Office de la Propriété Intellectuelle du Canada
Un organisme d'Industrie Canada

Canadian Intellectual Property Office
An agency of Industry Canada

CA 2895307 A1 2016/02/29

(21) 2 895 307

(12) DEMANDE DE BREVET CANADIEN
CANADIAN PATENT APPLICATION

(13) A1

(86) **Date de dépôt PCT/PCT Filing Date:** 2014/08/30
(87) **Date publication PCT/PCT Publication Date:** 2016/02/29
(85) **Entrée phase nationale/National Entry:** 2015/06/26
(86) **N° demande PCT/PCT Application No.:** US 2014/053616

(51) **Cl.Int./Int.Cl.** ***E04B 1/00*** (2006.01),
E04B 1/343 (2006.01), ***E04B 2/00*** (2006.01),
E04G 21/00 (2006.01), ***E04H 1/00*** (2006.01)

(71) **Demandeur/Applicant:**
INNOVATIVE BUILDING TECHNOLOGIES, LLC, US

(72) **Inventeurs/Inventors:**
COLLINS, ARLAN, US;
WOERMAN, MARK, US

(74) **Agent:** BLAKE, CASSELS & GRAYDON LLP

(54) **Titre : MUR MITOYEN ET MUR D'EXTREMITE PREFABRIQUES**
(54) **Title: PREFABRICATED DEMISING AND END WALLS**

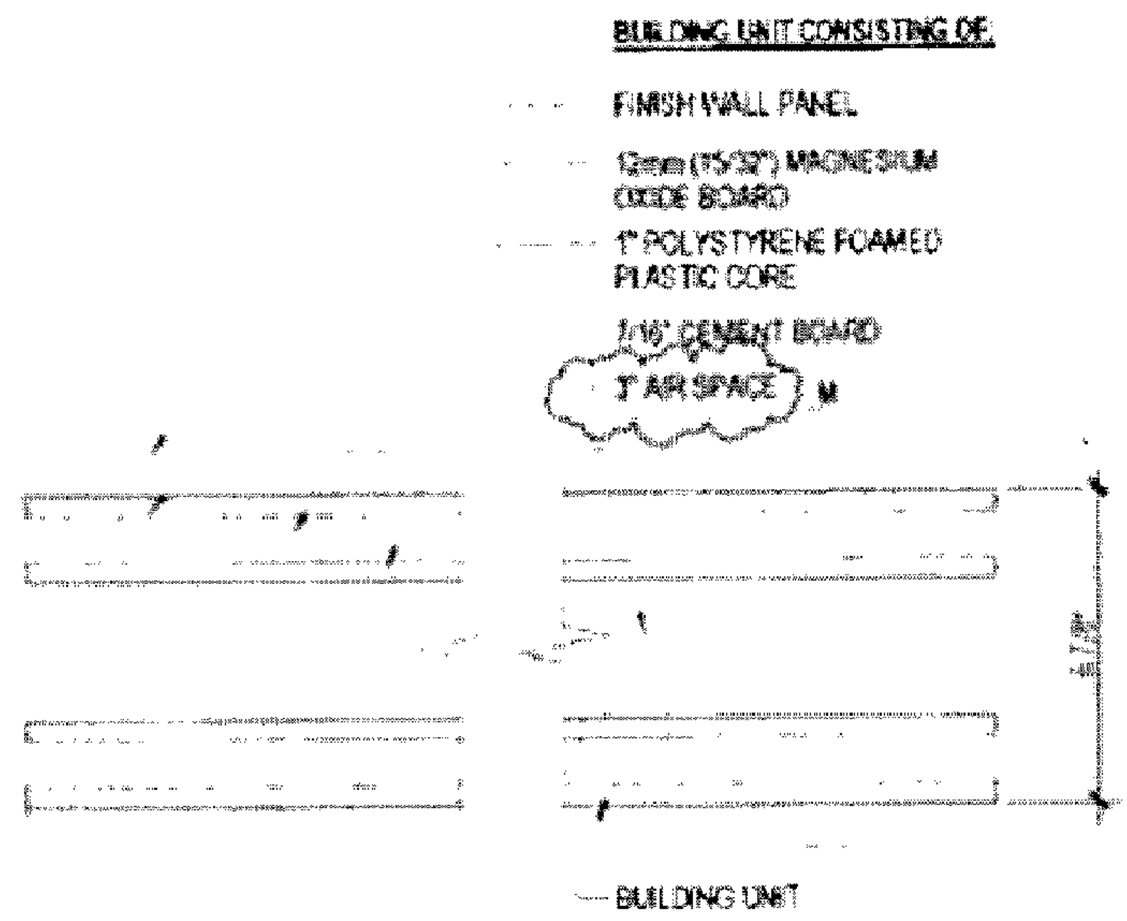


Figure 1

(57) **Abrégé/Abstract:**
An example apparatus is disclosed that may be a demising wall that may include two SIPS panels. Each of the SIPS panels may be configured to span between a floor and a ceiling of a building unit, and the two SIPS panels are spaced apart to define an interstitial

CA 2895307 A1 2016/02/29

(21) **2 895 307**

(13) **A1**

(57) **Abrégé(suite)/Abstract(continued):**
space between the SIPS panels, wherein each of the SIPS panels includes an interior surface having a magnesium oxide board and an exterior surface having a fibre cement board. An example method is disclosed for assembling a demising wall to a floor panel.

ABSTRACT

An example apparatus is disclosed that may be a demising wall that may include two SIPS panels. Each of the SIPS panels may be configured to span between a floor and a ceiling of a building unit, and the two SIPS panels are spaced apart to define an interstitial space between the SIPS panels, wherein each of the SIPS panels includes an interior surface having a magnesium oxide board and an exterior surface having a fibre cement board. An example method is disclosed for assembling a demising wall to a floor panel.

PREFABRICATED DEMISING AND END WALLS

BACKGROUND

[001] Building design and construction is the last large industry in the world where the products (office buildings, shopping malls, apartments, etc.) are built by hand. The people who design the buildings (architects and engineers) are typically separate from the people who construct the buildings (contractors) for liability reasons. Architects do not want the liability of how the building is built, and conversely, contractors do not want the liability of how the building is drawn and engineered. Furthermore, buildings are constructed by people with specific trade skills, deployed in a linear sequence and buildings are typically built by hand outside in the elements. Therefore, conventional construction is more of a process than a product, resulting in a great deal of waste and inefficiency.

[002] The industry's response to improving efficiency has historically been modular construction. In the case of multi-housing (apartments, hotels, student dorms, etc.), entire units are built off-site in a factory and the modules are trucked to the job site. The modules are then stacked and connected. The modules are wood frame, using trades and built by hand similar to conventional in-field construction. They are used in low-rise construction (1 – 6 stories). This method of construction has been around for several decades, and there are a number of companies in this space.

[003] In contrast, some building technology may utilize prefabricated components instead of prefabricated modules. The components comprise a "kit of parts", and the parts may be prefabricated independent of one another and trucked to the job site for installation and connection.

SUMMARY

[004] Demising and end wall panels are prefabricated sub-assemblies. Each panel may be designed to meet or exceed all fire, energy, life-safety and other applicable building codes in all municipalities. Demising and end wall panels may be fully integrated sub-assemblies, meaning they may contain interior unit finishes; exterior weather barrier finishes; all flashing and insulation to meet or facilitate meeting thermal and moisture protection requirements; plumbing, fire protection, and electrical/data/communications infrastructure.

[005] Demising and end walls are two component parts and they may be designed to fit into an overall building solution. The demising and end walls may also be designed to meet or

exceed all applicable codes for mid-rise and high-rise construction, which includes residential multi-housing buildings eight stories and higher.

[006] The foregoing summary is illustrative only and is not intended to be in any way limiting. In addition to the illustrative aspects, embodiments, and features described above, further aspects, embodiments, and features will become apparent by reference to the drawings and the following detailed description.

