Development Services

From Concept to Construction

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More Contact Info (http://www.portlandoregon.gov//bds/article/519984)

APPEAL SUMMARY

Status: Decision Rendered

Appeal ID: 31481	**Project Address:** 380 SE 11th Ave
Hearing Date: 4/12/23	**Appellant Name:** Kristina Hauri
Case No.: B-018	**Appellant Phone:** 5032339856
Appeal Type: Building	**Plans Examiner/Inspector:** Steven Mortensen, Corey Stanley
Project Type: commercial	**Stories:** 4 **Occupancy:** R-2, B, S-1, S-2 **Construction Type:** V-A
Building/Business Name: Francis + Clare Place	**Fire Sprinklers:** Yes - Throughout
Appeal Involves: Erection of a new structure	**LUR or Permit Application No.:** 22-209217-CO
Plan Submitted Option: pdf [File 1] [File 2] [File 3] [File 4]	**Proposed use:** Multi-Family

APPEAL INFORMATION SHEET

Appeal item 1

Code Section	2019 OSSC 713.5
Requires	Shaft enclosures shall be constructed as fire barriers in accordance with section 707 or horizontal assemblies constructed in accordance with Section 711, or both, and shall have continuity in accordance with section 707.5 for fire barriers or section 711.2.2 for horizontal assemblies as applicable.
Code Modification or Alternate Requested	To provide 2HR protection for horizontal ductwork using Fire Wrap
Proposed Design	The proposed design to utilize firewrap in lieu of a horizontal shaft to protect the ductwork in an unoccupied roof to maintain fire protection continuity and eliminate the need for Fire/Smoke Dampers (FSD) at shaft wall penetrations. Ductwork located in the unoccupied attic is an extension of the ductwork in the shaft from below that runs horizontal and connects ductwork from the floors below to the air handler located in the adjacent mechanical well. The proposed design provides equivalent protection by extending the protection of the shaft to the air handler on the roof through the use of 2 Hour rated Duct Wrap where it exits the shaft to the exterior wall as shown on the attached drawings Exhibit 1. The required continuity of 2 hour shaft to be achieved using 3M fire Barrier Duct Wrap 615+ (Exhibit 2) installed as describe in W-L-7180 (Exhibit 4) and tested fire design 3MU/DI 120-01 (Exhibit 3). Fire Barrier Duct Wrap to be continuous from the point the duct exits the 2 Hour GWB shaft enclosure until the duct meets the exterior sheathing at the wall of the attic/mechanical well.

	The duct to be wrapped to meet minimum gauge and maximum size requirements of table 1 of 3MU/DI 120-01
Reason for alternative	The proposed 3M Duct Wrap is designed and tested to provide same level of fire rated protection as that of the shaft enclosure when installed per the listing document. The duct wrap will maintain continuity of the protection of the duct, same as that provided by the shaft enclosure, from the point it exits the shaft enclosure up to the roof assembly where it exits the building.

Appeal item 2

Code Section	2019 OSSC 703.3 & 704.4
Requires	703.3 Alternative Methods for Determining Fire Resistance. The application of any of the alternative methods listed in this section shall be based on the fire exposure and acceptance criteria specified in ASTM E 119 or UL 263. 704.4 Protection of secondary members. Secondary members that are required to have a fire-resistance rating shall be protected by individual encasement protection.
Code Modification or Alternate Requested	To provide 1-hour fire rated protection for HSS Beam
Proposed Design	The proposed design consists of a 14” X 6” X ¼” HSS beam to be protected by intumescent paint with the thickness required by the manufacturer to provide 1-hour fire rated protection. See Exhibit 5 for detail, wall section, and structural plans/details for reference. The proposed design is equivalent to the UL-listed assembly BXUV.N614 to achieve a 1-hour fire-rated protection (Exhibit 6). The proposed HSS rectangular beam compared to the tested wide flange steel beam (W8x24 min) in the UL listed assembly using the W/D ratio shows a greater W/D ratio, which implies a greater inherent fire-resistance.
Reason for alternative	As a secondary structural member, HSS beams are required to have a 1-Hour fire rating per Table 601 of the OSSC. The HSS Beam is protected by intumescent paint to provide 1-hour fire-resistance, equivalent to the protection provided by the tested UL assembly N614. The proposed design for the HSS beam with intumescent paint protection exceed/achieves the required 1-hour fire-resistance.

