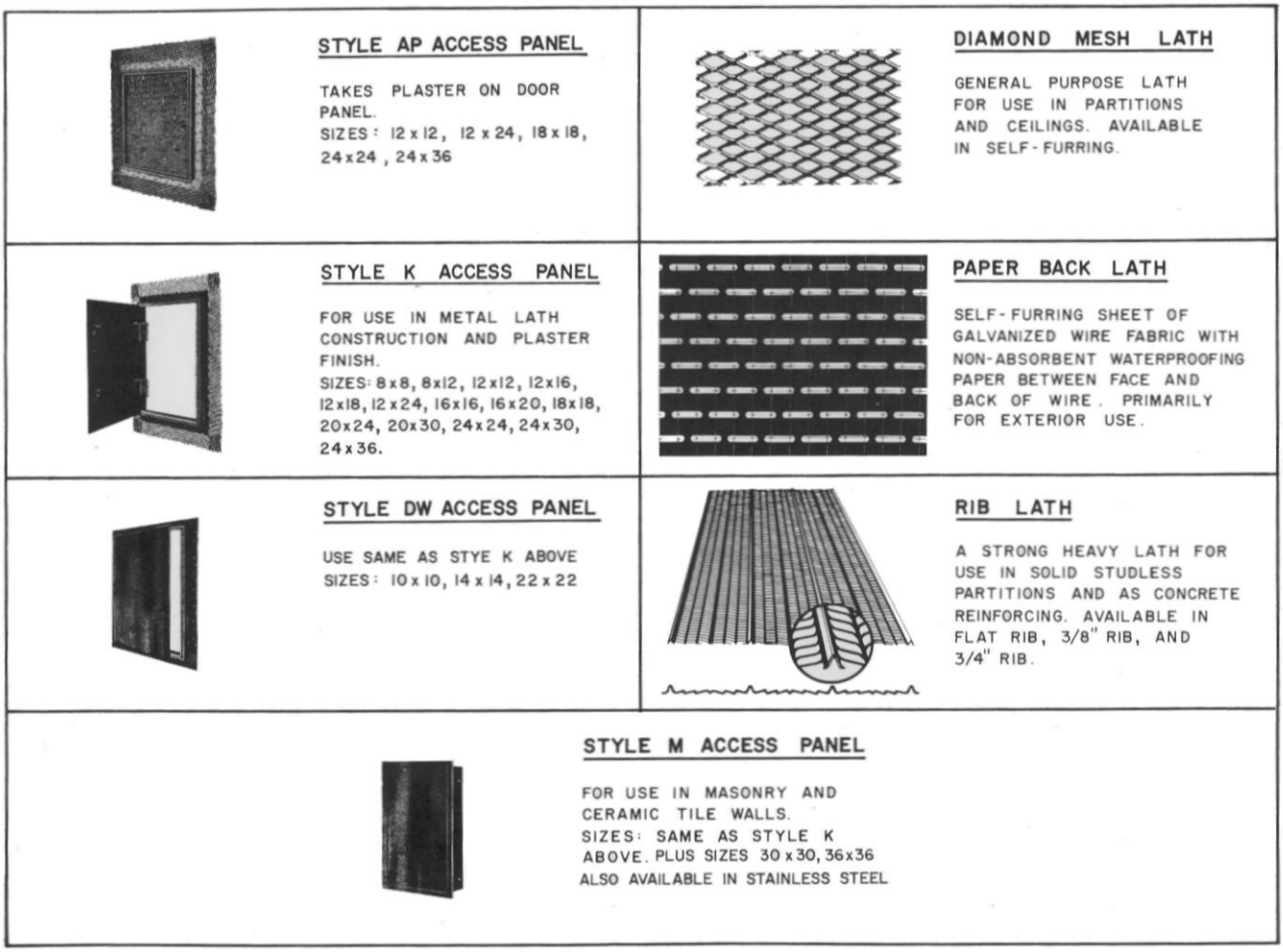
Metal Lath & Plaster Accessories Components



Metal Lath & Plaster Accessories Components



Metal Lath & Plaster Accessories Components



STYLE AP ACCESS PANEL

TAKES PLASTER ON DOOR PANEL.
SIZES: 12 x 12, 12 x 24, 18 x 18, 24 x 24, 24 x 36

DIAMOND MESH LATH

GENERAL PURPOSE LATH FOR USE IN PARTITIONS AND CEILINGS. AVAILABLE IN SELF-FURRING.

