



APPEALS
 City of Portland
 Bureau of Development Services
 1900 SW 4th Ave., Suite 5000 (5th floor)
 Portland, Oregon 97201
 (503) 823-7335

**Building Code Appeal Form
 (Project Information Sheet)**

BLD

To Appellant:

These forms must be filled out completely. If you need assistance, consult with the Plans Examiner or Inspector assigned to your project or with a Plans Examiner in the Development Services Center. Details of each appealed item must be included, and drawings must be submitted that clearly indicate the area and the conditions of each appealed item. Supplemental information such as photos, test data, etc., can be helpful if they are pertinent to the appealed item. Each appealed item requires a separate Appeal Information Sheet. As many items as desired may be submitted with one Project Information Sheet.

The fee, relevant drawings (**exclusive of any plans submitted for permit processing**) and any supplemental information must be submitted with these forms. Checks are to be made payable to "Treasurer, City of Portland". Fees are listed below:

\$227 for one and two family dwellings
Plus \$113 each for each appeal item over four

\$454 for all other conditions (four appeal items or less)
Plus \$113 each for each appeal item over four

Mail or hand-delivered appeals must be received by 5:00 PM on Friday. Electronic appeals must be received by 9:00 AM on Monday. (The fee, drawings and supplemental information for electronic appeals may be delivered separately by 9:00 AM on Monday.) In most cases, appeals submitted by these deadlines will be considered the following Wednesday. However, an appeal may be deferred to a later date depending on the number of appeals scheduled, the complexity of the appeal, or other unforeseen factors. Appeal decisions are mailed and are also usually available the following day at http://www.portlandonline.com/bds/index.cfm?c=34196#cid_105495, or by calling the Appeal Board Support Staff at (503) 823-7335.

Project Information (questions in **BOLD** cannot be left blank):

This appeal involves (check at least one below)

- Erection of a new structure
- Alteration of an existing structure
- Addition to an existing structure
- Change of Occupancy: from _____ to _____
- Other (specify): _____
- Reconsideration of Appeal ID # _____

Proposed Use of Structure (e.g., single-family dwelling, office, etc.) Multi-Family Apartment Building

Project Street Address 3423 SE Hawthorne Blvd

Owner Name Hub Apartments LLC Company _____

Address 2905 SW First Ave. **City** Portland **State** OR **Zip** 97201

Phone 503-221-0584 Email _____

Related Permit Application #, LUR Case #, or if none, check Preliminary

Permit # 15-215987-000-00-CO LUR Case # _____ Preliminary

Number of stories 5 **Occupancy Group** R-2 **Construction Type** VA over IA

Fire Sprinklers No Yes > Location: NFPA 13 Throughout

Plans Examiner/Inspector assigned to project Natalie Davis

I am the property owner, or the property owner's agent. In accordance with City Code Section 24.10.075, I am authorized to submit an appeal for an alternative material, design or method of construction or equipment or a modification to the strict interpretation of the Building Code as adopted by the City of Portland as outlined in the attached information. I hereby acknowledge that the City is not liable for any damages that result from or relate to any formal decision rendered by the City with respect to this appeal.

Appellant Name James Blomdahl Company Frontier Metal Fabrication

Address 11218 NE 66th Street **City** Vancouver **State** WA **Zip** 98662

Phone 360-514-0961 Email James@Frontierfabrication.com

Appellant signature _____ **Date** _____



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Any alternative method or modification of a Building Code requirement requires an appeal. A reasonable degree of equivalent health, accessibility, structural capacity, energy conservation, life safety or fire protection **must** be demonstrated before an appeal may be considered.

Code Section being appealed: OSSC 2014 – Section 1207.2 Air-borne Sound

Regulation Requirement:

Walls, partitions and floor/ceiling assemblies separating dwelling units from each other or from public or service areas shall have a sound transmission class (STC) of not less than 50 (45 if field tested) for air-borne noise when tested in accordance with ASTM E 90. Penetrations or openings in construction assemblies for piping; electrical devices; recessed cabinets; bathtubs; soffits; or heating, ventilating or exhaust ducts shall be sealed, lined, insulated or otherwise treated to maintain the required ratings. This requirement shall not apply to dwelling unit entrance doors; however, such doors shall be tight fitting to the frame and sill.

Proposed Design: (Describe the alternate methods or materials of construction to be used or that exist. Be as specific as possible)

The proposed, alternate design for the already permit approved, 3-hour fire-resistance rated floor/ceiling assembly meets the required fire-rating and is documented by an approved UL design listing. However, Sound Transmission Class (STC) and Impact Insulation Class (IIC) test data are not provided for the alternate assembly. An equal STC and IIC is proposed. The alternate assembly is by methods similar to the permit approved assembly. These materials are nominal 6-inches concrete, 1/2" Homasote Comfort Base Resilient Board, rigid foam board insulation and 1/2" gyp board attached to furring channels.

Please see attached narrative and details for further information.

Reason for Alternate: (Describe why the alternate is required and how it will provide equivalent health, accessibility, structural capacity, energy conservation, life safety or fire protection to what the code requires).

The alternate is an industry standard and readily available. Materials currently included in the already permit approved floor/ceiling assembly detail are being added to the proposed, alternate floor/ceiling assembly detail to achieve equal STC and IIC ratings as required. Equivalent fire protection and structural capacity is documented through the approved, UL design listing and associated specifications.