BRIEF DESCRIPTION OF THE DRAWINGS

[007] The foregoing and other features of the present disclosure will become more fully apparent from the following description and appended claims, taken in conjunction with the accompanying drawings. Understanding that these drawings depict only several embodiments in accordance with the disclosure and are, therefore, not to be considered limiting of its scope, the disclosure will be described with additional specificity and detail through use of the accompanying drawings, in which:

[008] Figure 1 is a schematic illustration of an embodiment demising wall;

[009] Figure 2 is a schematic illustration of an embodiment demising wall interfacing with an embodiment floor and ceiling panel;

[010] Figure 3 is a schematic illustration of an embodiment demising wall interfacing with an embodiment window wall;

[011] Figure 4 is a schematic illustration of an embodiment demising wall interfacing with an embodiment window wall;

[012] Figure 5 is a schematic illustration of an embodiment demising wall interfacing with an embodiment entry door;

[013] Figure 6 is a schematic illustration of an embodiment demising wall interfacing with an embodiment utility wall panel;

[014] Figure 7 is a schematic illustration of an embodiment end wall;

[015] Figure 8 is a schematic illustration of an embodiment end wall interfacing with an embodiment floor and ceiling panel;

[016] Figure 9 is a schematic illustration of an embodiment end wall interfacing with an embodiment window wall; and

[017] Figure 10 is a schematic illustration of an embodiment end wall interfacing with an embodiment utility wall panel;

[018] all arranged in accordance with at least some embodiments of the present disclosure.

DETAILED DESCRIPTION

[019] In the following detailed description, reference is made to the accompanying drawings, which form a part hereof. In the drawings, similar symbols typically identify similar components, unless context dictates otherwise. The illustrative embodiments described in the detailed description, drawings, and claims are not meant to be limiting. Other embodiments may be utilized, and other changes may be made, without departing from the spirit or scope of the subject matter presented herein. It will be readily understood that the aspects of the present disclosure, as generally described herein, and illustrated in the Figures, can be arranged, substituted, combined, separated, and designed in a wide variety of different configurations, all of which are implicitly contemplated herein.

[020] The demising and end wall panels may be sub-assemblies that may solve and/or alleviate the following problems in mid-rise and high rise residential projects: (a) costly and time consuming in-field construction of end walls of a building and demising (or separation) walls between units; (b) providing acoustical separation between units; (c) waterproofing, energy and thermal separation from the outside; and (d) providing interior finishes for a portion of the living space. The demising and end wall panels may meet and/or contribute to meeting: fire protection and codes; acoustical rating for ambient noise transfer; energy rating; tolerances for connecting to other wall panels; thermal and moisture protection. It is to be understood that not all embodiments may solve and/or alleviate all, or even any, of the above-described problems, and the problems are provided to facilitate appreciation of aspects of some embodiments described herein.

[021] Demising and end wall panels may be fully integrated sub-assemblies that include 9'x22' structurally insulated panels (each with non-combustible fibre cement boards glued to an expanded polystyrene foam plastic core – called SIPS panels). Demising and end walls may each include two 9'x22' SIPS panels connected at the top and bottom with furring or "hat" channels. Assembly of these materials in this manner may create an interstitial space for distribution of plumbing, electrical, duct work, and/or other systems to service a building's residential and/or commercial units.

[022] The exterior of the end wall panel may include a weather-resistive barrier and/or a cladding panel system attached to the 4-7/8" SIPS panel. The interior of the end wall panel may contain a series of finish panels attached to a 2" SIPS panel.

[023] The demising wall may include two 2" SIPS panels, each with interior finishes on the outside and an interstitial space on the inside where the electrical, data/communications cabling, fire sprinkler pipe and insulation run.

[024] Demising and end wall sub-assemblies may be prefabricated off-site in a factory/shop and transported to the project jobsite for (a) attachment to a floor/ceiling system; (b) connection to window and utility walls; and/or (c) hook-up to building utilities. Demising and end wall panels are installed horizontally may rest on the topping slab poured in the field over the floor and ceiling panels. The demising wall may be designed to achieve a one hour fire rating required by the building code, and the end wall a two hour fire rating.

[025] Demising Wall SIPS Panel: In some embodiments, a demising wall panel may include the following materials, as shown in Figure 1: two interior 2" SIPS panels each with an expanded polystyrene foam core with one layer of 12mm magnesium oxide board on the inside and an 11mm fibre cement board on the outside that serves as the substrate for the interior finishes. The SIPS panels may both span a distance between a floor and a ceiling of a building unit. There may not be any studs – including any metal studs – between the SIPS panels. In this manner, the demising wall may provide a stud-free interior wall implementation, with interior finishes provided by way of the fibre cement board, and building code requirements being met by way of the magnesium oxide board.

[026] In some embodiments, the demising wall may interface with a floor and ceiling panel as shown in Figure 2. In some embodiments, a hat channel may be coupled to a concrete surface of the floor and ceiling panel. In some embodiments, the floor and ceiling panel already has fasteners, such as screws, installed on the floor panel before concrete is poured over the floor panel. The demising wall may include a sister hat channel that nests over the hat channel coupled to the floor when installed. Acoustical caulk may be applied between the demising wall and the floor. In some embodiments, a second hat channel may be coupled to a surface of the ceiling panel and the demising wall may include a second sister hat channel that nests over the second hat channel coupled to the ceiling. The second hat channel coupled to the ceiling panel may allow for flexibility at the interface of the ceiling and the demising wall as loads are applied to the floor and ceiling panels. For embodiment, the second sister hat channel may be deeper than the second hat channel coupled to the surface of the ceiling

panel. In this manner, a gap may be defined between the second sister hat channel and the second hat channel such that movement of the floor or ceiling panels may be accommodated by the flexibility offered by the gap. In some embodiments, fire caulk is applied at the interface of the ceiling and demising wall.

[027] In some embodiments, the demising wall may interface with a window wall as shown in Figures 3 and 4. In some embodiments, the demising wall may interface with an entry door as shown in Figure 5. In some embodiments, the demising wall may interface with a utility wall as shown in Figure. In some embodiments, the demising wall may have more than one interface.

[028] End Wall SIPS Panel: In some embodiments, an end wall panel may include the following materials, as shown in Figure 7: (a) an exterior 4-7/8" SIPS panel with a weather resistive barrier and cladding system; and (b) an interior 2" SIPS panel with an expanded polystyrene foam core with one layer of 12mm magnesium oxide board on the inside and an 11mm fibre cement board on the inside that serves as the substrate for the interior finishes.

[029] In some embodiments, the end wall may interface with a floor and ceiling panel as shown in Figure 8. In some embodiments, a hat channel may be coupled to a concrete surface of the floor and ceiling panel. In some embodiments, the floor and ceiling panel already has fasteners, such as screws, installed on the floor panel before concrete is poured over the floor panel. The end wall may include a sister hat channel that nests over the hat channel coupled to the floor when installed. In some embodiments, a second hat channel may be coupled to a surface of the ceiling panel and the end wall may include a second sister hat channel that nests over the second hat channel coupled to the ceiling. The second hat channel coupled to the ceiling panel may allow for flexibility at the interface of the ceiling and the end wall as loads are applied to the floor and ceiling panels.

[030] In some embodiments, the end wall may interface with a window wall as shown in Figure 9. In some embodiments, the end wall may interface with a utility wall as shown in Figure. In some embodiments, the end wall may have more than one interface.

[031] Embodiment demising and end walls may have several advantages, including: (a) they may be fully integrated with electrical, fire protection, plumbing, venting, and other building system capabilities; (b) they may have both interior and exterior finishes; (c) the end walls may have a complete weather barrier system that is double-redundant; (d) they may be fully insulated for energy and sound; and (e) they may meet all fire, energy and life/safety building codes. It is to be understood that not all embodiments of demising and end walls may have

all, or even any of the described advantages, which are provided to facilitate appreciation of some aspects described herein.