STYLE K ACCESS PANEL

FOR USE IN METAL LATH CONSTRUCTION AND PLASTER FINISH.
SIZES: 8 x 8, 8 x 12, 12 x 12, 12 x 16, 12 x 18, 12 x 24, 16 x 16, 16 x 20, 18 x 18, 20 x 24, 20 x 30, 24 x 24, 24 x 30, 24 x 36.

PAPER BACK LATH

SELF-FURRING SHEET OF GALVANIZED WIRE FABRIC WITH NON-ABSORBENT WATERPROOFING PAPER BETWEEN FACE AND BACK OF WIRE. PRIMARILY FOR EXTERIOR USE.

STYLE DW ACCESS PANEL

USE SAME AS STYE K ABOVE
SIZES: 10 x 10, 14 x 14, 22 x 22

RIB LATH

A STRONG HEAVY LATH FOR USE IN SOLID STUDLESS PARTITIONS AND AS CONCRETE REINFORCING. AVAILABLE IN FLAT RIB, 3/8" RIB, AND 3/4" RIB.

STYLE M ACCESS PANEL

FOR USE IN MASONRY AND CERAMIC TILE WALLS.
SIZES: SAME AS STYLE K ABOVE. PLUS SIZES 30 x 30, 36 x 36
ALSO AVAILABLE IN STAINLESS STEEL

Reference Standards

The following ASTM Standards are applicable to the specification and installation of interior framing, lathing and plastering.

- C11 Definitions of Terms Relating to Gypsum and Related Building Materials and Systems
- C28 Specification for Gypsum Plasters
- C37 Specifications for Gypsum Lath
- C59 Specification for Gypsum Casting and Molding Plaster
- C61 Specification for Gypsum Keene's Cement
- C631 Specifications for Bonding Compounds for Interior Plastering
- C841 Specifications for Installation of Interior Lathing and Furring
- C842 Specification for Application of Interior Gypsum Plaster
- E84 Test Methods for Surface Burning Characteristics of Building Materials
- E119 Methods for Fire Tests of Building Construction and Materials

Section VI

Veneer Plaster

Veneer Plaster System

Veneer Plaster Over Veneer Base Offers Best Interior Surface

Veneer plaster and veneer base has been around for a quarter-century. Yet, surprisingly enough, many interiors miss the opportunity to benefit from its superior properties.

However, there's a change that's been subtly appearing. Over the last dozen years, innovative interior system contractors have been favoring veneer plaster over taped drywall.

Drywall's slightly lower cost has probably accounted for the slow progress, but quality of the finished wall is incomparable. Those who have been fortunate enough to choose veneer plaster for their interior finish acclaim the results.