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Any alternative method or modification of a Building Code requirement requires an appeal. A reasonable degree of equivalent health, accessibility, structural capacity, energy conservation, life safety or fire protection **must** be demonstrated before an appeal may be considered.

Code Section being appealed: OSSC 2014 – Section 1207.3 Structure-borne Sound

Regulation Requirement:

Floor/ceiling assemblies between dwelling units or between a dwelling unit and a public or service area within the structure shall have an impact insulation class (IIC) rating of not less than 50 (45 if field tested) when tested in accordance with ASTM E 492.

Proposed Design: (Describe the alternate methods or materials of construction to be used or that exist. Be as specific as possible)

The proposed, alternate design for the already permit approved, 3-hour fire-resistance rated floor/ceiling assembly meets the required fire-rating and is documented by an approved UL design listing. However, Sound Transmission Class (STC) and Impact Insulation Class (IIC) test data are not provided for the alternate assembly. An equal STC and IIC is proposed. The alternate assembly is by methods similar to the permit approved assembly. These materials are nominal 6-inches concrete, 1/2" Homasote Comfort Base Resilient Board, rigid foam board insulation and 1/2" gyp board attached to furring channels.

Please see attached narrative and details for further information.

Reason for Alternate: (Describe why the alternate is required and how it will provide equivalent health, accessibility, structural capacity, energy conservation, life safety or fire protection to what the code requires).

The alternate is an industry standard and readily available. Materials currently included in the already permit approved floor/ceiling assembly detail are being added to the proposed, alternate floor/ceiling assembly detail to achieve equal STC and IIC ratings as required. Equivalent fire protection and structural capacity is documented through the approved, UL design listing and associated specifications.

BARRY R. SMITH, PC, ARCHITECT

715 SW Morrison Street Suite 909
Portland, Oregon 97205-3105
Tel: 503.295.6261 Fax: 503.229.0626
e-mail to: barry@barrysmith.com

BUILDING CODE APPEAL NARRATIVE

PERMIT # 15-215987-000-00-CO

Date: 04/08/2016

I. GENERAL INFORMATION

Developer/Owner: Hub Apartments LLC
2905 SW First Ave.
Portland, Oregon 97201

Appellant: James Blomdahl
Frontier Metal Fabrications
11218 NE 66th Street
Vancouver, WA 98662
360-514-0961
James@Frontierfabrications.com

Architect: Barry R. Smith, PC, Architect
715 SW Morrison Street Suite 909
Portland, Oregon 97205-3105
503.295.6261(o) 503.229.0626(f)
Contact: Barry R. Smith
barry@barrysmith.com
see www.barrysmith.com

Plans Examiner: Natalie Davis
503.823.7274
Natalie.Davis@portlandoregon.gov

Location: 3423 SE Hawthorne Blvd

Permit Number: #15-215987-000-00-CO

Building Description: Multi-family, residential apartment building, consisting of (5) stories with (4) stories of Type VA construction over (1) story of Type IA construction. NFPA 13 automatic sprinkler system installed throughout.

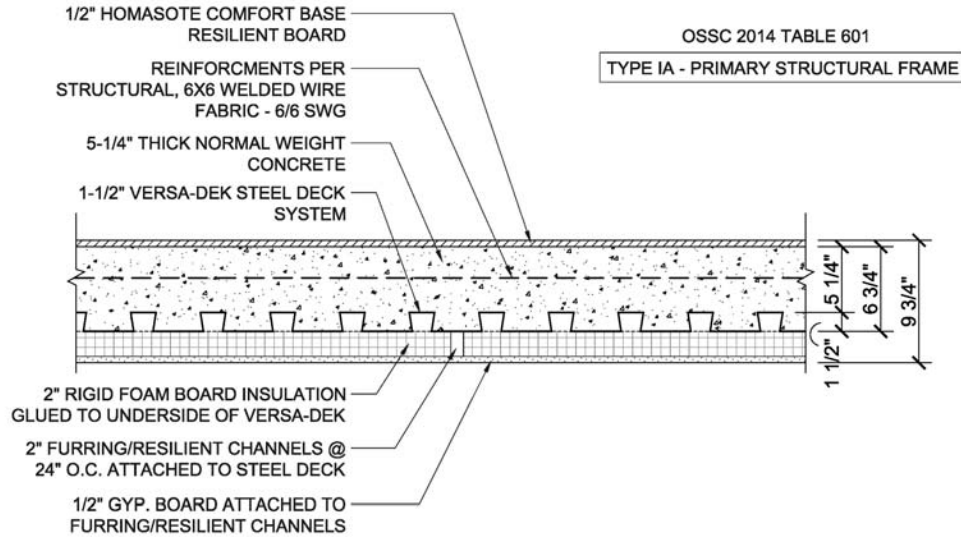
II. CODE SECTIONS BEING APPEALED:

1. OSSC 2014 – Section 1207.2 Air-borne Sound
2. OSSC 2014 – Section 1207.3 Structure-borne Sound

III. BASIS OF APPEALS:

See “Reason for Alternate” in the Building Code Appeal Application.

