Development Services

From Concept to Construction

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APPEAL SUMMARY

Status: Decision Rendered

Appeal ID: 19049	**Project Address:** 1470 NW Overton St
Hearing Date: 2/20/19	**Appellant Name:** Tom Jaleski
Case No.: B-018	**Appellant Phone:** 503-488-5651
Appeal Type: Building	**Plans Examiner/Inspector:** Steven Mortensen
Project Type: commercial	**Stories:** 7 **Occupancy:** B, R-2, S-1, S-2 **Construction Type:** I-A, III-B
Building/Business Name: Overton 15	**Fire Sprinklers:** Yes - Throughout
Appeal Involves: Erection of a new structure	**LUR or Permit Application No.:** 17-176535-CO
Plan Submitted Option: pdf [File 1] [File 2] [File 3] [File 4] [File 5] [File 6] [File 7]	**Proposed use:** Residential

APPEAL INFORMATION SHEET

Appeal item 1

Code Section	703.2
Requires	The fire-resistance rating of building elements, components or assemblies shall be determined in accordance with the test procedures set forth in ASTM E 119 or UL 263 or in accordance with Section 703.3. Where materials, systems or devices that have not been tested as part of a fire-resistance-rated assembly are incorporated into the building element, component or assembly, sufficient data shall be made available to the building official to show that the required fire-resistance rating is not reduced. Materials and methods of construction used to protect joints and penetrations in fire-resistance-rated building elements, components or assemblies shall not reduce the required fire-resistance rating.
Proposed Design	Vallaster Corl Architects are overseeing construction of a new 7-story residential building in Portland, Oregon. The project includes 5-stories of Type III-B construction over 2 stories of Type IA construction. Members of horizontal assemblies in Type IA construction that have direct connections to columns are considered primary structural members per §202 of the 2014 OSSC. Primary structural members are required to be 3-hour fire rated per Table 601. §704.3 allows protection to either be through individual encasement or membrane protection for structural members when not supporting a load bearing wall. The proposed design provides two levels of protection: (1) encasement protection per UL N307 that is installed inside a (2) 2-hour fire rated membrane cavity per UL D503. As an alternate design, the project would like to request the flexibility to provide encasement protection to the structural beam per the 3-hour fire rated UL N307 (assembly details attached, further analysis in attached engineering judgement letter) or per the 3-hour fire rated UL N309

(assembly details attached, comparable to UL N307 except N309 uses mineral wool batts and blankets instead of mineral wool boards).

Reason for alternative The proposed design is compared to a 3-hour fire rated restrained beam in the attached engineering judgement letter (EJ), per UL N307, to achieve the required minimum fire-resistance. However, the proposed steel beam (W16x26) is smaller than the tested steel beam (W8x28), and the proposed encapsulating mineral boards (Rockwool Comforboard) are different than the ones used in the tested assembly (Albi Dri-Clad)—hence the request of this appeal.

The proposed design has been reviewed and analyzed in the attached EJ letter—stamped by an Oregon registered fire protection engineer. The proposed protection of the structural beam includes two levels of protection, encasement protection per UL N307 (3-hour fire rating) installed inside a 2-hour fire rated membrane cavity per UL D503. Although the proposed beam is smaller than the UL N307 tested beam, the beam size does not play an active role in the fire rating of the proposed design (see Sections 5 and 6 in the attached EJ letter).

Additionally, the proposed mineral boards are greater in thickness and density than the tested boards used to achieve a 3-hour fire rating in UL N307—while other components of the proposed design provide equivalent or greater protection (Table 1 of the attached EJ letter). The proposed design will comply with the minimum required 3-hour fire-resistance per Table 601 of the 2014 OSSC, for protection of a primary structural member in Type IA construction.

Based on the analysis provided in the attached EJ letter and the conservative justification that the proposed design will provide at minimum equivalent protection to the tested 3-hour fire rated beam, UL N307, we urge you to grant this appeal.

APPEAL DECISION

Alternate 3 hour fire rated beam assembly with engineering analysis: Granted as proposed.

The Administrative Appeal Board finds that the information submitted by the appellant demonstrates that the approved modifications or alternate methods are consistent with the intent of the code; do not lessen health, safety, accessibility, life, fire safety or structural requirements; and that special conditions unique to this project make strict application of those code sections impractical.

Pursuant to City Code Chapter 24.10, you may appeal this decision to the Building Code Board of Appeal within 180 calendar days of the date this decision is published. For information on the appeals process and costs, including forms, appeal fee, payment methods and fee waivers, go to www.portlandoregon.gov/bds/appealsinfo, call (503) 823-7300 or come in to the Development Services Center.

Overton-15, 3-hour Beam Assembly

Engineering Judgement Report

Client Name: Vallaster Corl Architects

Client Address: 711 SW Alder St, Portland, OR 97205

Date: 2/15/2019

Table of Contents

1 PROJECT OVERVIEW

Vallaster Corl Architects are designing a new 7-story residential building in Portland, Oregon. The project includes 5-stories of Type IIIB construction over 2 stories of Type IA construction. The building is protected by an automatic fire sprinkler system and fire alarm system throughout.

Structural members of Type IA construction that have direct connections to columns are considered primary structural members per §202 of the 2014 Oregon Structural Specialty Code. Primary structural members are required to be 3-hour fire rated per Table 601. §704.3 allows protection to either be through individual encasement or membrane protection for structural members when not supporting a load bearing wall. The proposed design provides two levels of protection: (1) encasement protection per UL N307 that is installed inside a (2) 2-hour fire rated membrane cavity per UL D503.

Code Unlimited has been asked to provide analysis of the proposed design to ensure it will provide the required fire-resistance.

2 APPLICABLE CODES, STANDARDS, AND GUIDES

- 2014 Oregon Structural Specialty Code (OSSC), including the recently adopted Appendix N which references the International Fire Code.

3 DISCUSSION

3.1 Approach

- The proposed beam assembly has been analyzed in accordance with 2014 OSSC §703.3 **Alternative Methods for Determining Fire Resistance**.
- The proposed beam will be protected by encapsulation per UL N307 and installed in the UL D503 membrane cavity.
- Fire-resistance of the assembly is analyzed to ensure a minimum 3-hour fire rating is provided using published fire test data and acceptable fire science principles. The structural beam protection is compared to the 3-hour restrained beam UL N307 to provide analysis for equivalent protection.

4 PROPOSED DESIGN

The proposed design consists of 4-½" minimum (6" to bottom of steel pan) normal-weight concrete, fluted steel floor units, 1" of 4 lbs/ft^3 (pcf) mineral wool insulation to fill voids at open flutes, W16x26 steel beam encased by 2" mineral wool boards-11 pcf connected to 1-½" thick mineral wool noggings cut to friction fit between beam flanges, and 1 layer of 5/8" thick Type C gypsum wallboard (GWB) at the base of the assembly (Figure 1). The proposed design supports only one floor and no walls. The proposed assembly provides continuous horizontal protection to vertical connections. The proposed design is installed to provide protection per the tested assembly UL N307—which provides around 3-hours of fire-resistance. Additionally, as a conservative measure, the encasement protection is coupled with the 2-hour membrane protection of UL D503 required for the floor rating.

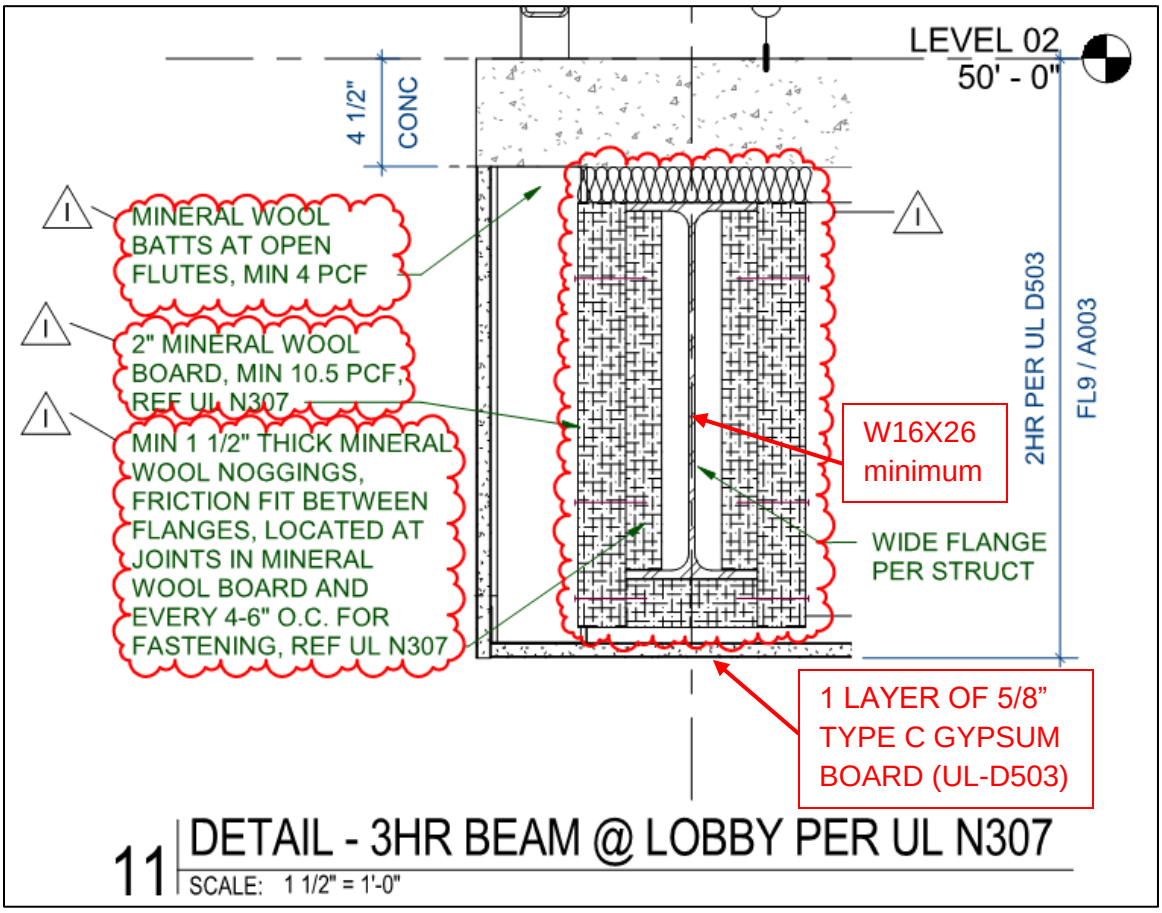


Figure 1: 3-hour fire-rated proposed beam assembly.

5 ASSEMBLY ANALYSIS

5.1 ASTM E119 Criteria

The proposed assembly is required to provide protection for primary structural members. Protection is based on maintaining the criteria for testing fire rating of unrestrained beams established in ASTM E119 for a minimum of 3 hours. The criteria for support beams is that the temperature of steel members shall not exceed 1300 ºF (704 ºC) at any single point nor an average temperature of 1100 ºF (593 ºC).

5.2 W/D Comparison of Proposed Beam and UL N307

Different sized beams are compared against each other through a factor referred to as the W/D Ratio. The weight per unit length of a member (W) is divided by the length of the exposed heated perimeter (D) to determine the inherent fire-resistance of a member. Lower W/D ratios correspond with thinner steel members and indicate less inherent fire-resistance than that of beams with higher W/D ratios.