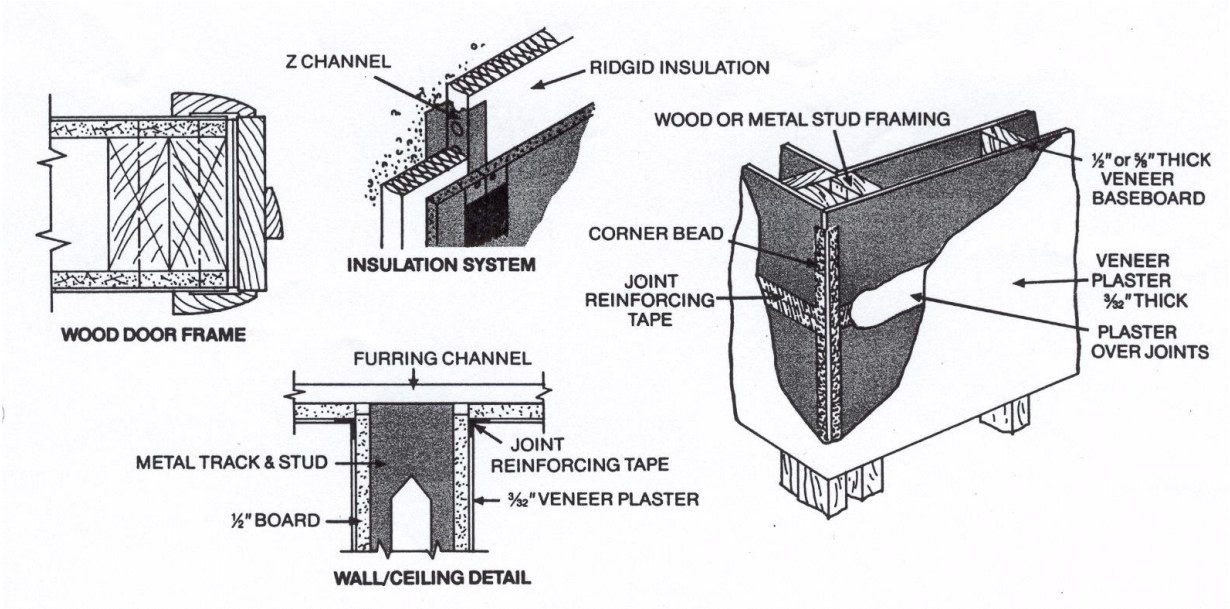
Sometimes called *skim coat*, veneer plaster finishes are applied over gypsum board that looks like regular drywall, except that surfaces of the board are colored light blue. This surface contains catalysts to harden the veneer plaster to its unusual compressive strengths. Most of these finishes are in the range of 3,000 psi, and are abrasive resistant.

Veneer plaster or *skim coat* provides a truly, distinct facing. Usual joint treatment of drywall is abandoned. No longer is it necessary to apply a bedding coat of joint compound, embed paper tape reinforcement over the joint, then coat and sand the joint a minimum of three times to achieve an acceptable finish.

There's no reason for anxiety over whether joints will re-appear as shadow lines, nor will joint compound treated nail heads typical of drywall installations expose themselves as dimples or pops.

Quality New or Remodeled Walls and Ceilings

A Veneer Plaster system consists of a one or two coat application of high strength plaster over veneer gypsum base- board. The baseboard is 1/2" or 5/8" thick, and the plaster is from 1/16 " to 1/8" thick.



Common Uses and Benefits of Veneer Plaster

Veneer Plaster Gives You a Quality Surface Under Critical Design Conditions

Great for curved surfaces, smooth finishes, gloss paint or wall coverings and hard use areas.

Popular Finish for Hospitals

Makes smooth, dense, monolithic surfaces easy to clean.

Popular Finish for Schools and Institutions

Veneer plaster provides a very hard and abuse resistant surface.

Popular in Upper End *Residential Construction*

Veneer plaster provides classic finishes and quality characteristics of real plaster at competitive costs.

Excellent Finish for Block or Concrete

Maintains impact and abrasion resistance and provides attractive, classic finishes.

Fast, Quality Application on Exterior Soffits

When protected from direct contact with weather.

Quality Material for Remodeling

Quickly resurfaces existing, sound, painted surfaces.

Assets You Acquire When You Choose Veneer Plaster

1. Reduces construction schedules.
2. A hard dense surface-impact resistance to 3000 P.S.I. (reduces future cleaning and maintenance costs).
3. An attractive, smooth surface in areas of critical light and/or gloss paint or wall covering.
4. Achieves fire and sound resistance ratings applied to 12" base. Is applied to the same framing systems as drywall.
5. Fills voids at all penetrations to reduce heat and sound transfer without caulking or gaskets.

6. The choice of all classic finishes (smooth, sand, dash, trowel textures) or creative, new textures.

Veneer Plaster provides you with most of the characteristics of real plaster at costs competitive with other quality, smooth wall installations. The Veneer Plaster System is fast. A one-coat system over veneer baseboard sets in one hour.