IV. PERMIT APPROVED DETAIL AND SPECIFICATIONS:



FIRE TEST: UL DESIGN D904 FOR 3-HOUR RESTRAINED ASSEMBLY,
BXUV - FIRE RESISTANCE RATINGS - ANSI/UL 263
BXUV7 - FIRE RESISTANCE RATINGS - CAN/ULC-S101 CERTIFIED FOR CANADA

STC TEST: NGC TEST #5006083 FOR A STC RATING OF 52 WHEN (1) LAYER OF 1/2" GYPSUM IS ATTACHED TO 7/8" FURRING/RESILIENT CHANNELS @ 24" O.C. (**MODIFIED FOR 2" FURRING/RESILIENT CHANNELS**)

IIC TEST: NGC TEST #7006119 FOR AN IIC RATING OF 50 WHEN 1/2" THICK HOMASOTE COMFORT BASE RESILIENT BOARD IS LAID OVER CONCRETE FLOOR.

NOTE: SEE STRUCTURAL PLANS AND DETAILS FOR FURTHER INFORMATION.

D **3 HR. FL./CL. ASSEM. - STC 52 - IIC 50**

A8.4 SCALE: 1" = 1' - 0"

SUMMARY OF FLOOR DECKING TESTED SOUND VALUES - STC & IIC

(Test Results by NGC- updated December 2006)

	<u>STC</u>	dB	<u>IIC</u>
1) Composite Deep Dek 4.5" x 18 GA - Base System:			
Metal deck and 7.5" concrete total depth (3" above top hat); concrete cured 28days. Ceiling consisting of one layer of 1/2" gypsum attached to 1-5/8" studs spaced at 24"oc perpendicular to the decking length. Clip angles (2-1/2") held the 1-5/8" studs with gypsum to underside of decking.			
◆ NGC Test #5006044, #7006069	54		31
Base System plus Homasote ComfortBase Resilient Board 1/2" thick			
◆ NGC Test #5006043, 7006068	53		53
2) Composite Deep Dek 6" x 18 GA - Base System:			
Metal deck and 9" concrete total depth (3" above top hat); concrete cured 28days. Ceiling consisting of one layer of 1/2" gypsum attached to 1-5/8" studs spaced at 24"oc perpendicular to the decking length. Clip angles (2-1/2") held the 1-5/8" studs with gypsum to underside of decking.			
◆ NGC Test #5006041, #7006066	56		30
Added: Homasote Comfort Base sound board 1/2" thick			
◆ NGC Test #5006042, #7006067	55		57
3) Composite Versa Dek 3.5, 20 GA - Base System:			
Concrete at 145pcf and 5-3/4" overall depth			
◆ NGC Test #5006078, #7006113	37		18
Base System plus one layer of 1/2" gypsum attached to furring/resilient channel 7/8" spaced at 24"oc.			
◆ NGC Test #5006075, #7006110	47		29
Base System plus Homasote Comfort Base sound board 1/2"thick.			
◆ NGC Test #5006077, #7006112	40		52
Base System plus one layer of 1/2" gypsum attached to furring/resilient channel 7/8" spaced at 24"oc. and Homasote Comfort Base sound board 1/2"thick.			
◆ NGC Test #5006076, #7006111	48		52
4) Composite 2" Versa Dek, 20 GA - Base System:			
Concrete at 120 pcf Lwt and 5" overall depth One layer of 1/2" gypsum attached to furring/resilient channel 7/8" spaced at 24"oc. and carpet 44oz with 3/8" pad			
◆ NGC Test #5006072, #7006107	50		68
Base System with carpet-commercial type(20oz / no pad) glued to concrete.			
◆ NGC Test #5006074, #7006109	51		53
Base System no carpet & pad with Homasote Comfort Base sound board 1/2"thick.			
◆ NGC Test #5006073, #7006108	49		55
5) Composite 2" Versa Dek, 20 GA - Base System:			
Concrete to be 145pcf and 5-1/4" overall depth Use one layer of 1/2" gypsum attached to furring/resilient channel 7/8" spaced at 24"oc.			
◆ NGC Test #5006083, #7006118	52		28
Base System plus Homasote Comfort Base resilient board 1/2"thick.			
◆ NGC Test #5006084, #7006119	48		50

Five (5) floor samples are to be tested. (Overall Size = 12' x 16')

Testing was performed by:

NGC Testing Services
1650 Military Road
Buffalo, NY 14217

Bob Menchetti
ph: 716-873-9750 ext.341
fx: 716-873-9753
(also: Craig Cooper
cgcooper@ngctestingservices.com)



Design No. D904 BXUV.D904 Fire-resistance Ratings - ANSI/UL 263

[Page Bottom](#)

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.