APPEAL DECISION

1. Use of 3M Fire Barrier Duct Wrap to provide 2-hour protection for horizontal ductwork: Granted provided protection of supporting construction required by OSSC 707.5.1 and 711.2.3 is verified at time of plan review and provided the continuity of the 2-hour fire rating is maintained from where the fire wrap connects the vertical shaft to the exterior sheathing of the exterior wall and is verified at time of plan review.

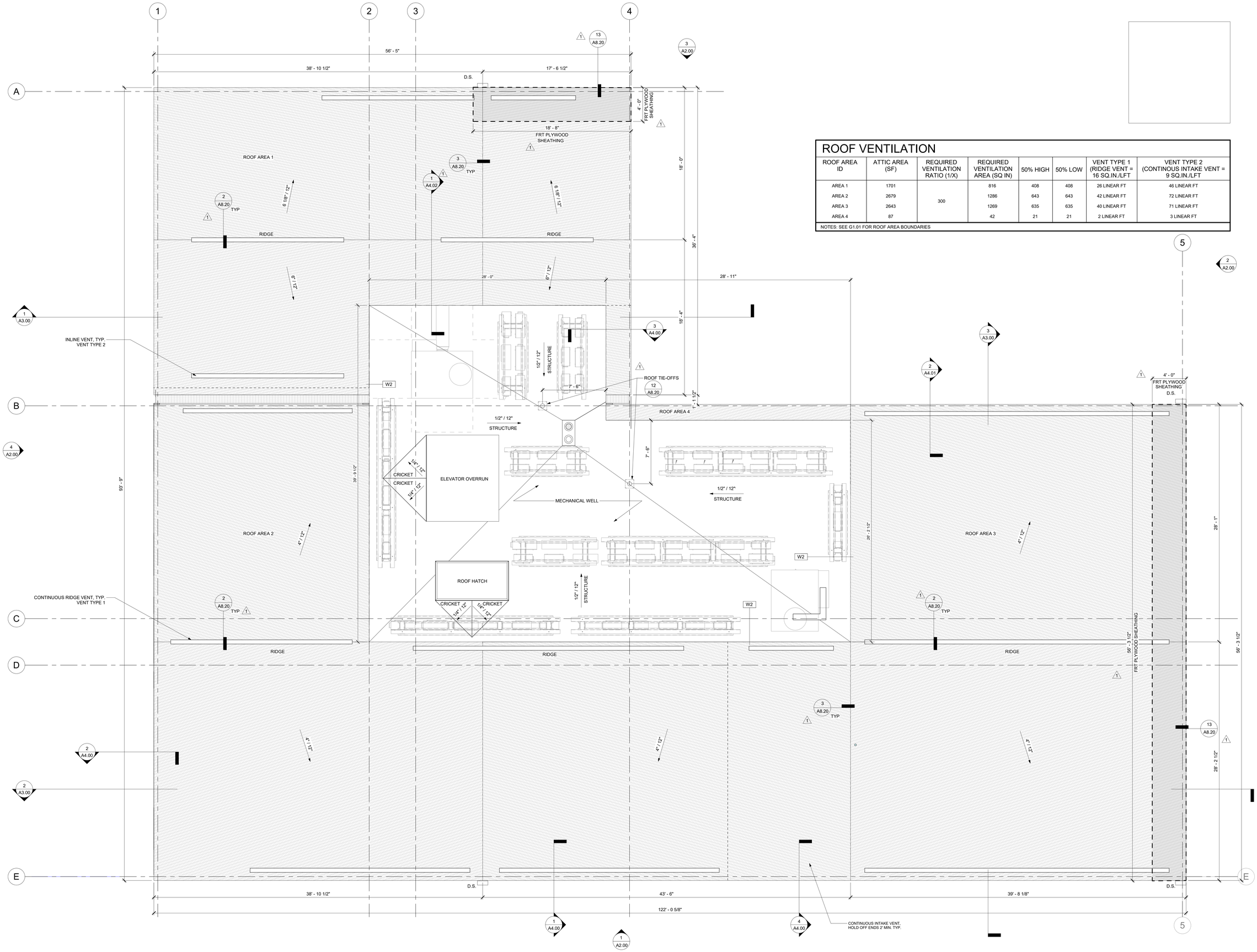
2. Alternate two-hour fire rated HSS beam assembly with engineering analysis: Granted provided the intumescent paint manufacturer’s charts must be provided with the intumescent paint deferred submittal or with the permit drawings to indicate the specific thickness of intumescent paint required on all 4 sides of the HSS 14x6x1/4 beam.