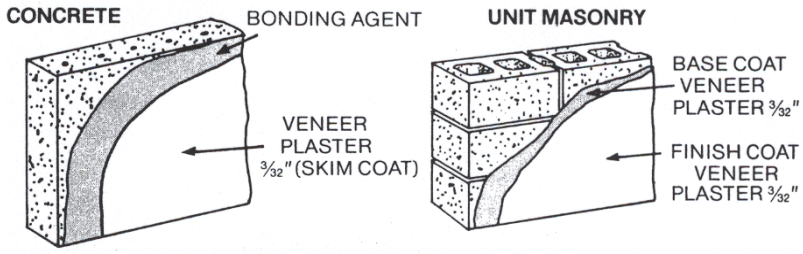
Note: Two coats are applied to C.M.U., and are optional on veneer baseboard.

1. Requires no drying heat.
2. No sanding under normal conditions.
3. Less time for scaffold to be in place.
4. May be painted in as little as 24 hours.
5. May be left unpainted or universal liquid color may be used to provide integral color.

Veneer Plaster is Fast and Economical for Finishing Masonry and Concrete Surfaces

Veneer Plaster maintains abrasion and impact resistance, and provides a true surface with an improved appearance.

Clean concrete surfaces of foreign matter. Be sure curing compounds and form releasing agents, if present, will not prevent a good bond. Apply a liquid bonding agent, then a skim coat finish of Veneer Plaster.

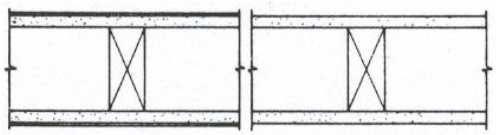


Two-coat system: A base coat of plaster may be necessary to *true up* the concrete surface before application of the finish coat. Concrete block should be clean. If possible, have mortar joints struck flush with block. If the block is painted, apply a bonding agent before plastering. Apply base coat first, let set, then follow with a finish coat.

Wood Stud Construction

Specification	Description
Construction Type:	Gypsum Veneer Base, Veneer Plaster, 2 X 4 Wood Studs or Greater
Fire Rating:	1 Hr.
STC 34	
GA File No.	WP 3620

One layer ½" Type X gypsum veneer base applied at right angles to each side of 2x4 wood studs 16" o/c. with 5d etched nails, 1 ¾" long, 0.099" shank, ¼" heads, 8" o/c. Minimum 1/16" gypsum-veneer plaster over each face. Stagger vertical joints 16" o/c. and horizontal joints each side 12" o/c. Sound tested without veneer plaster, or sound insulation (load bearing).

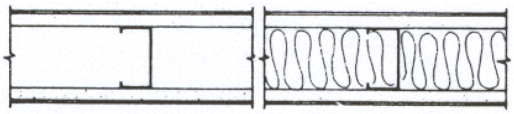


Thickness: 4⅞" Approx. Weight: 7 psf

Metal Stud Construction

Specification	Description
Construction Type:	Gypsum Veneer Base, Veneer Plaster 2 ½" Metal Studs or Greater
Fire Rating:	1 Hr.
STC 44	
GA File No.	WP 1240

One layer ½" Type X gypsum veneer base applied parallel or at right angles to each side of 2 ½" metal studs 24" o/c., with 1" Type S drywall screws 8" o/c., to edges or ends and 12" o/c. to intermediate studs. Omit screws in top and bottom runners. Stagger joints 24" o/c. each side 1/16" gypsum veneer plaster applied over both sides. Sound tested with 3" glass fiber in stud space and with studs 16" o/c. (non-load bearing).



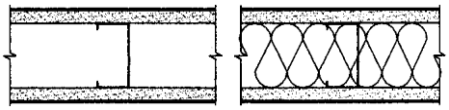
Thickness: 3⅝" Limiting Height: 14'8"
Approx. Weight: 5 psf

GA FILE No. WP 1240		Generic		1 Hr Fire	40 – 44 STC Sound

GYPSUM VENEER PLASTER, GYPSUM VENEER BASE, STEEL STUDS

One layer ½" Type X gypsum veneer base applied parallel or at right angles to each side of 2 ½" steel studs 24" o/c. 1" Type S drywall screws 8" o/c. at vertical joints and 12" o/c. at intermediate studs. 1/16" gypsum veneer plaster applied over each side.