BXUV - Fire Resistance Ratings - ANSI/UL 263

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

[See General Information for Fire-resistance Ratings - ANSI/UL 263](#)

[See General Information for Fire Resistance Ratings - CAN/ULC-S101 Certified for Canada](#)

Design No. D904

May 22, 2015

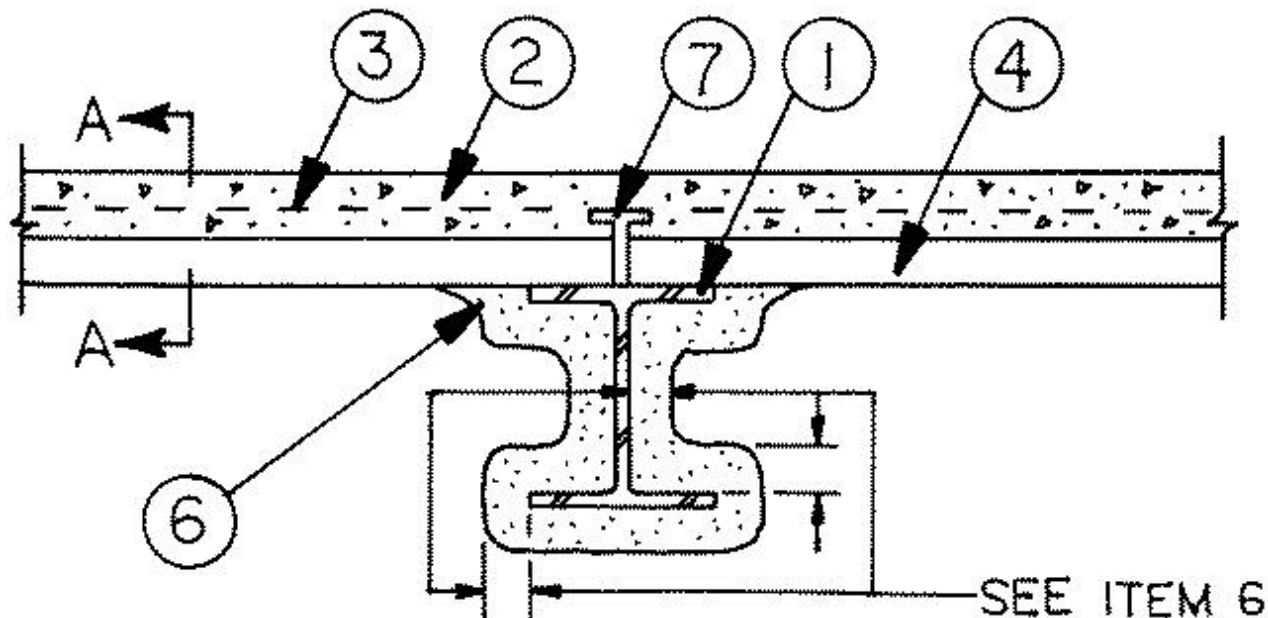
Restrained Assembly Ratings — 1, 1-1/2, 2 and 3 Hr. (See Items 2, 4A and 6)

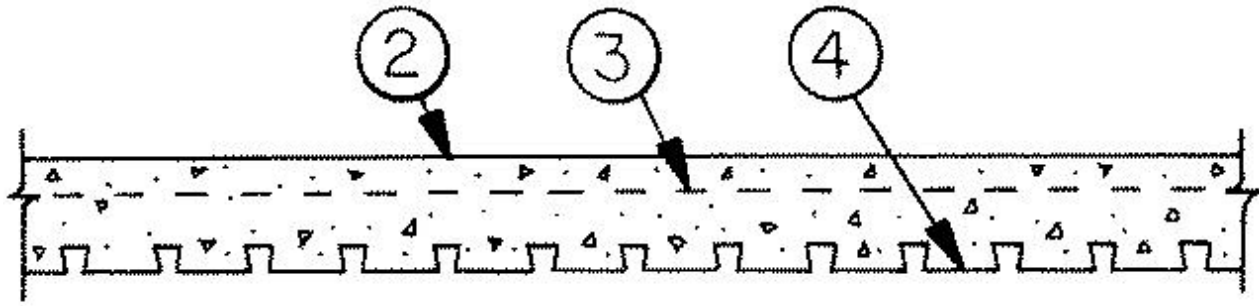
Unrestrained Assembly Rating — 3/4, 1 and 1-1/2 Hr. (See Item 4 and 4A)

Unrestrained Beam Rating — 1, 1-1/2 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.**





SEC. A-A

1. **Beam** — W10x29 or W8x28, min size. (See Item 6).

2. **Normal-Weight, Lightweight or Semi-Lightweight** — Normal weight concrete, carbonate or siliceous aggregate, 147 pcf unit weight, 3500 psi compressive strength. Lightweight concrete, expanded shale, clay or slate aggregate by rotary-kiln method or expanded clay or flyash aggregate by sintered-grate method, 112 pcf unit weight, 4000 psi compressive strength. Semi-Lightweight concrete, consisting of lightweight aggregate as described above and carbonate or siliceous normal weight aggregate, 130 pcf, 3500 psi compressive strength. Concrete thickness measured from the top of the crest of the deck.

Restrained Assembly Rating	Concrete (Type)	1.5 in. deep Deck Concrete Thickness (in.)	2.0 in. deep Deck Concrete Thickness (in.)
1 (see item 4A)	NW	N/A	2 (see item 4A)
1-1/2	NW	3-1/4	2-3/4
2	NW	3-3/4	3-1/4
2	SLW	3-1/2	3
2	LW	3	2-1/2
3	NW	5-1/4	4-3/4
3	LS	3-3/4	3-1/4
3	SLW	4-1/2	4

3. **Welded Wire Fabric** — 6x6 — 6/6 SWG.