Appellant may contact John Butler (503 865-6427) or e-mail at John.Butler@portlandoregon.gov with questions.

The Administrative Appeal Board finds with the conditions noted, 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 90 calendar days of the date this decision is published. For information on the appeals process, go to www.portlandoregon.gov/bds/appealsinfo, call (503) 823-6251 or come in to the Development Services Center.



ROOF VENTILATION

ROOF AREA ID	ATTIC AREA (SF)	REQUIRED VENTILATION RATIO (1/X)	REQUIRED VENTILATION AREA (SQ IN)	50% HIGH	50% LOW	VENT TYPE 1 (RIDGE VENT = 16 SQ.IN./LFT	VENT TYPE 2 (CONTINOUS INTAKE VENT = 9 SQ.IN./LFT
AREA 1	1701	300	816	408	408	26 LINEAR FT	46 LINEAR FT
AREA 2	2679		1286	643	643	42 LINEAR FT	72 LINEAR FT
AREA 3	2643		1269	635	635	40 LINEAR FT	71 LINEAR FT
AREA 4	87		42	21	21	2 LINEAR FT	3 LINEAR FT

NOTES: SEE G1.01 FOR ROOF AREA BOUNDARIES

1 A1.05 ROOF PLAN
1/4" = 1'-0"

NORTH

4/5/2023 8:08:46 AM

HOLST

123 NE 3RD AVE.
SUITE 310
PORTLAND, OR
97232

HOLSTARC.COM

FRANCIS + CLARE PLACE

1131 SE Oak St.
Portland, OR 97214

JOB NO. 21-008

BID SET

02.13.2023

issue:	date:
50% SD SET	04.01.2022
100% SD SET	06.10.2022
50% DD SET	08.05.2022
100% DD SET	09.16.2022
50% CD SET	10.31.2022
PERMIT SET	12.05.2022
BID SET	02.13.2023
ADD 1	03.03.2023