[032] The present disclosure is not to be limited in terms of the particular embodiments described in this application, which are intended as illustrations of various aspects. Many modifications and embodiments can be made without departing from its spirit and scope, as will be apparent to those skilled in the art. Functionally equivalent methods and apparatuses within the scope of the disclosure, in addition to those enumerated herein, will be apparent to those skilled in the art from the foregoing descriptions. Such modifications and embodiments are intended to fall within the scope of the appended claims. The present disclosure is to be limited only by the terms of the appended claims, along with the full scope of equivalents to which such claims are entitled. It is to be understood that this disclosure is not limited to particular methods, reagents, compounds compositions or biological systems, which can, of course, vary. It is also to be understood that the terminology used herein is for the purpose of describing particular embodiments only, and is not intended to be limiting.

[033] With respect to the use of substantially any plural and/or singular terms herein, those having skill in the art can translate from the plural to the singular and/or from the singular to the plural as is appropriate to the context and/or application. The various singular/plural permutations may be expressly set forth herein for sake of clarity.

[034] It will be understood by those within the art that, in general, terms used herein, and especially in the appended claims (e.g., bodies of the appended claims) are generally intended as "open" terms (e.g., the term "including" should be interpreted as "including but not limited to," the term "having" should be interpreted as "having at least," the term "includes" should be interpreted as "includes but is not limited to," etc.).

[035] It will be further understood by those within the art that if a specific number of an introduced claim recitation is intended, such an intent will be explicitly recited in the claim, and in the absence of such recitation no such intent is present. For embodiment, as an aid to understanding, the following appended claims may contain usage of the introductory phrases "at least one" and "one or more" to introduce claim recitations. However, the use of such phrases should not be construed to imply that the introduction of a claim recitation by the indefinite articles "a" or "an" limits any particular claim containing such introduced claim recitation to embodiments containing only one such recitation, even when the same claim includes the introductory phrases "one or more" or "at least one" and indefinite articles such as "a" or "an" (e.g., "a" and/or "an" should be interpreted to mean "at least one" or "one or

more"); the same holds true for the use of definite articles used to introduce claim recitations. In addition, even if a specific number of an introduced claim recitation is explicitly recited, those skilled in the art will recognize that such recitation should be interpreted to mean at least the recited number (e.g., the bare recitation of "two recitations," without other modifiers, means at least two recitations, or two or more recitations).

[036] Furthermore, in those instances where a convention analogous to "at least one of A, B, and C, etc." is used, in general such a construction is intended in the sense one having skill in the art would understand the convention (e.g., "a system having at least one of A, B, and C" would include but not be limited to systems that have A alone, B alone, C alone, A and B together, A and C together, B and C together, and/or A, B, and C together, etc.). In those instances where a convention analogous to "at least one of A, B, or C, etc." is used, in general such a construction is intended in the sense one having skill in the art would understand the convention (e.g., "a system having at least one of A, B, or C" would include but not be limited to systems that have A alone, B alone, C alone, A and B together, A and C together, B and C together, and/or A, B, and C together, etc.). It will be further understood by those within the art that virtually any disjunctive word and/or phrase presenting two or more alternative terms, whether in the description, claims, or drawings, should be understood to contemplate the possibilities of including one of the terms, either of the terms, or both terms. For embodiment, the phrase "A or B" will be understood to include the possibilities of "A" or "B" or "A and B."

[037] In addition, where features or aspects of the disclosure are described in terms of Markush groups, those skilled in the art will recognize that the disclosure is also thereby described in terms of any individual member or subgroup of members of the Markush group.

[038] As will be understood by one skilled in the art, for any and all purposes, such as in terms of providing a written description, all ranges disclosed herein also encompass any and all possible subranges and combinations of subranges thereof. Any listed range can be easily recognized as sufficiently describing and enabling the same range being broken down into at least equal halves, thirds, quarters, fifths, tenths, etc. As a non-limiting embodiment, each range discussed herein can be readily broken down into a lower third, middle third and upper third, etc. As will also be understood by one skilled in the art all language such as "up to," "at least," "greater than," "less than," and the like include the number recited and refer to ranges which can be subsequently broken down into subranges as discussed above. Finally, as will be understood by one skilled in the art, a range includes each individual member.

Thus, for embodiment, a group having 1-3 items refers to groups having 1, 2, or 3 items. Similarly, a group having 1-5 items refers to groups having 1, 2, 3, 4, or 5 items, and so forth.

[039] The herein described subject matter sometimes illustrates different components contained within, or connected with, different other components. It is to be understood that such depicted architectures are merely embodiments, and that in fact many other architectures can be implemented which achieve the same functionality. In a conceptual sense, any arrangement of components to achieve the same functionality is effectively "associated" such that the desired functionality is achieved. Hence, any two components herein combined to achieve a particular functionality can be seen as "associated with" each other such that the desired functionality is achieved, irrespective of architectures or intermedial components. Likewise, any two components so associated can also be viewed as being "operably connected", or "operably coupled", to each other to achieve the desired functionality, and any two components capable of being so associated can also be viewed as being "operably couplable", to each other to achieve the desired functionality. Specific embodiments of operably couplable include but are not limited to physically mateable and/or physically interacting components and/or wirelessly interactable and/or wirelessly interacting components and/or logically interacting and/or logically interactable components.

[040] While various aspects and embodiments have been disclosed herein, other aspects and embodiments will be apparent to those skilled in the art. The various aspects and embodiments disclosed herein are for purposes of illustration and are not intended to be limiting, with the true scope and spirit being indicated by the following claims.

EMBODIMENT CLAIMS

What is claimed is:

1. A demising wall comprising:

two SIPS panels, each of the SIPS panels configured to span between a floor and a ceiling of a building unit, the two SIPS panels spaced apart to define an interstitial space between the SIPS panels;

wherein each of the SIPS panels includes an interior surface having a magnesium oxide board and an exterior surface having a fibre cement board.

2. The demising wall of claim 1, further comprising a hat channel coupled between the two SIPS panels, wherein the hat channel is configured to maintain the interstitial space.

3. A method of assembling a demising wall to a floor panel, the method comprising:

providing a floor panel having a first hat channel affixed to the floor panel at a desired location of the demising wall;

placing the demising wall having a second hat channel on the floor panel such that the first and second hat channels nest, providing alignment between the floor panel and the demising wall.

4. The method of claim 3, further comprising:

providing a ceiling panel having a third hat channel affixed to the ceiling panel at the desired location of the demising wall;

nesting the third hat channel into a fourth hat channel, wherein the fourth hat channel is coupled to a ceiling end of the demising wall; and

wherein the fourth hat channel is deeper than the third hat channel, such that a gap is defined between the third and fourth hat channels in a nested position.