4. **Steel Floor and Form Units***; — Composite. All 1-1/2 or 2 in. deep, 17, 18 or 24 in. wide, 22 MSG min galv fluted units. Welded to supports 12 in. O.C. max. Adjacent units button-punched or welded together 36 in. O.C. at joints. For 2 in. deep units with clear spans not more than 10 ft, the Unrestrained Assembly Rating is 1-1/2 hr.

CHIA TEH CONSTRUCTION MATERIAL CO LTD — Types ALK, ALN, Versa I, Versa II, and Versa III.

CONSOLIDATED SYSTEMS INC — 24 in. wide, Type Versa-Dek.

EPIC METALS CORP — Type Epicore, and Bondek.

HARD DECK ENTERPRISES CO LTD — 36 in. wide Types HD-2W, HD-3W, HD-4W-620-51H, Type HD-4W-555-65H.

MARLYN STEEL DECKS INC — Type Marcore.

4A. **Steel Floor and Form Units*** — Composite, 2 in. deep only, 17, 18 or 24 in. wide, 22 MSG min galv fluted units. Welded to supports 12 in. OC max. Adjacent units button-punched or welded together 36 in. OC at joints. For clear spans not more than 10 ft, the Unrestrained Assembly rating is 1 hour.

EPIC METALS CORP — Type Epicore

5. **Joint Cover** — Optional — (Not shown) — 2 in. wide cloth adhesive tape applied following the contour of the steel

form units or around the end of each open flute.

6. Spray-Applied Fire Resistive Materials* — Applied by mixing with water and spraying in more than one coat to steel beam surfaces which are clean and free of dirt, loose scale, and oil. Min average and min individual density of 15 and 14 pcf, respectively, for Types 300, 300AC, 300ES, 300HS, 300N, 3000, 3000ES and SB. For Types 400AC and 400ES min average and min individual density of 22 and 19 pcf, respectively. For method of density determination, see Design Information Section, Sprayed Material. The Spray-Applied Fire Resistive Materials shall be applied to the floor units a min of 2 in. beyond each side of the beam's top flange at the beam thickness. Crest areas above the beam need not be filled with Spray-Applied Fire Resistive Materials.

The min thicknesses of Spray-Applied Fire Resistive Materials required for various fire resistance ratings are shown in the table below:

Restrained Assembly Rating Hr	Unrestrained Beam Rating Hr	Min Beam Size	Min Thkns on Beam In.
1, 1-1/2, 2, 3	1-1/2	W10x29	3/4
1, 1-1/2, 2	1	W10x29	9/16
1, 1-1/2, 2, 3	1-1/2	W8x28	3/4
1, 1-1/2, 2	1	W8x28	1/2

BERLIN CO LTD — Types 300, 300ES, 300N or SB.

GREENTECH THERMAL INSULATION PRODUCTS MFG CO L L C — Types 300, 300AC, or 400AC.

ISOLATEK INTERNATIONAL — Types 300, 300AC, Type 300ES, 300HS, 300N, SB, 400AC, 400ES, 3000, 3000ES.

NEWKEM PRODUCTS CORP — Types 300, 300ES, 300N, or SB.

In lieu of Item 6, **Spray-Applied Fire Resistive Materials*** — (Not shown)

6A. Spray-Applied Fire Resistive Materials* — Applied by mixing with water and spraying in more than one coat to steel beam surfaces which are clean and free of dirt, loose scale, and oil. Min average and min individual density of 17.5 and 16 pcf, respectively, for Type 300TW. Min average and min individual density of 22 and 19 pcf, respectively, for Type 400. For method of density determination, see Design Information Section, Sprayed Material. The Spray-Applied Fire Resistive Materials shall be applied to the floor units a min of 2 in. beyond each side of the beam's top flange at the beam thickness. Crest areas above the beam need not be filled with Spray-Applied Fire Resistive Materials.

The min thicknesses of Spray-Applied Fire Resistive Materials required for various fire resistance ratings are shown in the table below:

Restrained Assembly Rating Hr	Unrestrained Beam Rating Hr	Min Beam Size	Min Thkns on Beam In.
1, 1-1/2, 2, 3	1-1/2	W10x29	3/4
1, 1-1/2, 2	1	W10x29	9/16
1, 1-1/2, 2, 3	1-1/2	W8x28	3/4
1, 1-1/2, 2	1	W8x28	1/2

BERLIN CO LTD — Type 400.

GREENTECH THERMAL INSULATION PRODUCTS MFG CO L L C — Type 400.

ISOLATEK INTERNATIONAL — Type 300TW or 400.

NEWKEM PRODUCTS CORP — Type 400.

In lieu of Item 6 and 6A, **Spray-Applied Fire Resistive Materials*** — (Not shown)

6B. Applied by spraying with water in one coat, to a final untamped thickness as shown above to steel beam surface which is free of dirt, oil, and scale. Use of adhesive is optional. Steel beam surfaces shall be wetted with water before

sprayed-fiber application. The material shall be sprayed to the floor units a min of 2 in. beyond the beam's top flange at the beam thickness. Crest areas above the beam need not be filled with fiber. After completion of application, all surfaces of the material shall be given a light spray of water. Min avg untamped density, 13 pcf, with min ind untamped density, 11 pcf for Types II or DC/F. Min avg and min ind untamped densities of 22 and 19 pcf, respectively, for Type HP. For method of density determination, refer to Design Information Section.