W SHAPES continued…

METRIC					IMPERIAL				
	Column		Beam			Column		Beam	
SIZE (mm x kg/m)	M/D	Heated Perimeter (m)	M/D	Heated Perimeter (m)	SIZE (in. x lb./ft.)	W/D	Heated Perimeter (in.)	W/D	Heated Perimeter (in.)
W 460 x 68	44.7	1.52	51.1	1.36	W 18 x 46	0.786	58.5	0.876	52.4
x 67	40.6	1.65	46.7	1.46	-	-	-	-	-
x 61	37.1	1.64	42.0	1.45	-	-	-	-	-
x 60	39.7	1.51	44.8	1.35	x 40	0.688	58.1	0.768	52.1
x 52	34.8	1.49	39.5	1.34	x 35	0.602	58.1	0.672	52.1
W 410 x 149	78.8	1.89	94.5	1.63	W 16 x 100	1.37	73.1	1.59	62.7
x 132	70.2	1.88	84.5	1.61	x 89	1.22	72.8	1.43	62.4
x 114	61.2	1.86	74.1	1.60	x 77	1.07	71.9	1.25	61.6
x 100	54.0	1.85	65.0	1.59	x 67	0.936	71.6	1.09	61.4
x 85	55.1	1.54	63.6	1.36	x 57	0.963	59.2	1.09	52.1
x 74	48.3	1.53	56.6	1.35	x 50	0.846	59.1	0.962	52.0
x 67	44.0	1.52	51.2	1.34	x 45	0.767	58.7	0.870	51.7
x 60	39.7	1.51	45.4	1.33	x 40	0.686	58.3	0.780	51.3
x 54	36.0	1.50	41.1	1.32	x 36	0.617	58.3	0.702	51.3
x 46	34.0	1.35	38.8	1.21	x 31	0.592	52.4	0.681	46.9
x 39	28.8	1.35	33.1	1.21	x 26	0.499	52.1	0.558	46.6

W SHAPES continued…

METRIC					IMPERIAL				
	Column		Beam			Column		Beam	
SIZE (mm x kg/m)	M/D	Heated Perimeter (m)	M/D	Heated Perimeter (m)	SIZE (in. x lb./ft.)	W/D	Heated Perimeter (in.)	W/D	Heated Perimeter (in.)
W 200 x 42	40.0	1.06	47.6	0.894	W 8 x 28	0.688	40.7	0.819	34.2

Figure 2: W/D ratios of proposed structural beam and UL N307 beam.

The W/D ratio of the proposed beam is 0.558, and the W/D ratio of the UL N307 test beam is 0.819 (Figure 2). The proposed beam's W/D ratio is ~30% less than the tested standard. However, the structural beam size is not actively contributing to the fire rating of the proposed design. The beam is protected by the insulation of the encasement protection and the heat dissipation by the membrane protection. Therefore, the smaller beam size is not applicable in fire rating of the proposed design.

5.3 Fire-Resistance Analysis

§704.3 allows rated membrane protection for primary structure, other than columns, that do not support more than two floors or one floor and roof or support a load-bearing walls or a nonload-bearing wall more than two stories high. The proposed beam supports a single floor level only and no walls.

UL N307 is a 3-hour rated assembly where a restrained structural beam is protected by encasement with mineral wool and fiber boards. The UL test details adequate protection such that the structural beam does not reach an average temperature of 1100 ºF (593 ºC) or 1300 ºF (704 ºC) at any point for 3 hours given the installation per UL N307.

The membrane protection of the proposed structural beam provides 2-hour fire-resistance as tested in UL D503. The proposed structural beam, including the proposed membrane protection and encasement protection provided by the mineral wool boards, is compared below in Table 1 to the 3-hour fire rated restrained beam, UL N307 (Figure 3), to ensure at minimum equivalent protection is provided.

Design No. N307

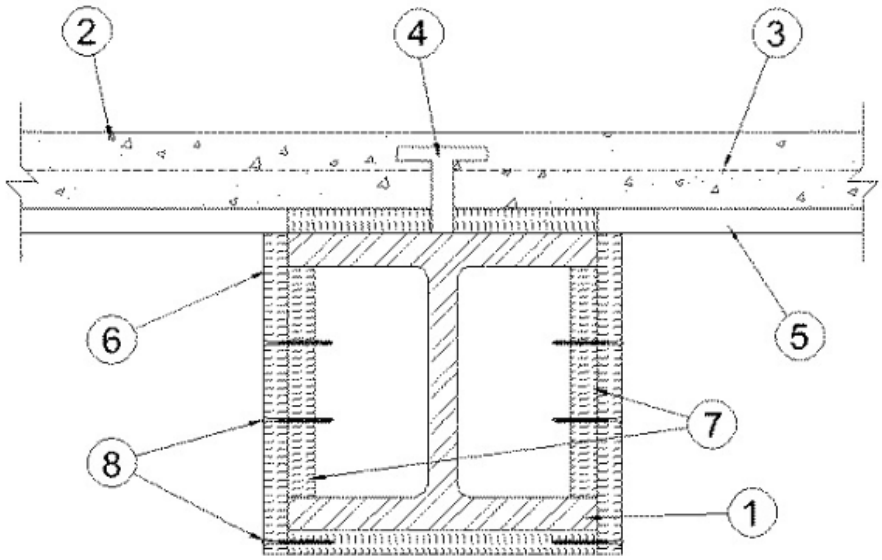
February 07, 2003

Restrained Beam Ratings — 1, 1-1/2, 2, or 3 Hr (See Item 6)

Unrestrained Beam Ratings — 1, 1-1/2 & 2 Hr (See Item 6)

This design was evaluated using a load design method other than the Limit States Design Method (e.g., Working Stress Design Method). For jurisdictions employing the Limit States Design Method, such as Canada, a load restriction factor shall be used — See Guide BXUV or BXUV7

*** Indicates such products shall bear the UL or cUL Certification Mark for jurisdictions employing the UL or cUL Certification (such as Canada), respectively.**



1. **Beam —** W8x28, min size.

2. **Normal Weight or Lightweight Concrete —** Normal weight concrete, carbonate or siliceous aggregate, 150 (+ or -) 3 pcf unit weight, 4500 psi compressive strength. Lightweight concrete, expanded shale, clay or slate aggregate by Rotary-Kiln method, 120 (+ or -) 3 pcf unit weight, 4500 psi compressive strength, vibrated.

3. **Welded Wire Fabric —** 6 by 6 in., No. 10/10 SWG.

4. **Shear Connectors —** (Optional) — Studs, 3/4 in. diam by 3-3/8 in. long, headed type or equivalent per AISC specification. Welded to top flange of beam through the deck.

5. **Steel Floor and Form Units* —** Composite or noncomposite 1-1/2 in. deep fluted types min No. 22 MSG welded to beam.

6. **Mineral and Fiber Boards —** Boards cut in various widths to be compatible with the size of beam being protected. Boards placed parallel with the flange of the beams are cut the width of the flange. Boards placed parallel with the web of the beams are cut the width of the beam (web side) plus twice the board thickness. The voids created by the flutes above the beam to be filled with mineral wool batts having a nom density of 4 lb per cu ft.

Restrained Beam Ratings, Hr	Min. Thickness, In.
1	3/4
1-1/2	3/4
2	3/4
3	1-5/8

Unrestrained Beam Rating Hr	Min Thkns In.
1	3/4
1-1/2	3/4
2	1-5/8

ALBI MFG, DIV OF STANCHEM INC — Type Dri-Clad

7. **Noggings —** Min 1-1/2 in. thick, pieces of mineral and fiber board (See Item 6). Cut to friction fit between beam flanges; located at horizontal butted joints of adjacent mineral and fiber board sections (Item 6) on the web sides of the beam.

8. **Fasteners —** The boards are fastened to the noggings and to each other by means of spiral screw type fasteners, spaced a max of 4-6 in. OC. The fasteners are installed on both sides of horizontal joints.

* **Indicates such products shall bear the UL or cUL Certification Mark for jurisdictions employing the UL or cUL Certification (such as Canada), respectively.**

Figure 3: UL N307.

Table 1: Comparison between Tested and Proposed beam assembly

Element	UL Assembly Design No. N307 (Figure 3)	Proposed Assembly (Figure 1)
1. Beam	Steel Beam: W8x28 minimum W/D = 0.819.	Steel Beam: W16x26 minimum W/D = 0.558 **(See Sections 5.2 and 6)**
2. Concrete type	Normal weight concrete, carbonate or siliceous aggregate, 150 (+ or -) 3 pcf unit weight, 4500 psi compressive strength. OR Lightweight concrete, expanded shale, clay or slate aggregate by Rotary-Kiln method, 120 (+ or -) 3 pcf unit weight, 4500 psi compressive strength, vibrated.	**Normal Weight Concrete (per UL D503)** — Normal weight concrete, carbonate or siliceous aggregate, 152 ± 3 pcf unit weight, 4000 psi compressive strength. Concrete thickness above top of steel floor units is required to be 2-½" minimum for 2-hour assembly ratings. The proposed design provides a minimum concrete thickness of **4-½".** **(Exceeds minimum)**
3. Welded Wire Fabric	6 by 6 in., No. 10/10 SWG.	Not applicable to fire rating.
4. Shear Connectors (Optional)	Studs, 3/4 in. diam by 3-3/8 in. long, headed type or equivalent per AISC specification. Welded to top flange of beam through the deck.	Not applicable to fire rating.
5. Steel Floor and Form Units	Composite or noncomposite 1-1/2 in. deep fluted types min No. 22 MSG welded to beam.	**(Per UL D503)** Min. 2 in. deep, min. 20-gauge galv fluted steel floor units welded to supports. Welds spaced 12 in. OC. Supports spaced max. 10 ft OC. **(Exceeds minimum)**

Element	UL Assembly Design No. N307 (Figure 3)	Proposed Assembly (Figure 1)
6. Mineral and Fiber Boards (Encasement)	**1-5/8" thick boards** cut in various widths to be compatible with the size of beam being protected. Boards placed parallel with the flange of the beams are cut the width of the flange. Boards placed parallel with the web of the beams are cut the width of the beam (web side) plus twice the board thickness. The voids created by the flutes above the beam to be filled with **mineral wool batts having a nom density of 4 pcf**. The UL tested Albi Dri-Clad mineral board, **1-5/8" thick for the 3-hour rating**, which has a **density of 10.5 pcf**.	**2" thick mineral wool boards** cut in widths to be compatible with the size of beam being protected. Boards placed parallel with the flange of the beams are cut the width of the flange. Boards placed parallel with the web of the beams are cut the width of the beam (web side) plus twice the board thickness. The voids created by the flutes above the beam to be filled with **mineral wool batts having a nom density of 4 pcf**. The proposed mineral board is **2" thick** of Rockwool Comfortboard, which has a **density of 11 pcf**. **(Exceeds minimum)**
7. Noggings	**Min 1-1/2 in. thick**, pieces of mineral and fiber board (See Item 6). Cut to friction fit between beam flanges; located at horizontal butted joints of adjacent mineral and fiber board sections (Item 6) on the web sides of the beam. The mineral wool boards used in the tested assembly have a minimum density of **10.5 pcf.**	**Min 1-1/2" thick** mineral wool noggings, friction fit between flanges, located at joints in mineral wool board and every 4-6" o.c. for fastening. The mineral wool boards used in the proposed assembly have a minimum density of **11 pcf.** **(Exceeds minimum)**
8. Fasteners	The boards are fastened to the noggings and to each other by means of spiral screw type fasteners, spaced a max of 4-6 in. OC. The fasteners are installed on both sides of horizontal joints.	The boards are fastened to the noggings and to each other by means of spiral screw type fasteners, spaced a max of 4-6 in. OC. The fasteners are installed on both sides of horizontal joints. **(Equivalent)**

Element	UL Assembly Design No. N307 (Figure 3)	Proposed Assembly (Figure 1)
Gypsum Board (Additional Protection)	Not Included	**Per UL D503 – (1) layer** 5/8 in. thick, 4 ft wide Type C gypsum board, installed with long dimension perpendicular to cross tees with side joints centered along main runners. Wallboard fastened to each cross tee with five wallboard screws with one screw located at the mid-span of the cross tee, one screw located 12 in. from and on each side of the cross tee mid-span, and one screw located 1-1/2 in. from each wallboard side joint. Except at wallboard end joints, wallboard screws shall be located on alternating sides of cross tee flange. At wallboard end joints, wallboard screws shall be located 1/2 in. from the joint. Wallboard fastened to main runners with wallboard screws, 1/2 in. from side joints midway between intersections with cross tees (24 in. OC) End joints of adjacent wallboard sheets shall be staggered not less than 4 ft OC. Wallboard sheets screw-attached to leg of wall angle with wallboard screws spaced 12 in. OC. **(Additional Protection)**
Fire Resistance	**3-hours**	**Greater than 3-hours (Exceeds minimum)**

6 SUMMARY

Primary structural members require protection for 3 hours per OSSC Table 601. §704.3 allows membrane protection to meet the protection requirements when the beams are not supporting load bearing walls.