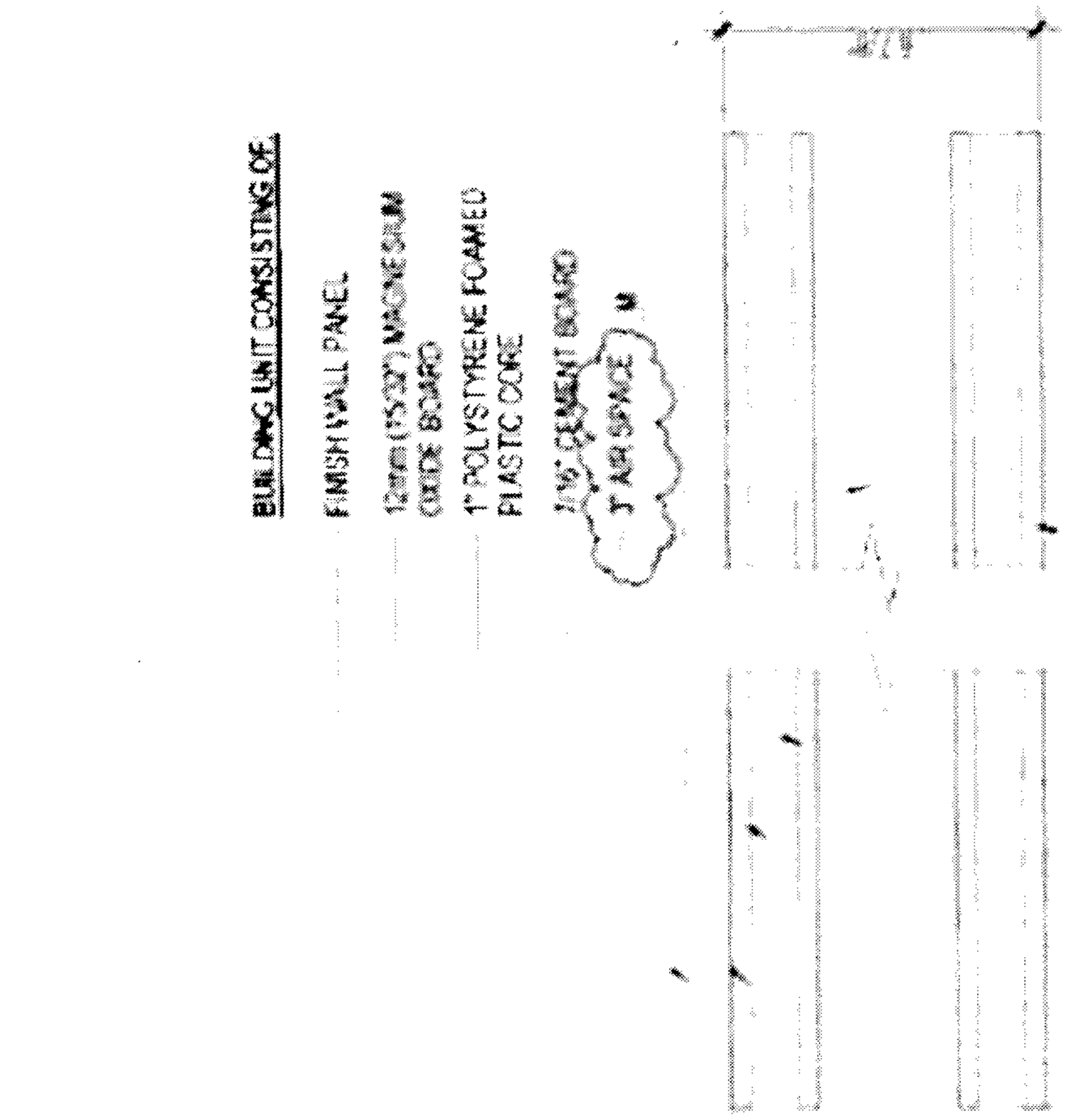

BUILDING UNIT CONSISTING OF
FINISH WALL PANEL
12mm (FSC) MAGNESIUM OXIDE BOARD
1" POLYSTYRENE FOAMED PLASTIC CORE
1/2" CEMENT BOARD
1" AIR SPACE
BUILDING UNIT