#	revision:	date:
1	PERMIT REV 1	02.08.2023

EXHIBIT 1

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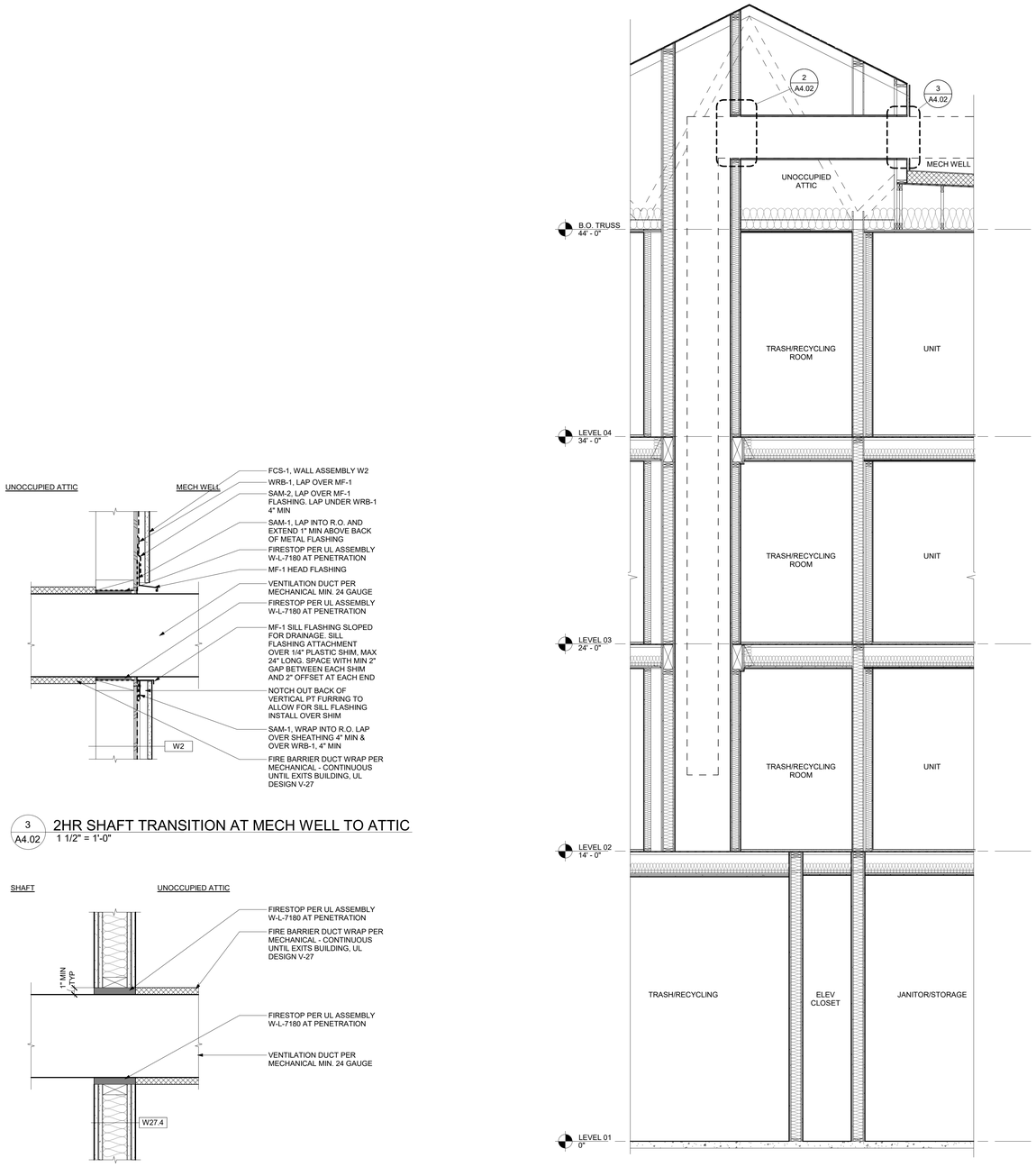
ROOF PLAN

sheet:
A1.05



1 WALL SECTION @ SHAFT TO DUCT
A4.02 3/8" = 1'-0"

3 A4.02 2HR SHAFT TRANSITION AT MECH WELL TO ATTIC
1 1/2" = 1'-0"

2 A4.02 2HR SHAFT TRANSITION AT ATTIC
1 1/2" = 1'-0"

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50% SD SET	04.01.2022
100% SD SET	06.10.2022
50% DD SET	08.05.2022
100% DD SET	09.16.2022
50% CD SET	10.31.2022
PERMIT SET	12.05.2022
BID SET	02.13.2023
ADD 1	03.03.2023