The basis of analysis of the proposed design is establishing that the horizontal assembly currently provides membrane protection for 2-hours as tested in UL D503. The ASTM E119 testing criteria requires maximum temperature to not exceed 1300 ºF at any point along the beam, or a maximum average temperature of 1100 ºF, for the minimum duration of the required fire rating. This is the failure criteria for the protection of the steel member and must be maintained through our analysis.

Table 1 compares the proposed design with the 3-hour rated restrained beam, UL N307. The steel beam in the proposed design (W16x26, W/D = 0.558) is smaller than the UL N307 tested beam (W8x28, W/D = 0.819). However, the protection of the proposed beam is provided by two levels of protection: individual encasement per UL N307 (Table 1) installed inside a 2-hour membrane cavity per UL D503. Encasement protection is not required but permitted by §704.3 to achieve the 3-hour fire rating. Using this approach, the smaller size of the proposed steel beam is not applicable in the overall fire rating of the proposed design, as the fire rating of the design will be based on the two levels of protection described in Table 1 and this report.

Table 1 demonstrates the components of the proposed design as providing equivalent or greater protection than the 3-hour fire rated beam, UL N307. While the Albi Dri-Clad mineral boards used in the UL N307 to provide a 3-hour fire rating have a density of 10.5 pcf and are 1-5/8” thick (Figure 3), the proposed Rockwool Comfortboard mineral boards used for encasement protection have a density of 11 pcf and are 2” thick. The proposed mineral boards exceed the tested mineral boards in both density and thickness.

7 CONCLUSION

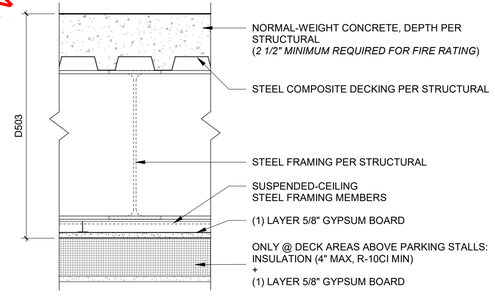
Code Unlimited has reviewed the proposed protection of the structural beam against the 3-hour fire rated restrained beam, UL N307. §704.3 allows protection to either be through individual encasement or membrane protection for structural members when not supporting a load bearing wall. The proposed design supports only one floor and no walls.

As demonstrated in Sections 5 and 6 of this report, the proposed protection of the structural beam includes two levels of protection, encasement protection per UL N307 (3-hour fire rating) installed inside a 2-hour fire rated membrane cavity per UL D503. Although the proposed beam is smaller than the UL N307 tested beam, the beam size plays a minor role in the overall fire rating of the proposed design. Additionally, the proposed mineral boards are greater in thickness and density than the tested boards used to achieve a 3-hour fire rating in UL N307—while other components of the proposed design provide equivalent or greater protection (Table 1). The proposed design will comply with the minimum required 3-hour fire-resistance per Table 601 of the 2014 OSSC, for protection of a primary structural member in Type IA construction.

Therefore, the proposed design, when installed as detailed above, as evaluated in this report will exceed the minimum 3-hour fire-resistance for the structural beam as required by OSSC.

Franklin Callfas
Principal/Fire Protection Engineer
Code Unlimited

FOR REFERENCE ONLY, NO CHANGE TO FLOOR/CEILING ASSEMBLY



2HR
FL9 **METAL DECK @ LEVEL 02**

UL: D503

STC:

VALLASTER CORL ARCHITECTS, PC
711 SW ALDER
PENTHOUSE SUITE
PORTLAND, OR 97205
PHONE : 503.228.0311
FAX : 503.228.0314
www.vcarch.com

REGISTERED ARCHITECT
JAMES M. VALLASTER
PORTLAND, OREGON
STATE OF OREGON

OWNER :

PEARL DISTRICT APARTMENTS, LLC

PROJECT NAME :

OVERTON 15

1470 NW OVERTON ST
PORTLAND, OR 97209

REVISIONS :

1	2018_0125	CONFORMING
B	2017_0730	LS CHKSHT#1
E	2018_0103	LS CHKSHT#2

ISSUE DATES :

11-01-2016: DD MEP

11-14-2016: DD 75%

11-23-2016: DD 100%

05-22-2017: PERMIT SET

02-02-2018: CONFORMING SET

JOB NO. : 1612

DRAWN :

CHECKED :

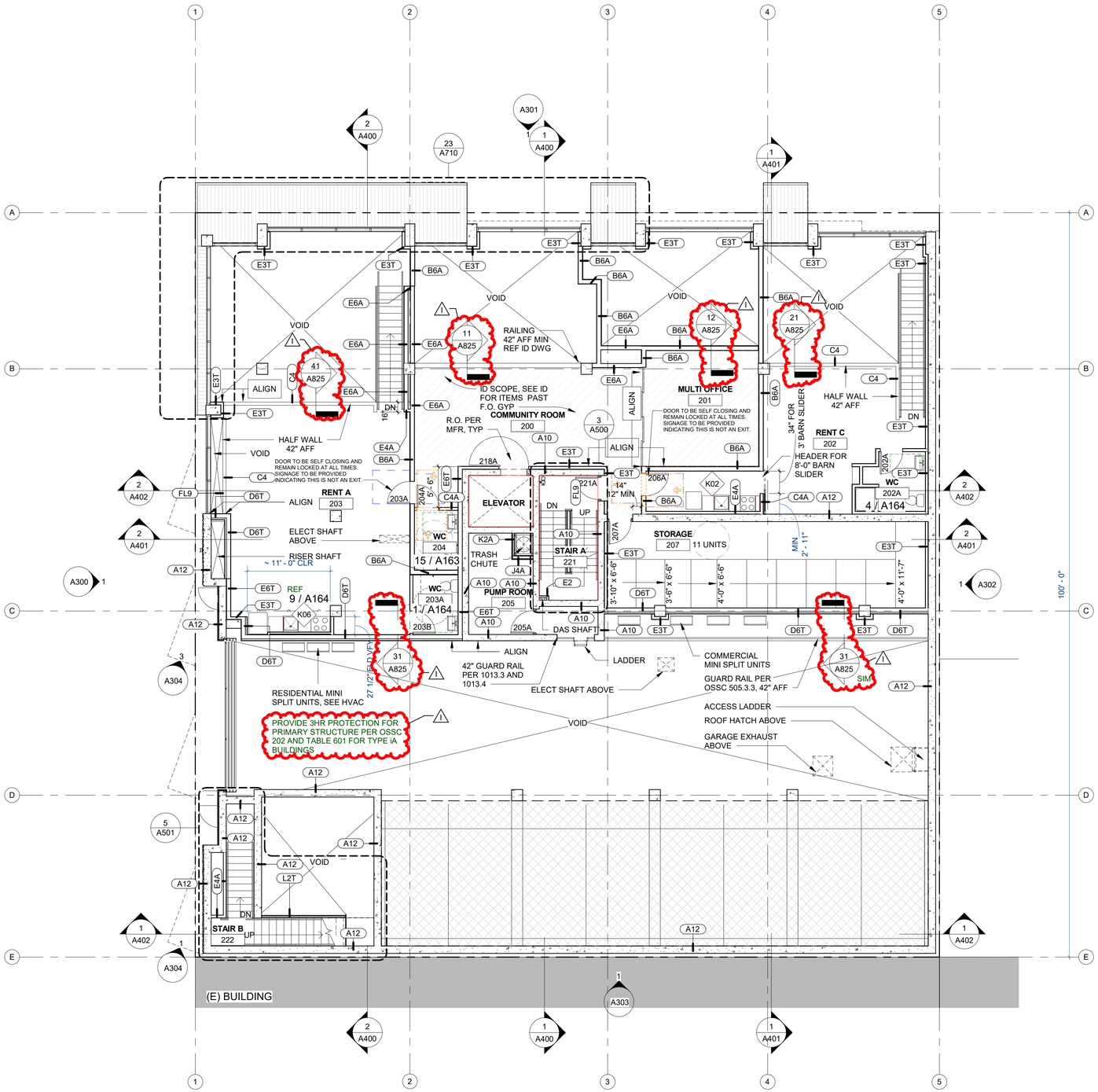
CONFORMING SET 02 FEBRUARY 2018

HORIZONTAL ASSEMBLIES

A003

ORIGINAL SHEET SIZE : 22"x34"

2/14/2019 12:34:59 PM



A102 | 1 LEVEL 02
SCALE: 1/8" = 1'-0"

GENERAL NOTES

1. PROVIDE A WEATHERTIGHT, FULLY INSULATED BUILDING ENVELOPE
2. INTERIOR WALLS TO BE FULL HEIGHT FROM FLOOR TO STRUCTURE UNLESS OTHERWISE NOTED. REFER TO ASSEMBLY LEGEND ON WALL ASSEMBLIES SHEETS
3. EXTEND FIRE RATED WALLS TO STRUCTURE ABOVE.
4. PROVIDE SHEET BACKING AS REQUIRED TO SUPPORT WALL AND CEILING HUNG CABINETS, GRAB BARS, RAILINGS, AND ALL OTHER ACCESSORIES THAT REQUIRE SUPPORT. VERIFY LOCATIONS PRIOR TO INSTALLATION OF GYPSUM BOARD. COORDINATE REQUIREMENTS FOR INCREASED METAL STUD GAUGES AND WOOD STUD SIZES.
5. PROVIDE REINFORCED STUDS OR STEEL POSTS AS REQUIRED FOR FREE STANDING PARTIAL HEIGHT WALLS.
6. REFER TO INTERIOR ELEVATION SHEETS FOR TYPICAL FIXTURE AND ACCESSORY MOUNTING HEIGHTS.
7. ALL EXTERIOR EXPOSED CONCRETE IS ARCHITECTURAL CONCRETE.
8. ALL INTERIOR EXPOSED CONCRETE WITHIN PUBLIC SPACES IS ARCHITECTURAL CONCRETE.
9. TYPE A UNITS: LIGHTING CONTROLS, ELECTRICAL SWITCHES, RECEPTACLE OUTLETS, ENVIRONMENTAL CONTROLS, APPLIANCE CONTROLS, OPERATING HARDWARE FOR OPERABLE WINDOWS, PLUMBING FIXTURE CONTROLS, AND USER CONTROLS FOR SECURITY/INTERCOM SYSTEMS SHALL COMPLY WITH ANSI 309. AT LEAST ONE OPERABLE WINDOW IN EACH SLEEPING, LIVING, OR DINING SPACE SHALL HAVE OPERABLE PARTS COMPLYING WITH ANSI 1003.9
10. TYPE B UNITS: LIGHTING CONTROLS, ELECTRICAL SWITCHES, RECEPTACLE OUTLETS, ENVIRONMENTAL CONTROLS, AND USER CONTROLS FOR SECURITY/INTERCOM SYSTEMS SHALL COMPLY WITH ANSI 309.2 & 309.3.