Figure 1

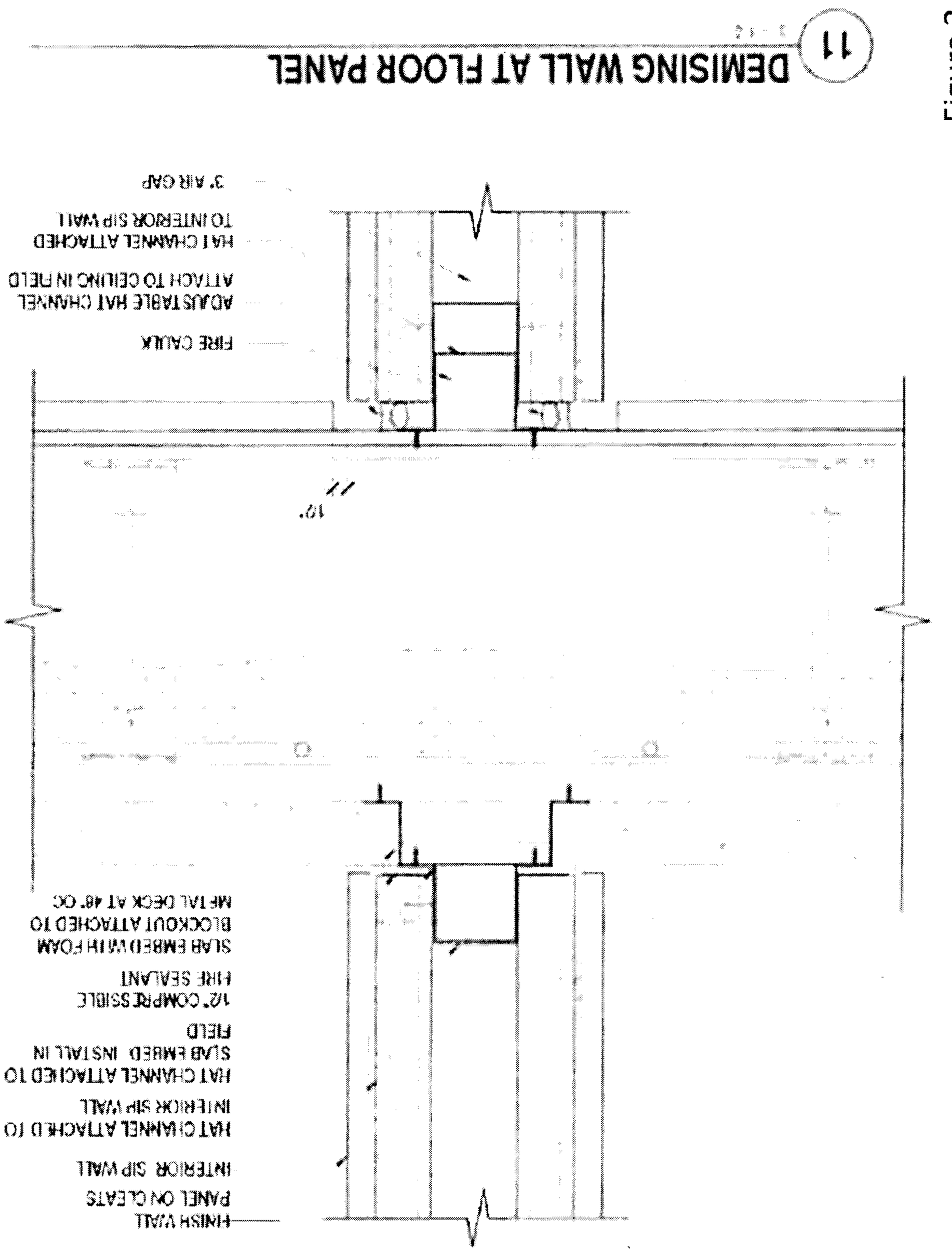
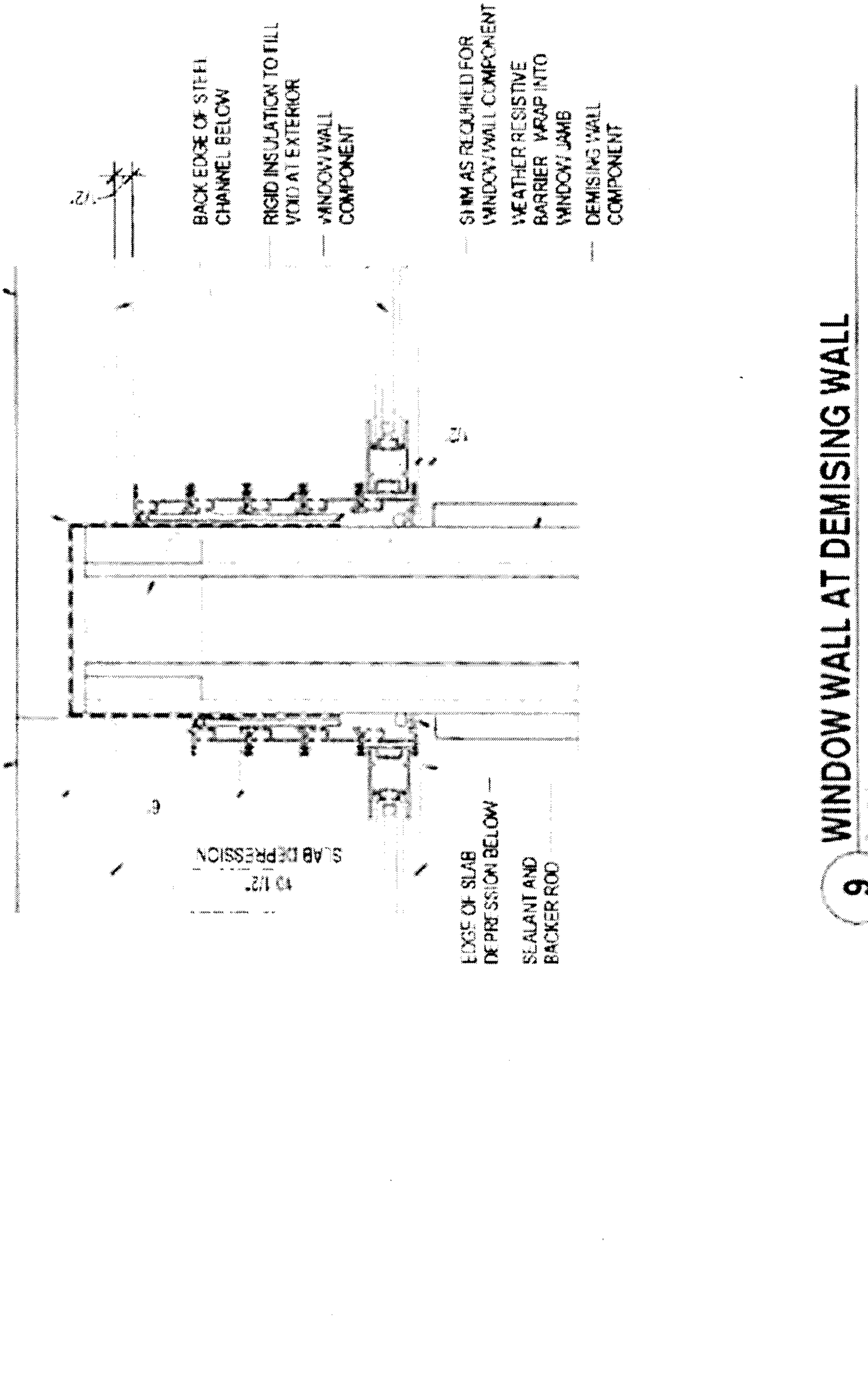
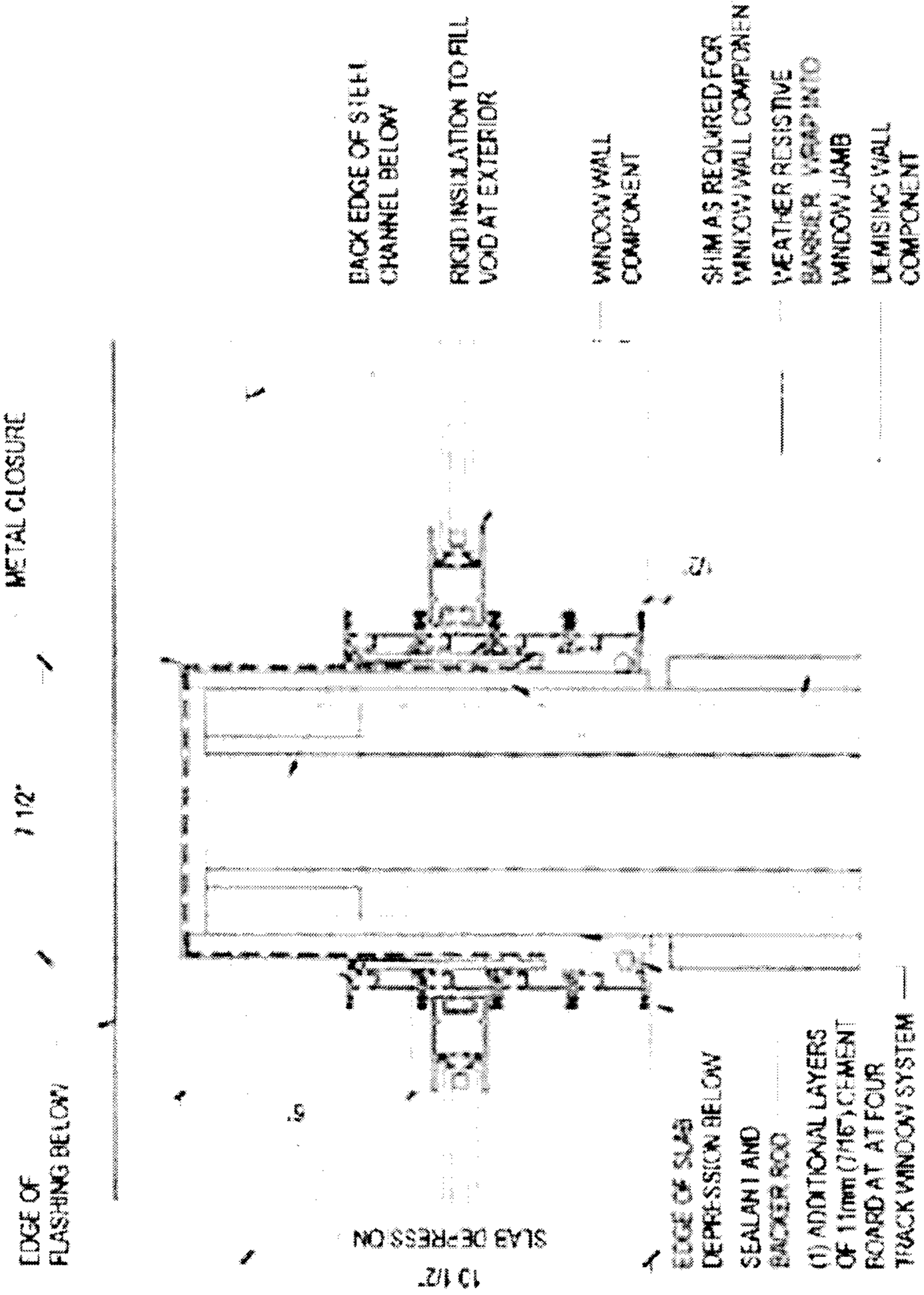

11
DEMISING WALL AT FLOOR PANEL
3" AIR GAP
HAT CHANNEL ATTACHED TO INTERIOR SIP WALL
ATTACH TO CEILING IN FIELD
ADJUSTABLE HAT CHANNEL
FIRE CAULK
10'
SLAB EMBED WITH FOAM BLOCKOUT ATTACHED TO METAL DECK AT 48" OC
FIRE SEALANT
1/2" COMPRESSIBLE FIELD
SLAB EMBED INSTALL IN
HAT CHANNEL ATTACHED TO INTERIOR SIP WALL
HAT CHANNEL ATTACHED TO INTERIOR SIP WALL
PANEL ON CLEATS
FINISH WALL