Restrained Assembly Rating Hr	Unrestrained Beam Rating Hr	Min Beam Size	Min Thkns on Beam In.
1, 1-1/2, 2, 3	1-1/2	W10x29	3/4
1, 1-1/2, 2	1	W10x29	9/16
1, 1-1/2, 2, 3	1-1/2	W8x28	3/4
1, 1-1/2, 2	1	W8x28	1/2

ISOLATEK INTERNATIONAL — Type D-C/F, HP or Type II, Type EBS or Type X adhesive/sealer is optional.

7. **Shear-Connector Studs** — Optional — Studs, 3/4 in. diam by 3 in. long headed type or equivalent per AISC specifications. Welded to the top flange of the beam through the steel form units.

*** 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 2015-05-22

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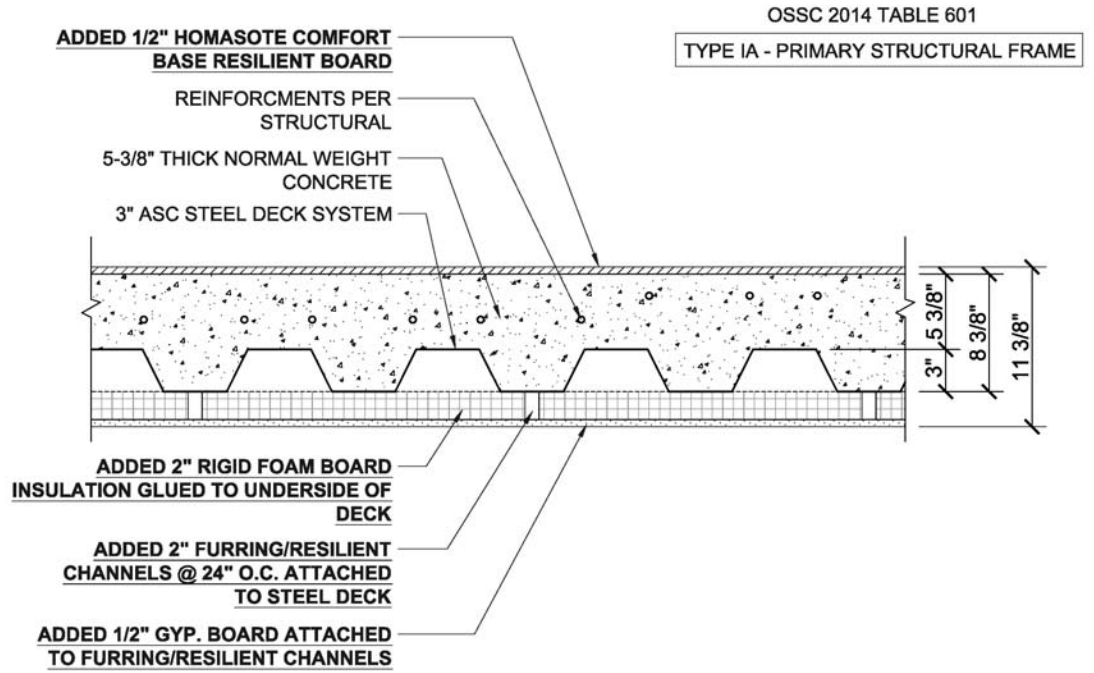
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V. PROPOSED ALTERNATE DETAIL AND SPECIFICATIONS:



FIRE TEST: UL DESIGN D924 FOR 3-HOUR RESTRAINED ASSEMBLY

STC TEST: N/A

IIC TEST: N/A

NOTE: SEE STRUCTURAL PLANS AND DETAILS FOR FURTHER INFORMATION.

-
A--

3 HR. FL./CL. ASSEM.

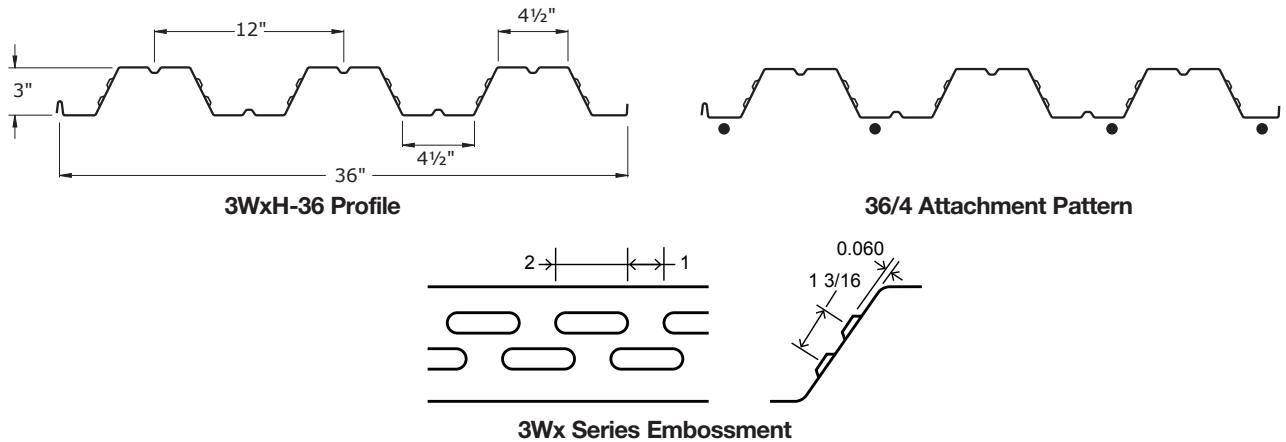
SCALE: 1" = 1' - 0"