NOTES - FLOOR PLANS

1. REFER TO ASSEMBLY SHEETS FOR WALL & FLOOR ASSEMBLIES.
2. UNIT DEMISING WALLS (D.M.) ARE 1-HOUR RATED TYPICAL.
3. STUD SIZES TYPICALLY USED THROUGHOUT PROJECT ARE SHOWN - REFER TO STUD SIZE ON WALL ASSEMBLIES SHEET FOR REQUIRED SIZES. COORDINATE BLOCKING AND BRACING REQUIREMENTS FOR WALL HUNG ITEMS.
4. INTERIOR WALLS AT UNITS TO BE ASSEMBLY N6A, U.N.O.
5. SEE ENLARGED PLANS FOR MORE INFORMATION, TYPICAL. DIMENSIONS ON ENLARGED PLANS ARE SHOWN TO FACE OF FINISH U.N.O.
6. UNIT CLOSETS HAVE SHELF AND ROD WIRE SHELF, UNO.
7. SEE SHEET A825 FOR INTERIOR TRANSITIONS

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REGISTERED ARCHITECT
JAMES M. VALLASTER
PORTLAND, OREGON
STATE OF OREGON

OWNER :
PEARL DISTRICT APARTMENTS, LLC

PROJECT NAME :
OVERTON 15
1470 NW OVERTON ST
PORTLAND, OR 97209

REVISIONS :

1	2018_0125	CONFORMING
11	2018_0327	RFI #34
17	2018_0419	RFI #45
27	2018_0919	RFI #117
32	2018_1205	RFI 147
33	2019_0110	RFI 154
B	2017_0730	LS CHKSHT#1
E	2018_0103	LS CHKSHT#2
F	2018_0911	PLAN REV1
G	2018_1126	STRC CHKSHT
H	2019_0110	PLAN REV2
I	2019_0225	APPEAL

ISSUE DATES :
11-01-2016: DD MEP
11-14-2016: DD 75%
11-23-2016: DD 100%
05-22-2017: PERMIT SET
02-02-2018: CONFORMING SET

JOB NO. : 1612
DRAWN :
CHECKED :

CONFORMING SET 02 FEBRUARY 2018

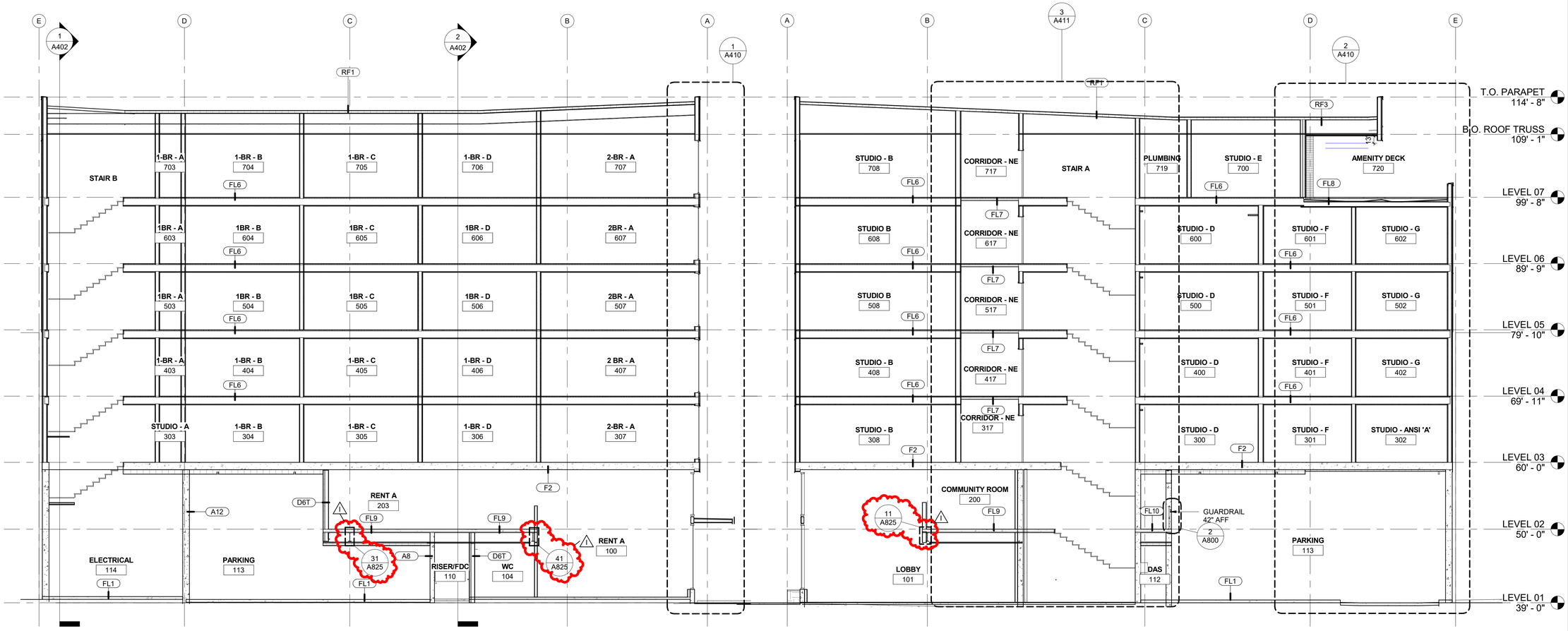
LEVEL 02

A102

ORIGINAL SHEET SIZE : 22"x34"

2/14/2019 12:35:01 PM

BIM 360://Overton 15/OVERTON 15.rvt



A400 2 BUILDING SECTION - NORTH/SOUTH @ GL 1.8
SCALE: 1/8" = 1'-0"

A400 1 BUILDING SECTION - NORTH/SOUTH @ GL 2.7
SCALE: 1/8" = 1'-0"

VALLASTER CORL ARCHITECTS, PC
711 SW ALDER
PENTHOUSE SUITE
PORTLAND, OR 97205
PHONE : 503.228.0311
FAX : 503.228.0314
www.vcarch.com

REGISTERED ARCHITECT JAMES M. VALLASTER PORTLAND, OREGON STATE OF OREGON

OWNER :

PEARL DISTRICT APARTMENTS, LLC

PROJECT NAME :

OVERTON 15

1470 NW OVERTON ST
PORTLAND, OR 97209

REVISIONS :

B 2017_0730 LS CHKSHT#1
~~2018_0102 LS CHKSHT#2~~
I 2019_0225 APPEAL
E LS CHKSH #2 : 01-02-2018

ISSUE DATES :

11-01-2016: DD MEP

11-14-2016: DD 75%

11-23-2016: DD 100%

05-22-2017: PERMIT SET

02-02-2018: CONFORMING SET

JOB NO. : 1612

DRAWN :

CHECKED :

CONFORMING SET 02 FEBRUARY 2018

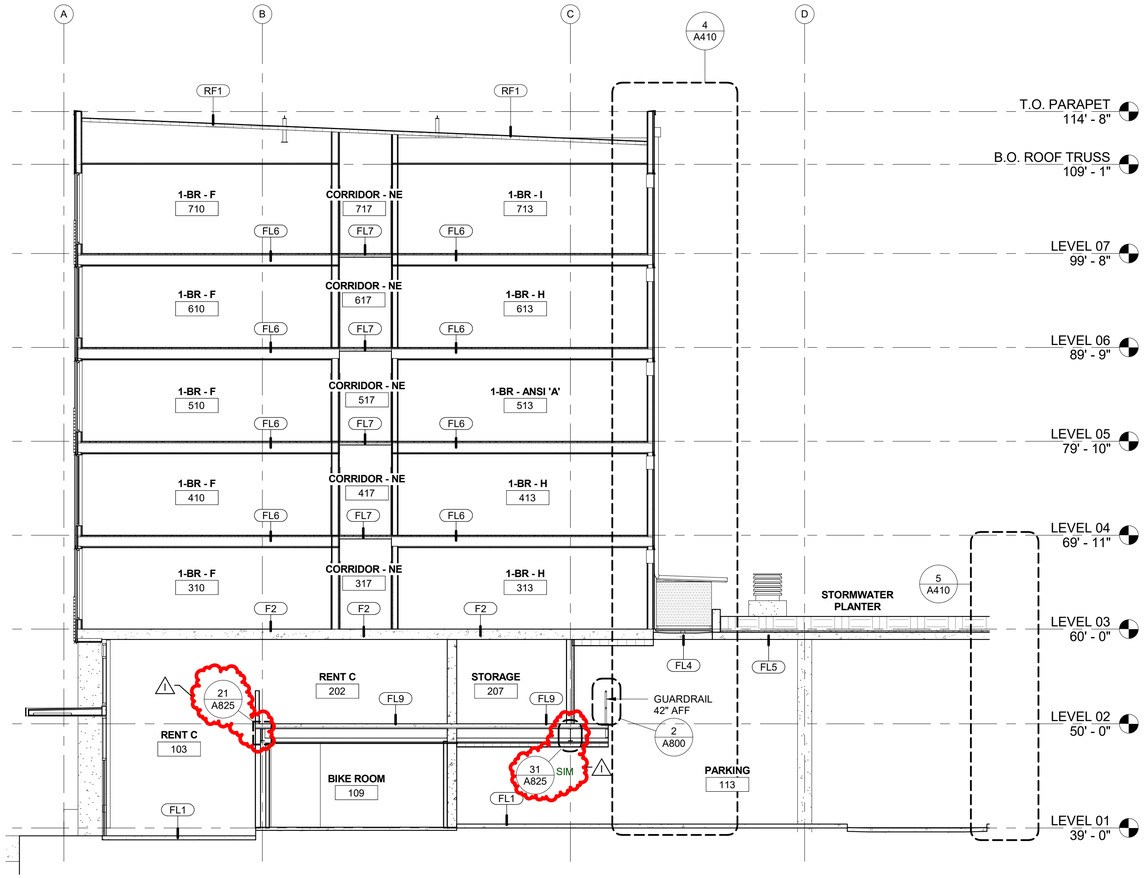
BUILDING SECTIONS

A400

ORIGINAL SHEET SIZE : 22"x34"

2/14/2019 12:35:02 PM

BIM 360://Overton 15/OVERTON 15.rvt



A401 | 1 BUILDING SECTION - NORTH/SOUTH @ GL 4

SCALE: 1/8" = 1'-0"

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www.vcarch.com

REGISTERED ARCHITECT
JAMES M. VALLASTER
PORTLAND, OREGON
STATE OF OREGON

OWNER :

PEARL DISTRICT APARTMENTS, LLC

PROJECT NAME :