Figure 2

Figure 3



9 WINDOW WALL AT DEMISING WALL



6 WINDOW WALL AT DEMISING WALL

Figure 4

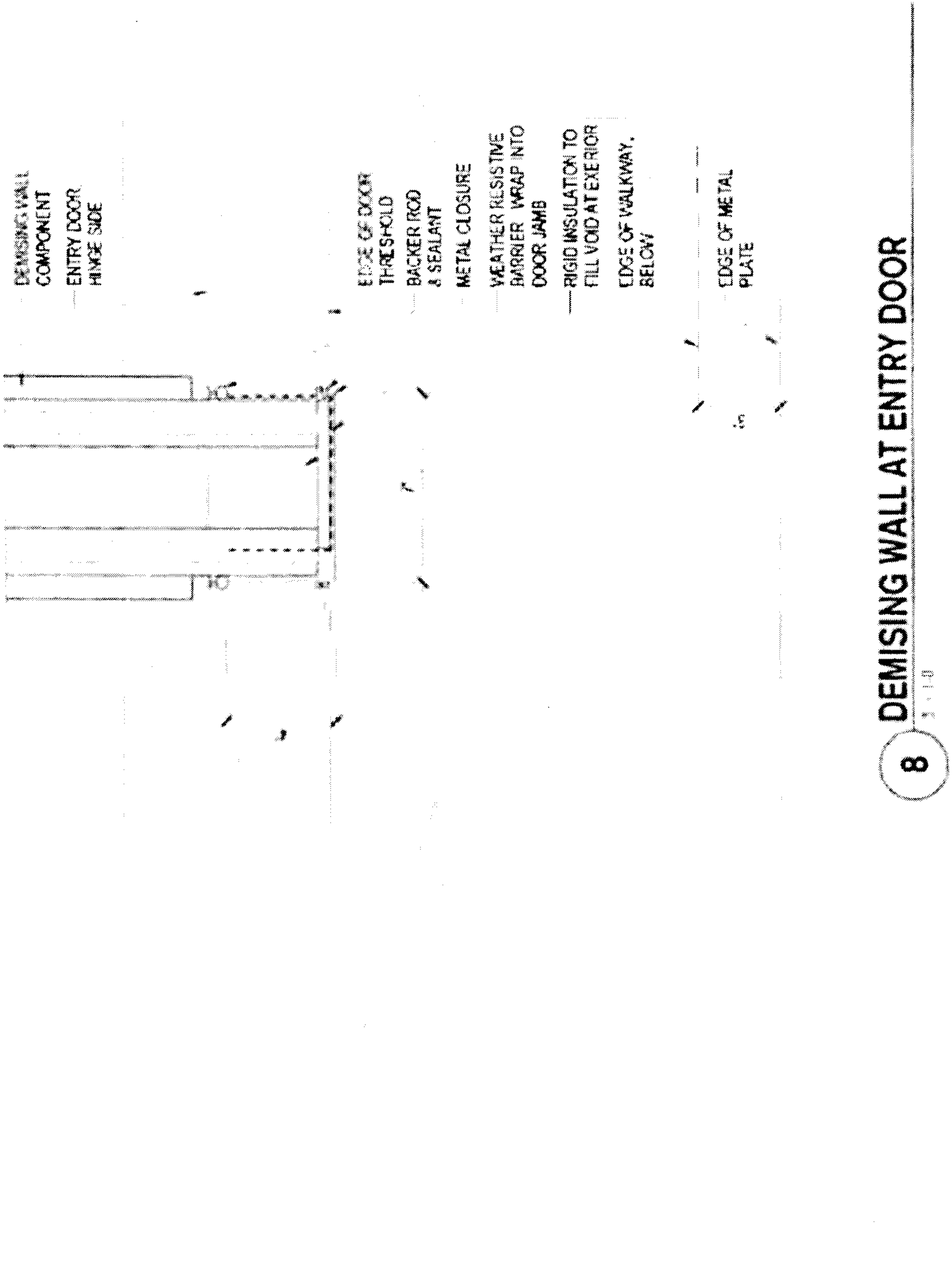

DEMISING WALL COMPONENT
ENTRY DOOR HINGE SIDE
EDGE OF DOOR THRESHOLD
BACKER ROD & SEALANT
METAL CLOSURE
WEATHER RESISTIVE BARRIER WRAP INTO DOOR JAMB
RIGID INSULATION TO FILL VOID AT EXERIOR
EDGE OF WALKWAY, BELOW
EDGE OF METAL PLATE
8
DEMISING WALL AT ENTRY DOOR

Figure 5

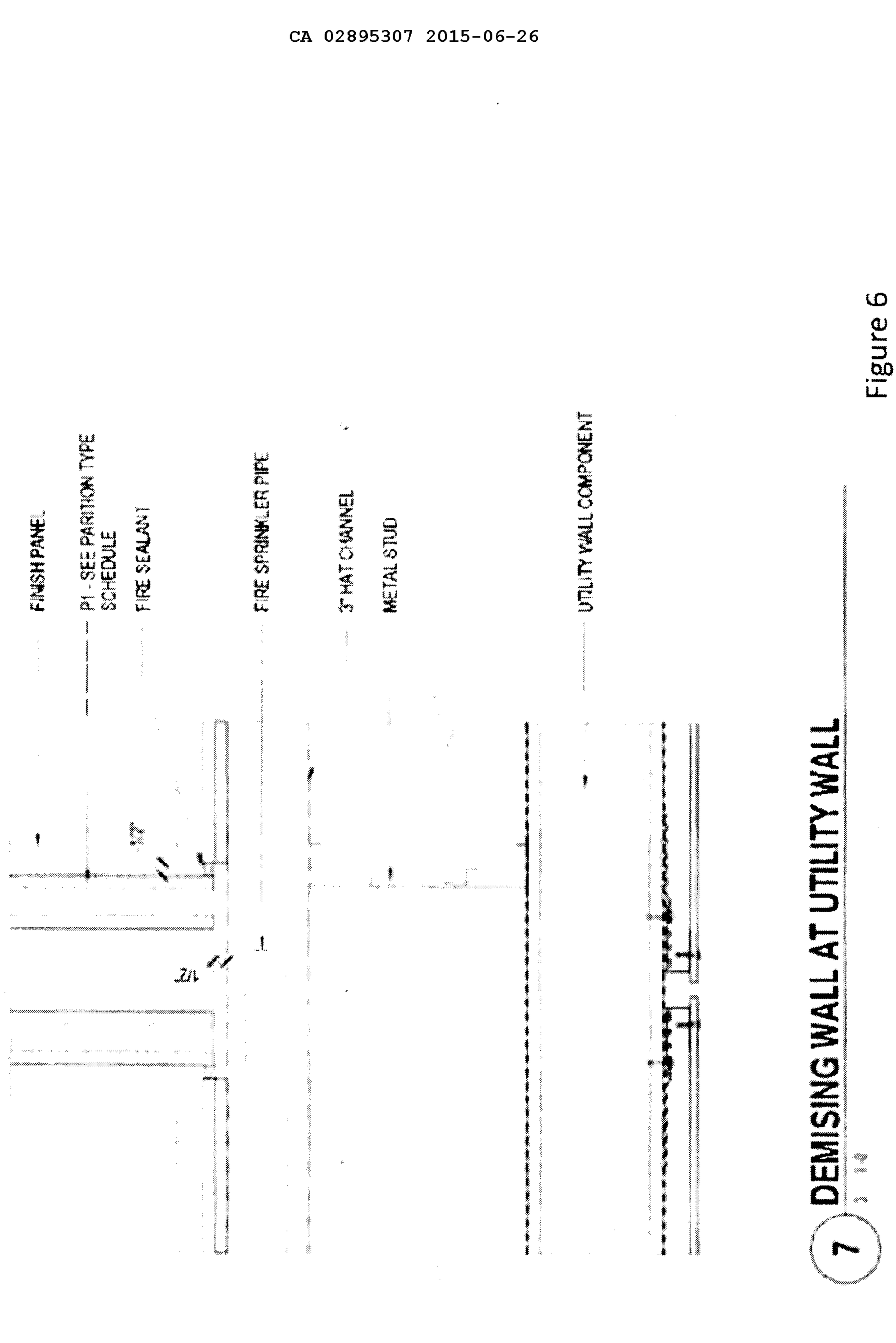

7
1 1/4" = 1'-0"
DEMISING WALL AT UTILITY WALL
FINISH PANEL
P1 - SEE PARTITION TYPE SCHEDULE
FIRE SEALANT
FIRE SPRINKLER PIPE
3" HAT CHANNEL
METAL STUD
UTILITY WALL COMPONENT