Figure 1.4.1: ASC STEEL DECK- UNDERWRITERS LABORATORIES (UL) FIRE RESISTANCE

Restrained Assembly Rating ⁸	Concrete		CF 1-3/8	Deck ³										Smooth Series™ Option	Note	UL Design Number	
	Thickness	Type		BH-36	BHN-36	BHN-35 ¹ / ₄	BHF-36	NH-32	NHN-32	NHF-32	2WH-36	2WHF-36	3WXH-36				3WXHF-36
hr	in	pcf															
1	3 1/2	147-153 NW		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Y	D923	
1-1/2	4	147-153 NW		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Y		
2	4 1/2	147-153 NW		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Y		
3	5 1/4	147-153 NW		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Y		
1	2 1/2	107-113 LW		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Y		
1-1/2	3	107-113 LW		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Y		
2	3 1/4	107-113 LW		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Y		
2	3 1/4	107-116 LW						✓	✓	✓	✓	✓	✓	✓	Y		
3	4 3/16	107-113 LW		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Y		
1	2 5/8	107-120 LW		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Y		
2	3 1/2	107-120 LW		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Y		
3	4 7/16	107-120 LW		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Y		
2	4 1/8	142-148 NW		✓	✓	✓					✓		✓		N/A	4	D924
2	4 3/8	142-148 NW		✓	✓	✓					✓		✓		N/A	5	
2	3 1/8	105-111 LW		✓	✓	✓					✓		✓		N/A		
3	5	142-148 NW		✓	✓	✓					✓		✓		N/A	4	
3	5 3/8	142-148 NW		✓	✓	✓					✓		✓		N/A	5	
3	4	105-111 LW		✓	✓	✓					✓		✓		N/A		
Refer to D902 for these values.																D925	
Refer to D916 for these values.																D927	
Refer to D916 for these values.																D929	
Refer to D902 for these values.																D931	
Refer to D916 for these values.																D949	
1	3 1/2	147-153 NW		✓	✓	✓	✓				✓	✓	✓	✓	Y	D957	
1-1/2	4	147-153 NW		✓	✓	✓	✓				✓	✓	✓	✓	Y		
2	4 1/2	147-153 NW		✓	✓	✓	✓				✓	✓	✓	✓	Y		
3	5 1/4	147-153 NW		✓	✓	✓	✓				✓	✓	✓	✓	Y		
1	2 1/2	107-113 LW		✓	✓	✓	✓				✓	✓	✓	✓	Y		
1-1/2	3	107-113 LW		✓	✓	✓	✓				✓	✓	✓	✓	Y		
2	3 1/4	107-113 LW		✓	✓	✓	✓				✓	✓	✓	✓	Y		
2	3 1/4	107-116 LW									✓	✓	✓	✓	Y		
3	4 3/16	107-113 LW		✓	✓	✓	✓				✓	✓	✓	✓	Y		
1	2 5/8	107-120 LW		✓	✓	✓	✓				✓	✓	✓	✓	Y		
2	3 1/2	114-120 LW		✓	✓	✓	✓				✓	✓	✓	✓	Y		
3	4 7/16	114-120 LW		✓	✓	✓	✓				✓	✓	✓	✓	Y		

2.1 3WxH-36



Panel Properties

Gage	Weight psf	Base Metal Thickness in	Yield Strength ksi	Tensile Strength ksi	Gross Section Properties				
					Area in ² /ft	Moment of Inertia in ⁴ /ft	Distance to N.A. from Bottom in	Section Modulus in ³ /ft	Radius of Gyration in
22	1.70	0.0290	50	65	0.504	0.770	1.48	0.497	1.236
21	1.92	0.0330	50	65	0.556	0.850	1.48	0.548	1.236
20	2.09	0.0359	50	65	0.605	0.927	1.48	0.595	1.236
19	2.43	0.0420	50	65	0.708	1.083	1.48	0.695	1.236
18	2.76	0.0478	50	65	0.806	1.233	1.49	0.789	1.236
16	3.43	0.0598	50	65	1.008	1.540	1.49	0.984	1.236

Gage	Effective Section Modulus at F_y					Effective Moment of Inertia for Deflection			
	Compression	Bending				Moment of Inertia	Moment of Inertia	Uniform Load Only	
	Area	Section Modulus	Distance to N.A. from Bottom	Section Modulus	Distance to N.A. from Bottom			$I_d = (2I_e + I_g)/3$	
	A_c in ² /ft	S_{e+} in ³ /ft	y_b in	S_{e-} in ³ /ft	y_b in	I_{e+} in ⁴ /ft	I_{e-} in ⁴ /ft	I_+ in ⁴ /ft	I_- in ⁴ /ft
22	0.309	0.392	1.33	0.404	1.63	0.727	0.720	0.741	0.737
21	0.362	0.452	1.36	0.465	1.61	0.823	0.813	0.832	0.826
20	0.414	0.510	1.39	0.524	1.59	0.910	0.900	0.916	0.909
19	0.532	0.636	1.43	0.654	1.55	1.083	1.073	1.083	1.077
18	0.651	0.761	1.46	0.781	1.52	1.233	1.230	1.233	1.231
16	0.887	0.984	1.49	0.982	1.50	1.540	1.540	1.540	1.540