OVERTON 15

1470 NW OVERTON ST
PORTLAND, OR 97209

REVISIONS :

1	2018_0125	CONFORMING
B	2017_0730	LS CHKSHT#1
E	2018_0103	LS CHKSHT#2
I	2019_0225	APPEAL

ISSUE DATES :

11-01-2016: DD MEP

11-14-2016: DD 75%

11-23-2016: DD 100%

05-22-2017: PERMIT SET

02-02-2018: CONFORMING SET

CONFORMING SET 02 FEBRUARY 2018

JOB NO. : 1612

DRAWN :

CHECKED :

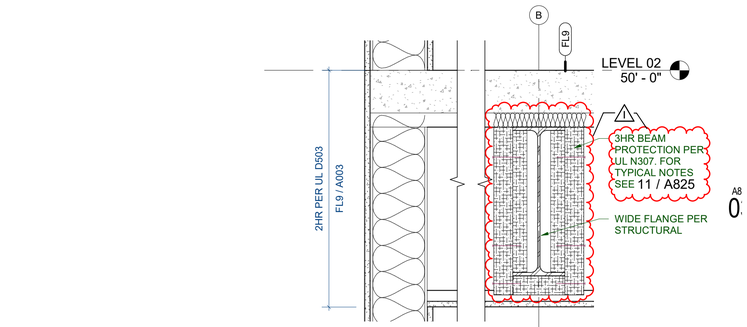
BUILDING SECTIONS

A401

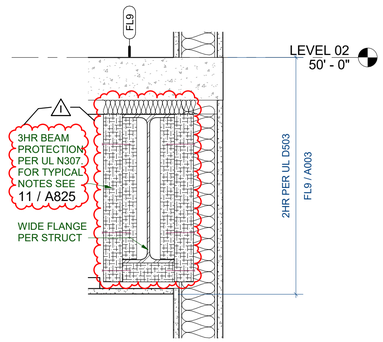
ORIGINAL SHEET SIZE : 22"x34"

2/14/2019 12:35:03 PM

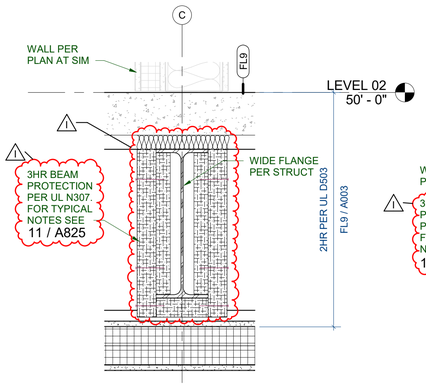
BIM 360://Overton 15/OVERTON 15.rvt



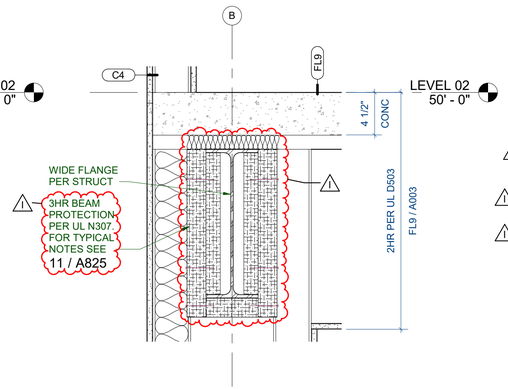
12 DETAIL - 3HR BEAM @ MULTI OFFICE PER UL N307
SCALE: 1 1/2" = 1'-0"



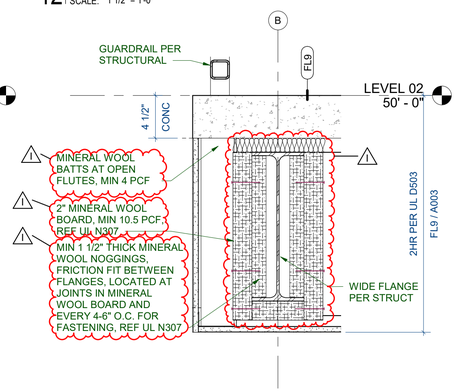
41 DETAIL - 3HR BEAM @ RENT A PER UL N307
SCALE: 1 1/2" = 1'-0"



31 DETAIL - 3HR BEAM @PARKING PER UL N307
SCALE: 1 1/2" = 1'-0"



21 DETAIL - 3HR BEAM @ RENT C PER UL N307
SCALE: 1 1/2" = 1'-0"



11 DETAIL - 3HR BEAM @ LOBBY PER UL N307
SCALE: 1 1/2" = 1'-0"

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PHONE : 503.228.0311
FAX : 503.228.0314
www.vcarch.com

REGISTERED ARCHITECT
JAMES M. VALLASTER
PORTLAND, OREGON
STATE OF OREGON

OWNER :

PEARL DISTRICT APARTMENTS, LLC

PROJECT NAME :

OVERTON 15

1470 NW OVERTON ST
PORTLAND, OR 97209

REVISIONS :

1	2018_0125	CONFORMING
C	2017_1002	ZONE CKSHT
E	2018_0103	LS CHKSHT#2
I	2019_0225	APPEAL

ISSUE DATES :
11-01-2016: DD MEP
11-14-2016: DD 75%
11-23-2016: DD 100%
05-22-2017: PERMIT SET
02-02-2018: CONFORMING SET

JOB NO. : 1612
DRAWN :
CHECKED :

CONFORMING SET 02 FEBRUARY 2018

INTERIOR DETAILS

A825

ORIGINAL SHEET SIZE : 22"x34"

2/14/2019 12:35:04 PM

BIM 360://Overton 15/OVERTON 15.rvt

MEZZANINE FRAMING PLAN KEYNOTES:

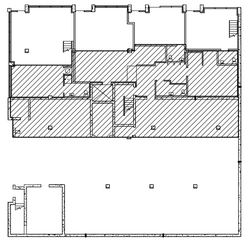
1. COMPOSITE CONCRETE SLAB: 18 GAGE 'B' FORMLOK METAL DECK, (2) SPAN MINIMUM 6" TOTAL THICKNESS.
2. #4 x 2'-6" x 5" EMBED SLAB-WALL EPOXY DOWELS AT 2'-0" O/C. SEE DETAILS 6/S303, 7/S303, AND 10/S303
3. #4 x 2'-6" x 5" EMBED SLAB-WALL EPOXY DOWELS AT 4'-0" O/C. SEE DETAILS 6/S303, 7/S303, AND 10/S303
4. #3 AT 1'-0" O/C EACH WAY. PLACE BARS PARALLEL TO DECK FLUTES IN BOTTOM-MOST LAYER.
5. HSS 4 x 2 x 1/8 HALF HEIGHT WALL SUPPORT. SEE DETAIL 15/S303

NOTE:
SEE 11/S304 AND 12/S304 FOR TYPICAL PENETRATION REQUIREMENTS.

Highlight delineates Primary Structural Frame per OSSC 2014, Section 202. These members to receive 3 hr fire resistance.

Hatch delineates FL09, Based on UL D503, per A003, Horizontal Assemblies

Hatch delineates FL10, Based on UL D503, per A003, with additional rigid insulation and (1) layer of Gypsum Board at Parking Garage



NOTES:
a) DENOTES 125 PSF LIVE LOAD REGION

MEZZANINE 02 FLOOR LIVE LOAD
16225-170

1 S102 MEZZANINE FRAMING PLAN
SCALE: 1/8" = 1'-0"

0 2' 4' 8'

VALLASTER CORAL ARCHITECTS
711 SW ALDER
PENTHOUSE SUITE
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PHONE: 503 228 0311
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T.M. RIPPEY
CONSULTING ENGINEERS
7650 SW Beveland, Suite 100
Tigard, Oregon 97223
Phone: (503) 443-3900
Fax: (503) 443-3700

STRUCTURAL REGISTERED PROFESSIONAL ENGINEER 13,089 OREGON JULY 11, 2003 TIMOTHY MERRILL RIPPEY
EXPIRES: 12-31-20

OWNER :
PEARL DISTRICT APARTMENTS, LLC

PROJECT NAME :
OVERTON 15

SEC/ OVERTON ST.
& NW 15TH AVE.
PORTLAND, OR 97209

REVISIONS :

3	02/02/18	PERMIT REVISION
S2	05/10/18	RFI 51
S3	05/10/18	RFI 16
S4	05/10/18	RFI 56
S5	05/10/18	RFI 19
S6	05/10/18	ASI 01
S7	05/10/18	RFI 48

ISSUE DATES :
11-01-2016: DD MEP
11-14-2016: DD 75%
11-23-2016: DD 100%
05-22-2017: PERMIT SET

TMR JOB NO. :	16225
DRAWN :	JSC / CTT
CHECKED :	JKW / RW
STATUS :	PERMIT

LEVEL 02 FRAMING PLAN

S102

COMFORTBOARD™ 110

Continuous Insulation

Technical Data Sheet

Board Insulation 05080*
Board Insulation 07 21 13**

ROCKWOOL COMFORTBOARD™ 110 is a rigid mineral wool, non-structural insulated sheathing board used as continuous insulation in high-performance wall systems.

	Performance	Test Standard
Compliance	Mineral Fiber Block and Board Thermal Insulation - Type IVB Compliant Mineral Fibre Thermal Insulation for Buildings - Type 1 Compliant	ASTM C612 CAN/ULC S702
Reaction to Fire	Flame spread index = 0; Smoke developed index = 0 Flame spread index = 0; Smoke developed index = 0 Determination of Non Combustibility of Building Materials - Non Combustible	ASTM E84 (UL 723) CAN/ULC S102 CAN/ULC S114
Density	Actual Density - 11 lbs/ft³ (176 kg/m³)	ASTM C303
Corrosion Resistance	Effect of Coatings and Facings on Corrosion of Steel - Passed Corrosion of Steel - Passed Corrosion to Aluminum - Passed	ASTM C665 ASTM C665
Thermal Resistance	R-Value / inch @ 75°F 4 hr.ft².F/Btu RSI value / 25.4 mm @ 24°C 0.70 m²K/W	ASTM C518 (C177)
Reaction to Moisture	Moisture Sorption - 0.28% Water Vapor Transmission, Desiccant Method - 2160ng/Pa.s.m² (35 perm) Water Absorption - 1.2% Determination of Fungi Resistance - Passed	ASTM C1104 ASTM E96 ASTM C209 ASTM C1338
Compressive Strength	584psf (28kPa) @ 10% compression 1536psf (75kPa) @ 25% compression	ASTM C165
Thickness Dimensions	1" (25.4 mm), 1.25" (32 mm), 2" (50.8 mm), 2.5" (63.5 mm), 3" (76.2 mm) 24" x 48" (610 mm x 1219 mm), 48" x 72" (1219 mm x 1829 mm)	

Acoustical Performance

Thickness	125 Hz	250 Hz	500 Hz	1000 Hz	2000Hz	4000 Hz	NRC
1"	0.13	0.49	0.85	0.89	0.89	0.97	0.8
2"	0.5	0.71	0.85	0.9	0.96	1.01	0.85

Issued 01-01-18
Supersedes 08-23-17

NOTE: *Master Format 1995 Edition **Master Format 2004 Edition. As ROCKWOOL has no control over installation design and workmanship, accessory materials or application conditions, ROCKWOOL does not warranty the performance or results of any installation containing ROCKWOOL's products. ROCKWOOL's overall liability and the remedies available are limited by the general terms and conditions of sale. This warranty is in lieu of all other warranties and conditions expressed or implied, including the warranties of merchantability and fitness for a particular purpose.