#	revision:	date:

EXHIBIT 1

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WALL SECTION
& ATTIC DETAILS

sheet:
A4.02

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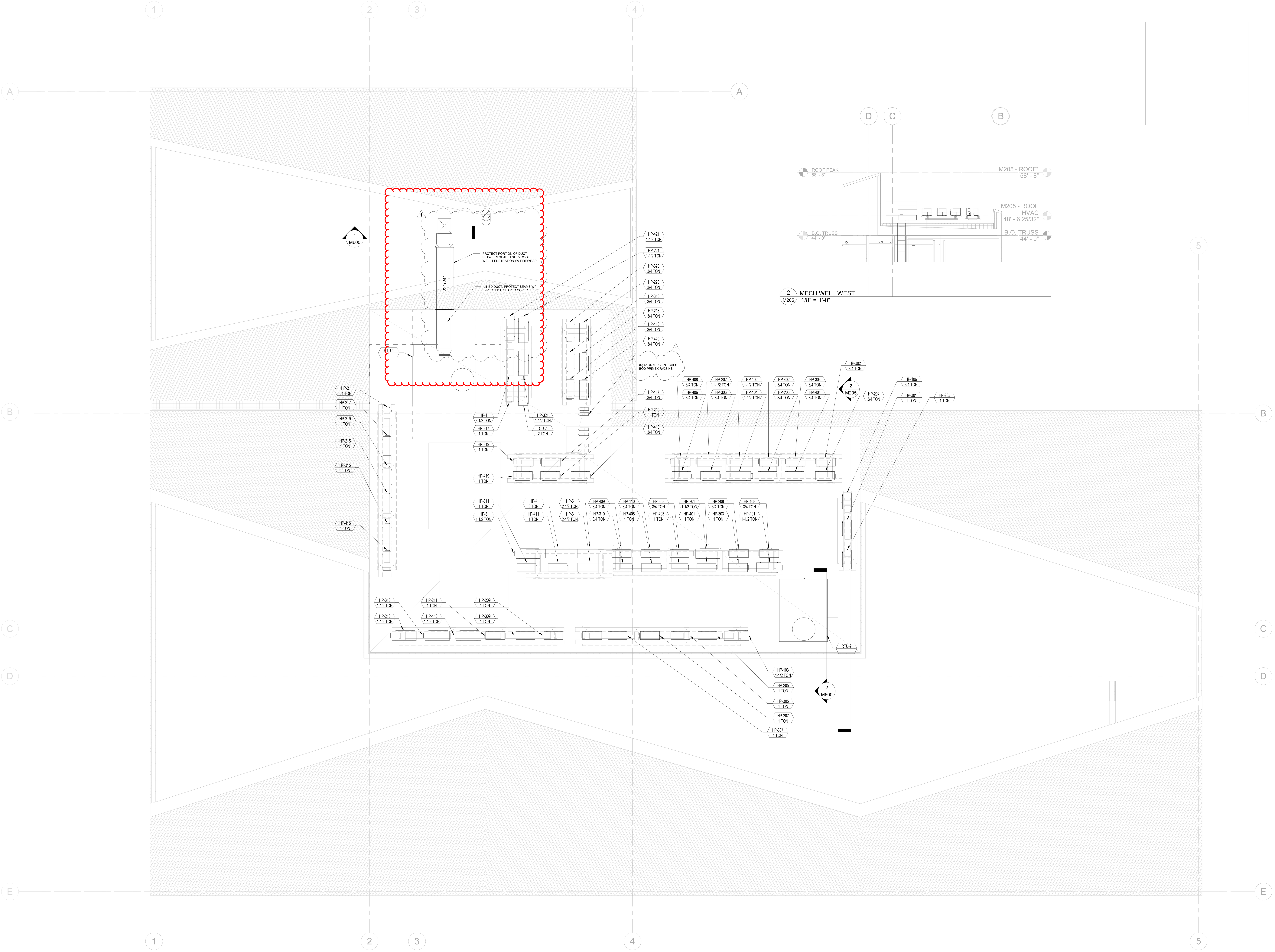

1 M205 - ROOF HVAC
1/4" = 1'-0"

HOLST

123 NE 3RD AVE.
SUITE 310
PORTLAND, OR
97232

HOLSTARC.COM

FRANCIS + CLARE PLACE

1131 SE OAK STREET
PORTLAND OREGON 97214

JOB NO. 422304

REGISTERED PROFESSIONAL ENGINEER 93857PE
Alexander H. Wilson
OREGON
MAY 14, 2019
ALEXANDER H. WILSON
EXPIRES: 06-30-2024

JOB START DATE: 9/19/22
PROJECT CONTACT: Checker
DRAFTER: Author
JOB NO. 422304

American Heating, Inc.
5035 SE 24TH AVENUE
PORTLAND, OREGON 97202-4765
TELEPHONE (503) 239-4600 FAX (503) 239-7038