Figure 6

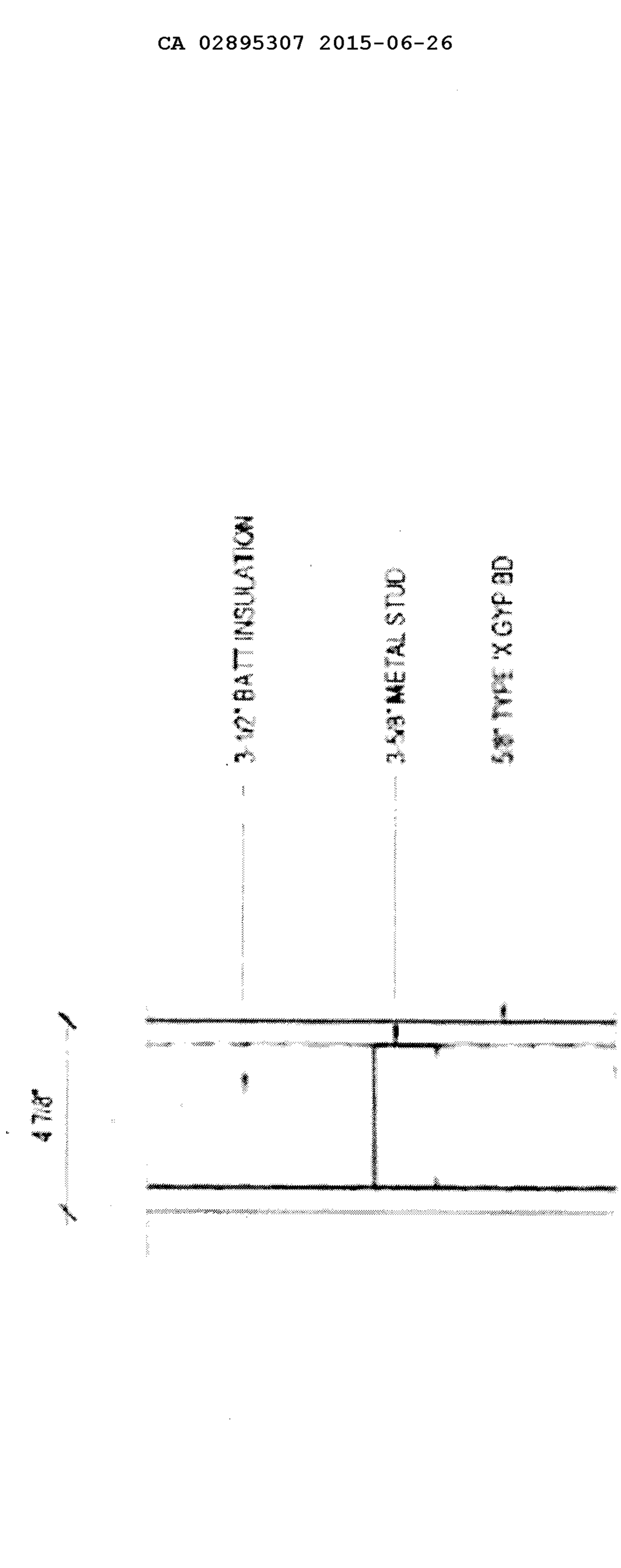
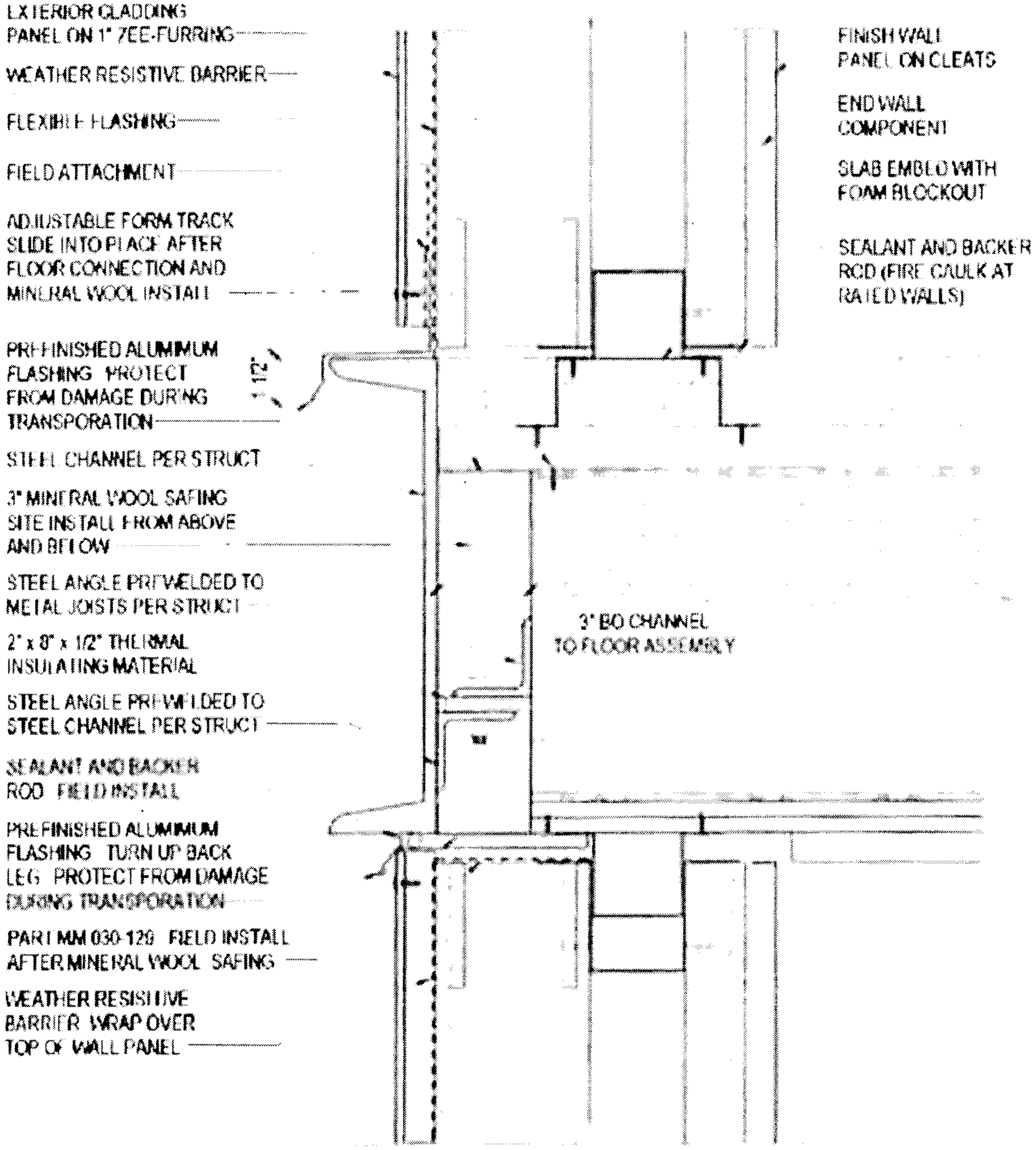