ROCKWOOL™

8024 Esquesing Line, Milton, ON L9T 6W3
Tel: 800-265-6878 • Fax: 800-991-0110
rockwool.com

ALBI DRICLAD UL FIRE-RESISTANCE LISTINGS

FIRE TEST ASTM E-119

Typical System	Size	Hourly Rating	Thickness in. (mm)	UL Design No.
Columns - Wide Flange	W10 x 49 (254 x 254 mm)	1	3/4 (19.1)	X313
		1-1/2	1-1/4 (32)	X313
		2	1-1/2 (38)	X313
		3	2-1/2 (64)	X313
	W12 x 120 (312.9 x 332.7 mm)	4	1-1/2 (38)	X313
Beams - Roof / Ceiling (Restrained & Unrestrained)	W8 x 28 (203 x 203 mm)	1	3/4 (19.1)	S301
		1-1/2	3/4 (19.1)	S301
		2	1-1/2 (38)	S301
Beams - Floor / Ceiling (Restrained & Unrestrained)	W8 x 28 (203 x 203 mm)	1	3/4 (19.1)	N307
		1-1/2	3/4 (19.1)	N307
		2 (restrained)	3/4 (38)	N307
		2 (unrestrained)	1-5/8 (41)	N307
		3 (restrained)	1-5/8 (41)	N307
Beams - Unprotected Roof / Ceiling (Restrained & Unrestrained)	W8 x 28 (203 x 203 mm)	1	3/4 (19.1)	P930
		1-1/2	3/4 (19.1)	P930
		2 (restrained)	3/4 (19.1)	P930
		2 (unrestrained)	1-5/8 (41)	P930
Beams - Protected Roof / Ceiling (Restrained & Unrestrained)	Type 10k1 Joists	1	1 (25.4)	P302
Assembly - Floor / Ceiling (Restrained)[1]	W8 x 28 (203 x 203 mm)	1	3/4 (19.1)	D929
		1-1/2	3/4 (19.1)	D929
		2	3/4 (19.1)	D929
		3	1-5/8 (41)	D929
Assembly - Floor / Ceiling (Unrestrained)[1]	W8 x 28 (203 x 203 mm)	1	3/4 (19.1)	D929
		1-1/2	3/4 (19.1)	D929
		2	1-5/8 (41)	D929
Assembly - Protected Floor / Ceiling (Restrained & Unrestrained)	W8 x 28 (203 x 203 mm)	1	3/4 (19.1)	D303
		1-1/2	3/4 (19.1)	D303
		2 (restrained)	3/4 (19.1)	D303
		2 (unrestrained)	1-5/8 (41)	D303
		3 (restrained)	1-5/8 (41)	D303
Assembly - Floor / Ceiling (Restrained & Unrestrained)	W8 x 24 (203 x 203 mm)	2	1 (25.4)	G301
Assembly - Protected Floor / Ceiling (Restrained & Unrestrained)	W8 x 28 (203 x 203 mm)	1	3/4 (19.1)	J301
		1-1/2	3/4 (19.1)	J301
		2 (restrained)	3/4 (19.1)	J301
		2 (unrestrained)	1-5/8 (41)	J301
		3 (restrained)	1-5/8 (41)	J301

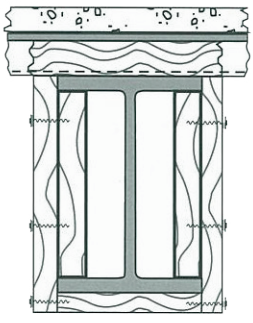
[1] Requiere montaje con proteccion.

EASY APPLICATION

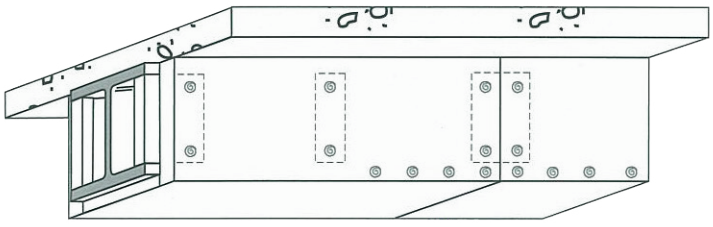
Albi DriClad installs without the adhesion and compatibility concerns associated with spray applied soft fireproofing. Although DriClad is easily cut with a knife or hand saw, the most efficient cutting device is a table saw. A knife may be used to cut around obstructions and structural members. Strips 4" wide x 1-1/2"minimum thickness are fit tightly between the top and bottom flanges 24"on center. Material is then cut and installed to box in the steel. AlbiScrews™ fasten the material 6" on center. DriClad is shipped on pallets in stretch-wrapped polyethylene for ease of handling and short term storage.

TYPICAL INSTALLATIONS

- Commercial Buildings
- Industrial Plants
- School Gymnasiums
- Warehouses
- Parking Garages
- Power Plants
- Elevator Shafts



Profiled metal deck/roof over steelwork



AlbiScrews @ 6" centers

Other Albi DriClad Literature

- Albi DriClad Long Form Guide Specification
- Albi DriClad Field Application Manual

* See complete marking on package

PHYSICAL PROPERTIES

Property	ASTM Test Method	Value
Dry Applied Density (Average)	- 10.5	PCF
Compressive Strength @ 10%	ASTM C165	95 PSF
Tensile Strength	ASTM C209	155 PSF
Moisture Absorption	ASTM C209	0.50% By Volume
Moisture Adsorption	ASTM C553	0.03% By Volume
Sound Absorption	ASTM C423	NRC - 0.80
Deflection	ASTM E759	No Delamination
Thermal Performance (R Value)	ASTM C158	4.2 (per inch)
Corrosion & Fungi Resistance	ASTM C665	Non Corrosive/No Fung Growth
Leachable Chlorides	ASTM C871	No Leachable Chlorides
Air Erosion	ASTM C1071	0 @ 5800 ft/min
Fire Hazard Classification	ASTM E136	Non Combustible
Flame Spread	ASTM E84	0 (Class A)
Smoke Developed	ASTM E84	0 (Class A)

ALBI DRICLAD UL Classified Mineral Board*	Material Thickness	Material Thickness	Material Thickness	Material Thickness
	1.0 inch	1-5/8 inch	2.0 inch	2-1/2 inch
Sheets per Pallet	45 sheets	28 sheets	21 sheets	18 sheets
Total Square Feet per Pallet	1080 sq. ft.	672 sq. ft.	504 sq. ft	432 sq. ft.
Gross Weight per Pallet	1000 lbs	1000 lbs.	1000 lbs.	1000 lbs.

Also inquire about these fireproofing products from Albi:

Albi Clad 800
Intumescent fireproofing, withstands severe weathering and abuse

Albi Clad TF
Water-based, thin-film intumescent fireproofing for exposed interior structural steel

Albi Clad FP
Water-based, thin-film intumescent fireproofinh for exposed wood, wallboard, and other combustible assemblies

ALBI PROTECTIVE COATINGS

For more than five decades, Albi fireproofing materials have demonstrated superior performance and reliability under a range of extreme environments worldwide. These proprietary formualtions also meet global building codes and insurance requirements. Lightweight Albi materials provide long-term protection, outstanding durability, aesthetic properties and are completely free from asbestos.

Albi
Protective Coatings

Albi Protective Coatings, **Division of StanChem, Inc.**
401 Berlin Street, East Berlin, Connecticut 06023 U.S.A.
Tel: (860) 828-0571 Fax: (860) 828-3297
www.albi.com info@albi.com

FIRE-RESISTANCE DESIGN

Assembly Usage Disclaimer

BXUV - Fire Resistance Ratings - ANSI/UL 263 Certified for United States

BXUV7 - Fire Resistance Ratings - CAN/ULC-S101 Certified for Canada

See General Information for Fire-resistance Ratings - ANSI/UL 263 Certified for United States
Design Criteria and Allowable Variances

See General Information for Fire Resistance Ratings - CAN/ULC-S101 Certified for Canada
Design Criteria and Allowable Variances

Design No. D503

February 27, 2018

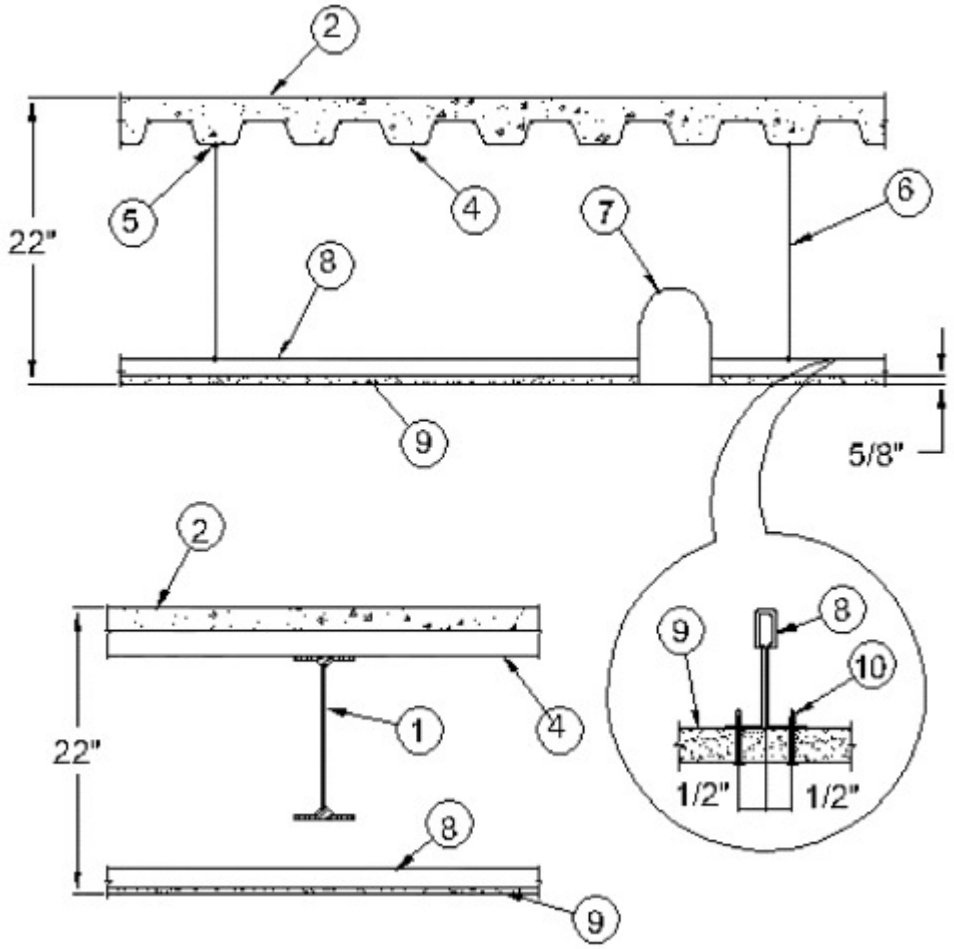
Restrained Assembly Ratings - 1 or 2 Hr (See Item 2)

Unrestrained Assembly Ratings - 1 or 2 Hr (See Item 2)

Unrestrained Beam Ratings - 2 Hr

This design was evaluated using a load design method other than the Limit States Design Method (e.g., Working Stress Design Method). For jurisdictions employing the Limit States Design Method, such as Canada, a load restriction factor shall be used — See Guide BXUV or BXUV7

*** Indicates such products shall bear the UL or cUL Certification Mark for jurisdictions employing the UL or cUL Certification (such as Canada), respectively.**



1. **Beam —** W12x19, min size.