QUALITY CONTROL CHECKING DONE BY:

INITIALS:	DATE:	INITIALS:	DATE:

PERMIT SET

05 OCT 2018

issue:	date:
50% CD SET	10.31.2022

#	revision:	date:
1	PERMIT REV 1	2/7/2023

EXHIBIT 1

title:
ROOF - MECHANICAL

sheet:
M205

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EXHIBIT 2

3M Fire Barrier Duct Warp 615+
Product Data Sheet and Installation guide

3M™ Fire Barrier Duct Wrap 615+

Product Data Sheet and Installation Guide

Commercial Kitchen Grease and Ventilation Air Ducts

Confidence
Even Under Fire

FIRE BARRIER

UP TO 2 HOUR Fire Protection

FLEXIBLE WRAP

GREASE & AIR DUCT Fire Protection

ICC ES™ ICC-ES ESR-1255

NFPA® 96

CLASSIFIED UL®

BATTS AND BLANKETS
FOR USE IN FIRE RESISTIVE DUCT ASSEMBLIES
SEE UL FIRE RESISTANCE DIRECTORY
90G9

LISTED
OMEGA POINT LABORATORIES US
Intertek
FIRE RESISTANT DUCT
SEE INTERTEK DIRECTORY

LISTED
C US
Intertek
FIRE RESISTANT DUCT
SEE INTERTEK DIRECTORY

LISTING STATE OF CALIFORNIA STATE FIRE MARSHAL SERVICE

CSFM
LISTING No.
2440-0941:112

3M

3M™ Fire Barrier Duct Wrap 615+

Product Data Sheet and Installation Guide

FIRE BARRIER — UP TO 2 HOUR Fire Protection

FLEXIBLE WRAP — GREASE & AIR DUCT Fire Protection

ICC-ES ESR-1255

NFPA 96

LISTED — OMEGA POINT LABORATORIES US — Intertek — FIRE RESISTANT DUCT SEE INTERTEK DIRECTORY

LISTED — C UL US — Intertek — FIRE RESISTANT DUCT SEE INTERTEK DIRECTORY

CLASSIFIED UL

BATTS AND BLANKETS
FOR USE IN FIRE RESISTIVE DUCT ASSEMBLIES
SEE UL FIRE RESISTANCE DIRECTORY
90G9

CSFM
LISTING No.
2440-0941:112

1. Product Description

3M™ Fire Barrier Duct Wrap 615+ is a flexible fire-resistant wrap consisting of an inorganic fiber blanket encapsulated with a scrim-reinforced foil. The product is 1-1/2" thick, 6 pcf density.[1] It is used to fire rate commercial kitchen grease ducts as well as ventilation ducts. 3M™ Fire Barrier Duct Wrap 615+ is a proven alternative to 1- or 2-hour fire-resistant rated shaft enclosures for grease ducts (ICC-ES ESR-1255). With its excellent insulating capabilities, low weight and thin profile, it is an ideal choice for a duct enclosure system. This non-asbestos[2] wrap installs easily due to its high flexibility and strength.

[1] In accordance with the tolerances in ASTM C 892 Standard Specification for High-Temperature Fiber Blanket Thermal Insulation.
[2] These fibers are not biopersistent and are therefore non-carcinogenic per Note Q of EU Directive 67/548/EEC (guideline 97/69/EG).