Stagger joints 24" on each side and on opposite sides. Sound tested with 3" glass fiber insulation in stud space and with studs 16" o/c. (NLB)



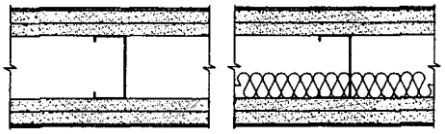
	Thickness: 3 5/8". Limiting Height: Refer to Section V Approx. Weight: 5 psf
Fire Test	UG, 8-5-63; UG, 11-1-63; UG,5-31-66
Sound Test:	G&H NG-269FT, 12-20-65

GA FILE No. WP 1560		Generic		2 Hr Fire	50 – 54 STC Sound

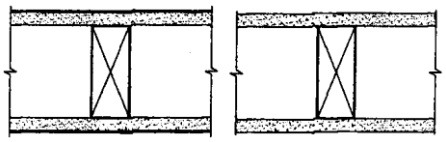
GYPSUM VENEER PLASTER, GYPSUM VENEER BASE, STEEL STUDS

Base layer ½" Type X gypsum veneer base applied parallel to each side of 2 ½" steel studs 24" o/c. with 1" Type S drywall screws 24" o/c. at vertical joints and intermediate studs. Face layer 1/2" type X gypsum veneer base applied parallel to each side with 15/8" Type S drywall screws 12" o/c. at vertical joints and intermediate studs. 3/32" gypsum veneer plaster applied over each side.

Joints staggered 24" each layer and side. Sound tested with 1" mineral fiber insulation stapled in stud space. (NLB)



	Thickness: 4 3/4". Limiting Height: Refer to Section V Approx. Weight: 10 psf.
Fire Test	Fire Test: UL R5085-7, R4142, 12-1-66, UL Design U303
Sound Test:	CK 654-66, 12-29-65

GA FILE No. WP 3620		Generic		1 Hr Fire	30 – 34 STC Sound
GYPSUM VENEER BASE, GYPSUM VENEER PLASTER, WOOD STUDS One layer ½" Type X gypsum veneer base applied at right angles to each side of 2 x 4 wood studs 16" o/c. with 5d etched nails, 1 ¾" long, 0.099" shank, ¼ " heads, 8" o/c. 1/16" gypsum veneer plaster applied over each face. Vertical joints staggered 16" and horizontal joints 12" on opposite sides. Sound tested without gypsum veneer plaster. (LOAD-BEARING)					
				Thickness: 4 7/8" Approx. Weight: 7 psf.	
			Fire Test	UC, 1-12-66	
			Sound Test:	G&H IBI-35FT, 5-26-64	

Reference Standards

The following ASTM Standards are applicable to the specification and installation of Veneer Plaster Systems:

C587 Specification for Gypsum Veneer Plaster

C588 Specification for Gypsum Base for Veneer Plasters

C843 Specification for Application of Gypsum Veneer Plaster

C 1047 Specification for Accessories of Gypsum Wall Board and Gypsum Veneer Base

Guide Specification for the Veneer Plaster System

Common Uses

Veneer plaster is used to achieve excellent abrasion and impact resistance. Veneer plaster provides a quality smooth finish in areas of critical light and/or gloss paint or wall covering. Veneer plaster sets in one hour, requires no drying heat, requires no sanding, and may be painted in as little as 24 hours. Veneer plaster may be left naturally white or integral colors may be used. Veneer plaster is used to finish CMU or concrete surfaces. Veneer plaster is used to resurface existing walls and ceilings.

Limitations

Veneer Plaster is not recommended for use in continued contact with moisture or high humidity.

Part I General

1.1 Work Included

Erection of all light gage metal framing, veneer plaster base, veneer trim & (one coat or two coat) veneer plaster.

1.2 Scope of Work

Work included under this section of specification for lathing and plaster, the contractor shall provide all labor, materials and equipment necessary to complete the job as shown on drawings and/or described herein for completion of work.

1.3 General Requirements

Compliance with standards and industry specifications:

- ASTM C-754 -Installation of Steel Framing Members
- ASTM C-843 -Application of Veneer Plaster
- ASTM C-844 -Application of Veneer Plaster Base

Note: Details of workmanship and installation not specified herein shall conform to the Texas Lathing and Plastering Contractors Association and the Texas Bureau For Lath and Plaster's recommendations and specifications.