Reactions at Supports (plf) Based on Web Crippling

Gage	Condition	Bearing Length of Webs							
		Allowable (R_n/Ω)				Factored (ΦR_n)			
		1"	2"	4"	6"	1"	2"	4"	6"
22	End	296	368	471	550	452	564	721	842
	Interior	522	630	783	900	776	937	1164	1338
21	End	379	470	598	697	580	719	915	1066
	Interior	667	801	990	1135	993	1191	1472	1688
20	End	424	524	666	775	649	802	1020	1186
	Interior	746	893	1101	1261	1110	1329	1638	1876
19	End	600	737	930	1078	918	1127	1423	1650
	Interior	1054	1252	1532	1747	1568	1863	2280	2599
18	End	743	908	1141	1320	1137	1389	1746	2020
	Interior	1305	1542	1878	2136	1941	2294	2794	3178
16	End	1143	1383	1723	1983	1749	2116	2636	3034
	Interior	2008	2350	2834	3206	2986	3495	4216	4768

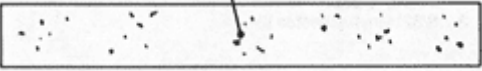
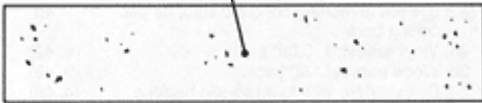
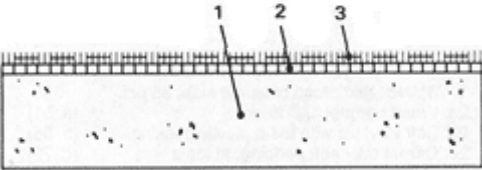
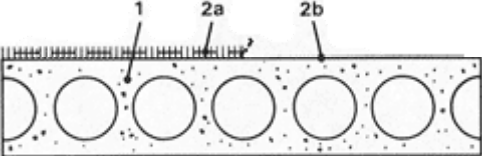
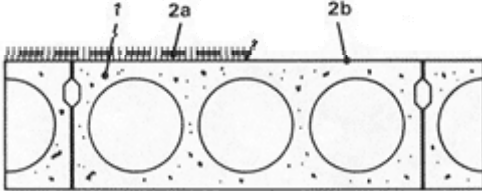
Web Crippling Constraints

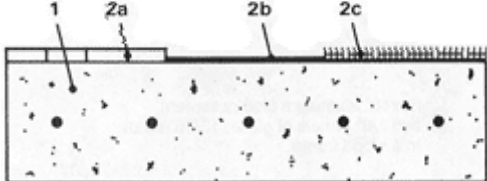
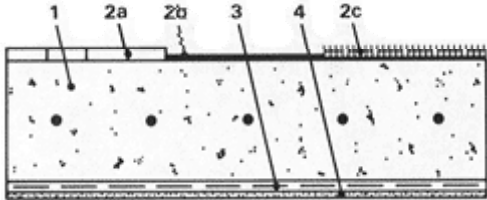
$h=2.16"$

$r=0.125"$

$\theta=54.4^\circ$

FLOORS: Concrete

Sketch	Brief Description	STC (IIC)
	1. 4" thick concrete slab, 54 psf.	44 (25)
	1. 6" thick concrete slab, 75 psf.	55 (34)
	1. 6" thick concrete slab. 2. 1/2" wood-fiber board glued to concrete. 3. 44 oz. carpet on 40 oz. hair pad.	NA (81)
	1. 6" thick hollow-core concrete panel, 45 psf. 2. <ul style="list-style-type: none"> a. Carpet and pad. b. No floor covering. 	48 (a. 69) (b. 23)
	1. 8" thick hollow-core concrete panel, 57 psf. 2. <ul style="list-style-type: none"> a. 66 oz. carpet on 50 oz. hair pad. b. No floor covering. 	50 (a. 74) (b. 28)

Sketch	Brief Description	STC (IIC)
	<ol style="list-style-type: none"> 1. 5" thick reinforced concrete slab, 55 psf. ceiling bare. 2. <ol style="list-style-type: none"> a. Wood parquet 1/2" thick. b. Soft vinyl tile with foam plastic backing. c. Carpet over soft padding, at least 1/4" thick. 	51 (a. 46) (b. 50) (c. 70)
	<ol style="list-style-type: none"> 1. 5" thick reinforced concrete slab, 55 psf. 2. <ol style="list-style-type: none"> a. Wood parquet 1/2" thick. b. Soft vinyl tile with foam plastic backing c. Carpet over soft padding, at least 1/4" thick. 3. Resilient furring channels on 1/2" fiberglass blankets. 4. 1/2" gypsum board. 	56 (a. 51) (b. 55) (c. 75)