2. **Normal Weight Concrete —** Normal weight concrete, carbonate or siliceous aggregate, 152 ± 3 pcf unit weight, 4000 psi compressive strength. Concrete thickness above top of steel floor units min. 2 in. for 1 hr assembly ratings and 2 hr unrestrained beam rating and 2-1/2 in. for 2 hr assembly ratings.

3. **Steel Fiber Reinforcement* —** (Not Shown) — Steel fibers added to concrete mix to control shrinkage cracks in concrete. See Fiber Reinforcement (CBXQ) Category for rate that fibers are added to concrete mix.

4. **Steel Floor Units* —** Min. 2 in. deep, min. 20-gauge galv fluted steel floor units welded to supports. Welds spaced 12 in. OC. Supports spaced max. 10 ft OC. See Steel Floor and Form Units (CHWX) Category for names of manufactures.

5. **Hanger Tab —** No. 18 GSG galv steel, 2 in. wide by 3-1/2 in. long, hooked at one end for attachment over male side joint of floor units; other end provided with hole for attachment of hanger wire. Spaced along side joints of floor units as required for hanger wire locations.

6. **Hanger Wire —** No. 12 SWG galv steel wire. Hanger wires spaced not over 48 in. O.C. along main runners and located at ends of main runners at walls.

7. **Recessed Luminaires Classified for Fire Resistance* —** Recessed incandescent luminaires having nominal 6 in diam. Spacing of luminaires not to exceed one luminiaire per 25 sq ft of ceiling area with a min separation of 3 ft

between luminaires. Luminaires installed in accordance with accompanying instructions. Wired in conformance with the National Electrical Code. See **Luminaires Classified for Fire Resistance** (CDHW) Category for names of manufactures.

8. **Steel Framing Members* —** Main runners nom 12 ft long spaced 48 in. OC. Cross tees nom 4 ft long installed perpendicular to main runners and spaced 24 in. OC. Additional cross tees located 8 in. from and on both sides of each wallboard end joint.
ROXUL USA INC. D/B/A ROCKFON — Type 650, 650C, 670, 670C

8A. **Steel Framing Members* —** As an alternate to Item 8. Main runners, cross tees, cross channels and wall angle as listed below:

a. **Main Runners —** Nom 10 or 12 ft. long, 15/16 in. or 1-1/2 in. wide face, spaced 4 ft. OC. Main runners suspended by min 12 SWG galv steel hanger wires spaced 48 in. OC. Hanger wires to be located adjacent to main runner/cross tee intersections.

b. **Cross Tees —** Nom 4 ft. long, 1-1/2 in. wide face, installed perpendicular to the main runners, spaced 24 in. OC. Additional cross tees or cross channels used at 8 in. from each side of butted wallboard end joints. The cross tees or cross channels may be riveted or screw attached to the wall angle or channel to facilitate the ceiling installation.

c. **Cross Channels —** Nom 4 ft. long installed perpendicular to main runners spaced 24 in. OC.

d. **Wall Angle or Channel —** Painted or galv steel angle with 1 in. legs or channel with 1 in. legs, 1-9/16 in. deep attached to walls at perimeter of ceiling with fasteners 16 in. OC. To support steel framing member ends and for screw-attachment of the gypsum wallboard.
CGC INC — Type DGL or RX.

USG INTERIORS LLC — Type DGL or RX.

8B. **Steel Framing Members* —** (Not Shown) — As an alternate to Items 8 and 8A - Main runners nom 12 ft long, spaced 72 in. OC. Cross tees, nom 6 ft long, installed perpendicular to main runners and spaced 24 in. OC. Additional 6 ft long cross tees required at each gypsum board end joint with butted gypsum board end joints centered between cross tees spaced 8 in. OC. The main runners and cross tees may be riveted or screw attached to the wall angle or channel to facilitate the ceiling installation.
USG INTERIORS LLC — Type DGL or RX

8C. **Steel Framing Members* —** (Not Shown) - As an alternate to Items 8 through 8B - Main runners nom 12 ft long, spaced 48 in. OC. Main runners suspended by min 12 SWG galv steel hanger wires spaced 48 in. OC. Hanger wires to be located adjacent to main runner/cross tee intersections. Cross tees, nom 4 ft. long, installed perpendicular to main runners and spaced 24 in. OC. Additional 4 ft. long cross tees required at 6 in. from each side of butted gypsum board end joints. The cross tees shall be riveted with 1/8 in. dia. rivets to the wall angle and to the main tee where the cross tee does not align with slot in the main tee. Galvanized steel wall angle with 1-1/2 in. legs attached to walls at perimeter of ceiling with fasteners at 16 in. OC. to support steel framing member ends and for screw-attachment of the gypsum board.
CERTAINTEED CORP — Types DWS12-13-20, DWS4.16-13-20, DWS4-13-20, DWS2-13-20, DWS2.16-13-20 and DWA1.5-1.5

8D. **Framing Members* —** (Not Shown) — As an alternate to Items 8 through 8C. Main runners nom 12 ft long, spaced 72 in. OC. Main runners suspended by min 12 SWG galv steel hanger wires spaced 48 in. OC. Cross tees, nom 6 ft long, installed perpendicular to main runners and spaced 24 in. OC. Additional 6 ft long cross tees required at each gypsum board end joint with butted gypsum board end joints centered between cross tees spaced 8 in. OC. The main runners and cross tees may be riveted or screw attached to the wall angle or channel to facilitate the ceiling installation.
ROXUL USA INC. D/B/A ROCKFON — Type 670C

9. **Gypsum Board* —** 5/8 in. thick, 4 ft wide, installed with long dimension perpendicular to cross tees with side joints centered along main runners. Wallboard fastened to each cross tee with five wallboard screws with one screw located at the mid-span of the cross tee, one screw located 12 in. from and on each side of the cross tee mid-span, and one screw located 1-1/2 in. from each wallboard side joint. Except at wallboard end joints, wallboard screws shall be located on alternating sides of cross tee flange.
At wallboard end joints, wallboard screws shall be located 1/2 in. from the joint. Wallboard fastened to main runners with wallboard screws, 1/2 in. from side joints midway between intersections with cross tees (24 in. OC) End joints of adjacent wallboard sheets shall be staggered not less than 4 ft OC. Wallboard sheets screw-attached to leg of wall angle with wallboard screws spaced 12 in. OC.

When alternate **Steel Framing Members*** (Item 8B and 8D) are used, gypsum board sheets installed with long dimension (side joints) perpendicular to the 6 ft long cross tees with the end joints staggered min 4 ft and centered between cross tees which are spaced 8 in. OC. Gypsum board side joints may occur beneath or between main runners. Prior to installation of the gypsum board sheets, backer strips consisting of nom 7-3/4 in. wide pieces of gypsum board are to be laid atop the cross tee flanges and centered over each butted end joint location. The backer strips are to be secured to the flanges of the cross tees at opposite corners of the backer strip with hold down clips to prevent the backer strips from being uplifted during screw-attachment of the gypsum board sheets. Gypsum board fastened to

cross tees with 1 in. drywall screws spaced 1 in. and 4 in. from the side joints and max 8 in. OC in the field of the board. The butted end joints are to be secured to the backer strip with No. 10 by 1-1/2 in. long Type G laminating screws located 1 in. from each side of the butted end joint and spaced 1 in. and 4 in. from the side joints and max 8 in. OC in the field of the board.

CGC INC — Type C

UNITED STATES GYPSUM CO — Type C, ULIX

USG BORAL DRYWALL SFZ LLC — Type C

USG MEXICO S A DE C V — Type C

9A. **Gypsum Board* —** For use when alternate **Steel Framing Members*** (Item 8C) are used - 1/2 in. thick, 4 ft. wide; installed with long dimension parallel to main runners and perpendicular to the 4 ft. long cross tees with the end joints centered between cross tees which are spaced 6 in. OC. Sheets are attached to cross tees with screws spaced 8 in. OC on the ends and 12 in. OC in the field with additional screws located 1-1/2 in, from the side edges. Sheets are attached to the main tees with screws spaced 8 in. OC with additional screws located 4 in. OC from the edges. Screws on the sides are located 1/2 in. from the side edge of the gypsum board.
CERTAINTEED GYPSUM INC — Type C

10. **Screw, Wallboard —** Type S-12, 1 in. long, self-drilling and self-tapping, 0.163 in. thread diam, 5/16 in. diam heads.

11. **Finishing System —** (Not Shown) — Paper tape embedded in compound over joints and covered with additional compound. Exposed screw heads covered with compound. Edges of compound feathered out.

12. **Wall Angle —** (Not Shown) — No. 26 MSG angle with 1-1/8 in. legs, nailed to the walls along perimeter of ceiling to support steel framing member ends and for screw-attachment of the gypsum wallboard.

*** Indicates such products shall bear the UL or cUL Certification Mark for jurisdictions employing the UL or cUL Certification (such as Canada), respectively.**

Last Updated on 2018-02-27

Design/System/Construction/Assembly Usage Disclaimer

- Authorities Having Jurisdiction should be consulted in all cases as to the particular requirements covering the installation and use of UL Certified products, equipment, system, devices, and materials.
- Authorities Having Jurisdiction should be consulted before construction.
- Fire resistance assemblies and products are developed by the design submitter and have been investigated by UL for compliance with applicable requirements. The published information cannot always address every construction nuance encountered in the field.
- When field issues arise, it is recommended the first contact for assistance be the technical service staff provided by the product manufacturer noted for the design. Users of fire resistance assemblies are advised to consult the general Guide Information for each product category and each group of assemblies. The Guide Information includes specifics concerning alternate materials and alternate methods of construction.
- Only products which bear UL's Mark are considered Certified.

The appearance of a company's name or product in this database does not in itself assure that products so identified have been manufactured under UL's Follow-Up Service. Only those products bearing the UL Mark should be considered to be Certified and covered under UL's Follow-Up Service. Always look for the Mark on the product.