Part II Materials

2.1 Framing

Metal studs, 25 gage, 3-5/8" wide (or as gage and width dictate) track both top and bottom to be same gage and width to receive studs.

2.2 Veneer Plaster Base

Veneer base board 1/2" or 5/8" thick, Type X fire rated.

2.3 Trim Accessories

Trim accessories for veneer plaster system as required.

1. Corner bead ground 3/32” No.900
2. Metal trim ground 3/32" No.701 A or B
3. Control joint grounds 3/32" No.093

2.4 Joint Reinforcement:

2 ½" fiber mesh.

2.5 Veneer Plaster

Proprietary specially formulated high strength gypsum.

Part III Execution

3.1 Framing

Install metal framing 16" per ASTM 754, o/c. when applying the ½" veneer base. 24" o/c. when using double layers of ½" board. 24" o/c. when using 5/8" board.

3.2 Veneer Plaster Base

1. Wall application. For vertical application of veneer base parallel to framing members, all ends and edges shall occur over framing members. Vertical joints shall be staggered on opposite sides of the wall. For horizontal application perpendicular to the framing members, end joints shall occur on framing members and be staggered. For application of multi-layers of board all joints shall be staggered. No joints shall occur at the corners of doorframes or other penetrations. No vertical joints shall occur within 8" of doorframes.
2. Ceilings. The veneer base application shall be perpendicular to the framing members, and the end joints shall be staggered. End joints shall occur on framing members unless specified otherwise for application to resilient channel systems.
3. Attach veneer base with fasteners of size and length specified by ASTM C-844, or according to a specified fire resistance design or to achieve a given shear value as specified. Fasteners shall be applied to hold the veneer base snugly against the framing member, and the fastener heads shall be set flush with the surface of the base.
4. Trim items. Install corner beads on all exterior corners. Use metal casing beads against all dissimilar materials. Install control joints where detailed.

3.3 Veneer Plaster

1. Pre-fill joints with a joint treatment compound, then tape. Go over all taped joints with veneer plaster and let set, then apply the finish veneer plaster.
2. Veneer plaster system is to be the one coat (two coat optional) system in thickness to 3/32" (to 1/8"). Mixing, proportions and application per specification and in strict accordance with the manufacturer's directions.
3. The finish shall be smooth, sand, dash or textured finish. Type of finish to be selected by architect.
4. Integral color may be used for sand finish and textures. Use universal liquid color or lime resistant mineral color. Color to be selected by architect. Provide sample of texture and/or color to be approved by architect before plastering begins.

The opinions, specifications, and recommendations in this Systems Manual are for general information only. This information is not intended to or does not constitute an express or implied warranty by the Texas Lathing and Plastering Contractors Association and the Texas Bureau for Lath and Plaster.

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Technical Comments

Veneer Plaster

Outstanding substrate for a variety of decoration, but here's a word of caution...

Many veneer plaster finish materials can be painted with acrylic, latex and vinyl breather-type paints the day following application, provided they are totally dry. However, lime putty-type finishes must be thoroughly dried and sealed before further decoration. (Some manufacturers recommend up to 30 to 60 days for drying).

Note: It is essential that lime-gauging finishes be thoroughly dried. If drying is impaired by application of even a breather-type paint, subsequent drying will result in deterioration of the paint film's bonding characteristics, ultimately resulting in paint delamination (peeling).

If oil or alkyd based enamel paint is to be used, the plaster system must be dry, and a primer-sealer should be applied prior to the finish paint coat. An epoxy paint finish also can be used over veneer plaster, sand float finish or lime putty-gauged finishes. For this application, the plaster must be dry because epoxy seals the surface. In addition, a penetrating sealer made especially for epoxy paints must be used.

Note: Selection of paint materials and methods of application must be in strict accordance with the paint manufacturer's recommendations.

For a complete listing of recommended TLPCA Contractors, call the Association Office or consult the TLPCA Web Page for a current list of firms and their phone numbers and addresses.