Figure 7



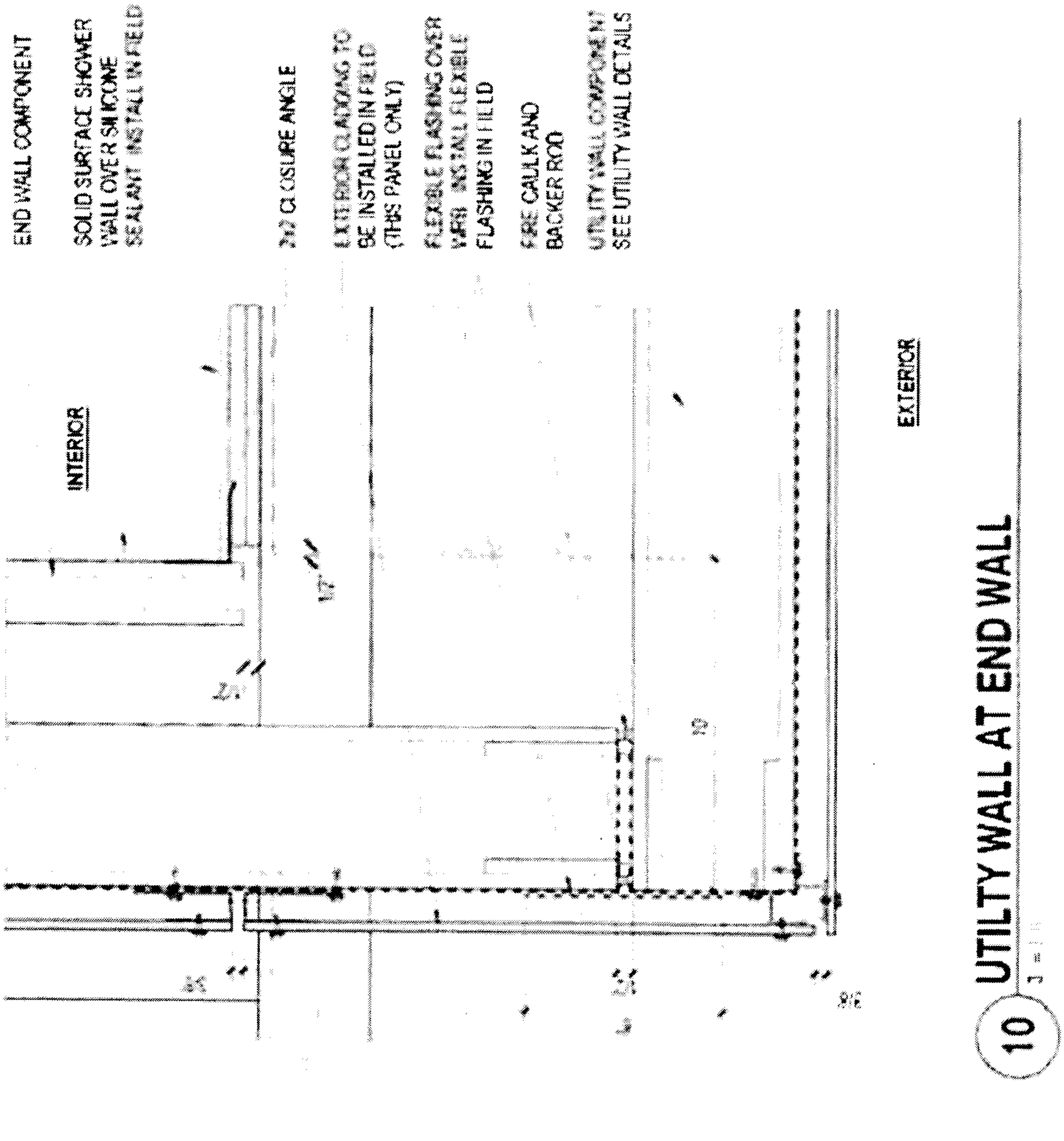
5 **END WALL AT FLOOR PANEL**

Figure 8

Figure 9

12 WINDOW WALL AT END WALL

3" = 1'-0"



10 UTILTY WALL AT END WALL

Figure 10

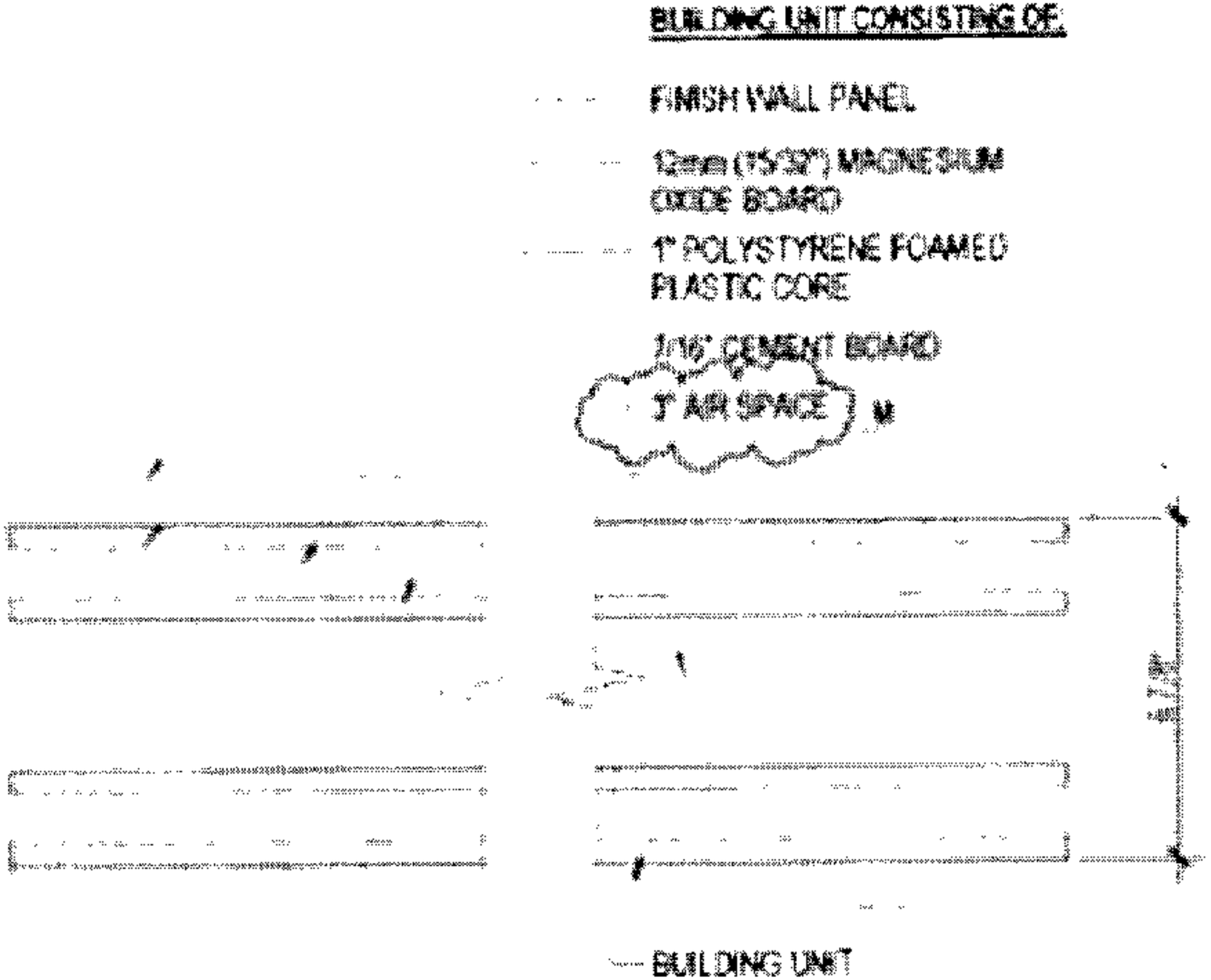

BUILDING UNIT CONSISTING OF:
FINISH WALL PANEL
1/2" POLYSTYRENE FOAMED PLASTIC CORE
1/16" CEMENT BOARD
1" AIR SPACE
BUILDING UNIT

Figure 1