BXUV.N307 - FIRE-RESISTANCE RATINGS - ANSI/UL 263

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BXUV - Fire Resistance Ratings - ANSI/UL 263 Certified for United States

BXUV7 - Fire Resistance Ratings - CAN/ULC-S101 Certified for Canada

See General Information for Fire-resistance Ratings - ANSI/UL 263 Certified for United States
Design Criteria and Allowable Variances

See General Information for Fire Resistance Ratings - CAN/ULC-S101 Certified for Canada
Design Criteria and Allowable Variances

Design No. N307

February 07, 2003

Restrained Beam Ratings — 1, 1-1/2, 2, or 3 Hr (See Item 6)

Unrestrained Beam Ratings — 1, 1-1/2 & 2 Hr (See Item 6)

This design was evaluated using a load design method other than the Limit States Design Method (e.g., Working Stress Design Method). For jurisdictions employing the Limit States Design Method, such as Canada, a load restriction factor shall be used — See Guide BXUV or BXUV7

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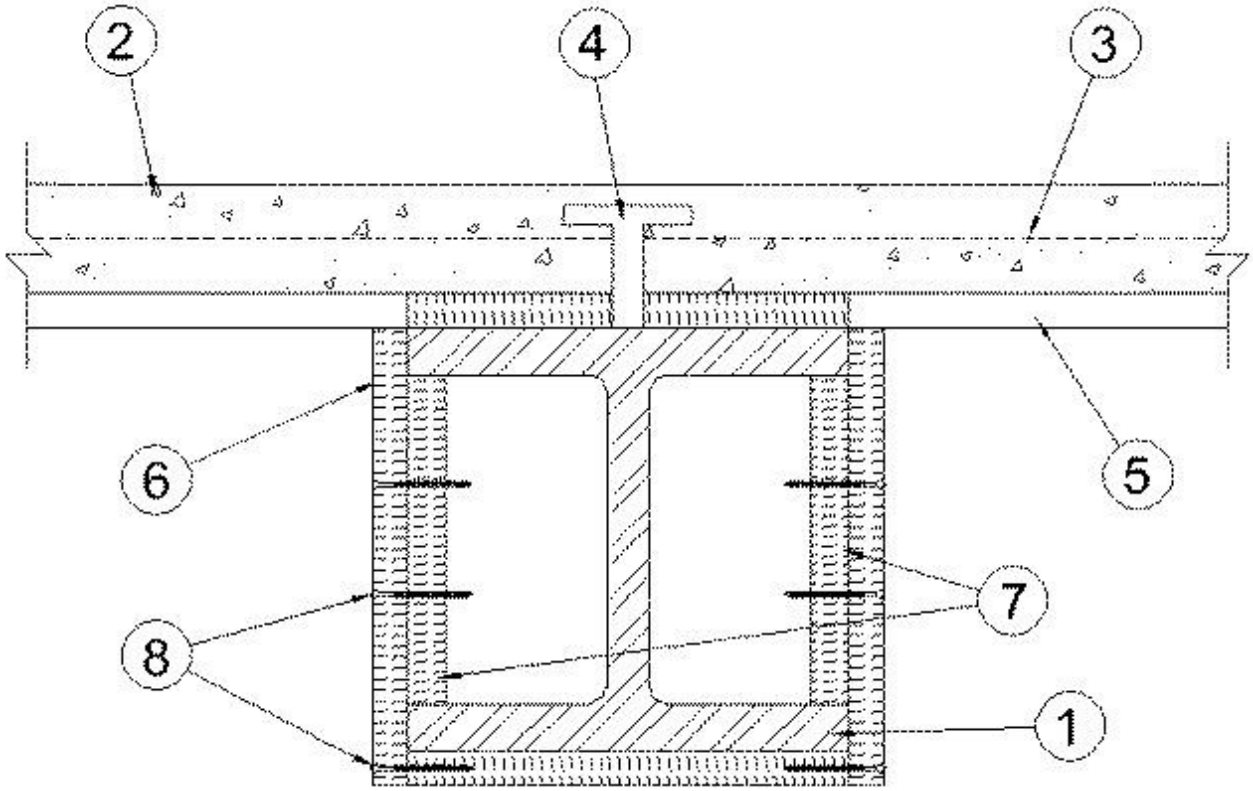

1. **Beam —** W8x28, min size.

2. **Normal Weight or Lightweight Concrete —** Normal weight concrete, carbonate or siliceous aggregate, 150 (+ or -) 3 pcf unit weight, 4500 psi compressive strength. Lightweight concrete, expanded shale, clay or slate aggregate by Rotary-Kiln method, 120 (+ or -) 3 pcf unit weight, 4500 psi compressive strength, vibrated.

3. **Welded Wire Fabric —** 6 by 6 in., No. 10/10 SWG.

4. **Shear Connectors —** (Optional) — Studs, 3/4 in. diam by 3-3/8 in. long, headed type or equivalent per AISC specification. Welded to top flange of beam through the deck.

5. **Steel Floor and Form Units* —** Composite or noncomposite 1-1/2 in. deep fluted types min No. 22 MSG welded to beam.

6. **Mineral and Fiber Boards —** Boards cut in various widths to be compatible with the size of beam being protected. Boards placed parallel with the flange of the beams are cut the width of the flange. Boards placed parallel with the web of the beams are cut the width of the beam (web side) plus twice the board thickness. The voids created by the flutes above the beam to be filled with mineral wool batts having a nom density of 4 lb per cu ft.

Restrained Beam Ratings, Hr	Min. Thickness, In.
1	3/4
1-1/2	3/4
2	3/4
3	1-5/8

Unrestrained Beam Rating Hr	Min Thkns In.
1	3/4
1-1/2	3/4
2	1-5/8

ALBI MFG, DIV OF STANCHEM INC — Type Dri-Clad

7. **Noggings —** Min 1-1/2 in. thick, pieces of mineral and fiber board (See Item 6). Cut to friction fit between beam flanges; located at horizontal butted joints of adjacent mineral and fiber board sections (Item 6) on the web sides of the beam.

8. **Fasteners —** The boards are fastened to the noggings and to each other by means of spiral screw type fasteners, spaced a max of 4-6 in. OC. The fasteners are installed on both sides of horizontal joints.

*** Indicates such products shall bear the UL or cUL Certification Mark for jurisdictions employing the UL or cUL Certification (such as Canada), respectively.**

Last Updated on 2003-02-07

FIRE-RESISTANCE DESIGN

Assembly Usage Disclaimer

BXUV - Fire Resistance Ratings - ANSI/UL 263 Certified for United States

BXUV7 - Fire Resistance Ratings - CAN/ULC-S101 Certified for Canada

See General Information for Fire-resistance Ratings - ANSI/UL 263 Certified for United States Design Criteria and Allowable Variances

See General Information for Fire Resistance Ratings - CAN/ULC-S101 Certified for Canada Design Criteria and Allowable Variances

Design No. N309

May 18, 2017

Restrained Beam Rating — 3 Hr (See Item 8)

Unrestrained Beam Rating — 3 Hr(See Item 8)

This design was evaluated using a load design method other than the Limit States Design Method (e.g., Working Stress Design Method). For jurisdictions employing the Limit States Design Method, such as Canada, a load restriction factor shall be used — See Guide BXUV or BXUV7

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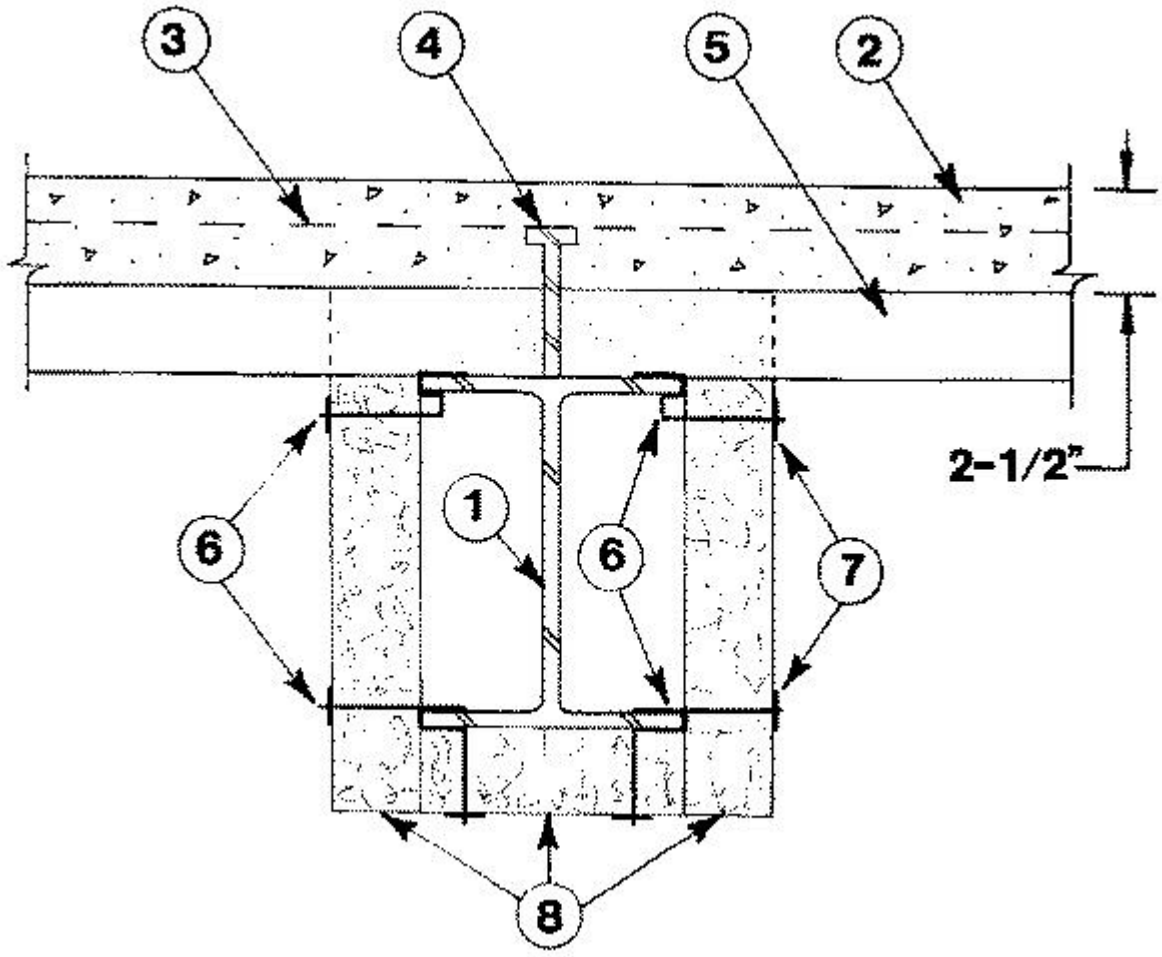

1. **Beam —** W8x24, min size.

2. **Normal Weight or Lightweight Concrete —** Normal weight (carbonate or siliceous aggregate), or lightweight (expanded shale, clay or slate aggregate by rotary kiln method). Min 104 pcf unit weight and min 3700 compressive strength.

3. **Welded wire Fabric —** 6x6 in., No. 10/10 SWG.

4. **Shear Connectors —** (Optional) — Studs, 3/4 in. diam headed type or equivalent per AISC specification. Welded to the top flange of beam through the steel floor units.

5. **Steel Floor and Form Units* —** Composite or noncomposite, min 1-1/2 in. deep fluted or cellular, minimum 22 MSG fluted, minimim 20/20 MSG cellular, welded to the beam.

6. **Fasteners —** Type Cafclip (No. 11 SWG) fasteners attached to the top and bottom beam flange edges and spaced lengthwise not greater than 14 in. O.C. and 3 in. from the ends of the batts. Batts impaled over cafclips and fastened with clinch shields (Item 7). Excess length of the stud is not required to be cut or bent. If the excess is cut, a minimum of 1/4 in. is required from the face of the clinch shields. Refer to Design No. D914 for illustration of the Cafclip fastener.

7. **Clinch Shields —** No. 28 MSG galvanized steel, 1-1/2 in. square, or 1-1/2 in. diameter round clinch shields.

8. **Batts and Blankets* —** Mineral wool batts attached to the beam in one or more layers to the thicknesses shown below by impaling over wire fasteners. For multiple layered applications, staggered joints are not required. When fluted type units are used, minimum 4-pcf mineral wool shall be stuffed between the crests of the fluted steel deck and the beam.

Restrained & Unrestrained Beam Rating, Hr	Deck Unit Type	Mtl Thkns of Type CB on Beam, In.
3	Fluted	3
3	Cellular	4

UNITED STATES MINERAL PRODUCTS CO, DBA ISOLATEK INTERNATIONAL — Type CB

9. **Adhesive* —** (Not Shown) — Applied to butt joints prior to installation of the batt. **ISOLATEK INTERNATIONAL** — Type CBA

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Last Updated on 2017-05-18

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