Flexible and lightweight with a thin profile for easier application and reduced space requirements

Product Features

- Two-layer wrap for grease ducts rated as a shaft alternative per ASTM E 2336
- Zero clearance to combustible throughout the entire enclosure system
- Butted inner layer in 2-layer grease duct applications
- One-layer wrap for fire-resistive ventilation ducts per ISO 6944
- High flexibility for installation ease
- Foil encapsulated for blanket protection, less dust, and high wrap strength
- Wide range of penetration seal systems
- Available in: 24" x 25 ft. (609.6mm x 7.62m) and 48" x 25 ft. (1219.2mm x 7.62m) rolls
- Blanket adhered to foil scrim helps prevent wrap from slumping

2. Applications

3M™ Fire Barrier Duct Wrap 615+ is an ideal fire resistive enclosure for commercial kitchen grease ducts and ventilation air ducts. It is a proven alternative to a 1- or 2-hour fire-resistant rated shaft enclosures for grease ducts and provides zero clearance to combustible construction throughout the entire enclosure system (per ICC-ES ESR-1255). 3M™ Fire Barrier Water Tight Sealant 1000 NS, 3M™ Fire Barrier Water Tight Sealant 1003 SL or 3M™ Fire Barrier Silicone Sealant 2000+ is used in combination with 3M™ Fire Barrier Duct Wrap 615+ to firestop the duct when the duct penetrates fire-rated floor or wall assemblies. 3M™ Fire Barrier Duct Wrap 615+ also provides a firestop solution where a T-rating is required for penetrations located outside wall cavities or outside fire-resistance rated shaft enclosures.

Two-layer grease duct applications: 3M™ Fire Barrier Duct Wrap 615+ meets the criteria of ASTM E 2336 Standard Test Methods for Fire Resistive Grease Duct Enclosure Systems.

Single-layer ventilation duct applications: 3M™ Fire Barrier Duct Wrap 615+ has passed ISO 6944-1985 Fire Resistance Tests – Ventilation Ducts.

T-rating for metallic through-penetrating items: 3M™ Fire Barrier Duct Wrap 615+ is used in conjunction with 3M Fire Barrier sealants to achieve up to 2-hour equal F & T-ratings in ASTM E 814 (UL 1479) tested through-penetrations.

3. Specifications

Installation shall be in strict accordance with manufacture's written instructions, as shown on the approved shop drawings. 3M™ Fire Barrier Duct Wrap 615+ shall be a high-temperature fibrous thermal insulation blanket encapsulated in a fiberglass-reinforced aluminized polyester foil. Duct Wrap density shall be nominal 6 pcf (96 kg/m^3) and have a nominal 1-1/2" (38.1mm) thickness. The fiber blanket shall have a continuous use limit of 1000°C (1832°F). The blanket thermal resistance (R-value) at ambient temperature shall be minimum $6.3 \frac{°F - ft^2 - hr}{Btu}$.

Smoke Developed Index and Flame Spread Index of the bare blanket, and of the foil encapsulated blanket shall be 0/0. The foil encapsulation shall be bonded to the core blanket material.

Typically Specified Division or Section
Division 7 – Thermal and Moisture Protection
Section 23 07 13 – Duct Insulation

Related Sections
Section 07 21 00 – Thermal Protection
Section 07 21 16 – Blanket Insulation
Section 07 84 00 – Firestopping
Section 23 00 00 – Heating, Ventilation and Air-Conditioning (HVAC)
Section 23 31 13 – Metal Ducts

4. Performance & Typical Physical Properties

Scrim Color:	Aluminum with Black Text
Blanket Color:	White
Blanket Weight:	0.9 lbs/ft.^{2} (4.38 kg/m^2)
Surface Burning:	Foil Encapsulated Blanket (ASTM E 84) Flame Spread 0, Smoke Development 0

Single layer R-Value of 3M™ Fire Barrier Duct Wrap 615+ at 77°F (25°C):

$$6.38 \ \frac{°F - ft^2 - hr}{Btu}$$

Single layer R (SI) Value of 3M™ Fire Barrier Duct Wrap 615+ at 77°F (25°C):

$$0.89 \ \frac{m^2 - K}{W}$$

Thermal Conductivity:

Temp.	*Btu - in. / hr - ft² - °F*	*W / m² - K*
500°F (260°C)	0.60	0.09
1000°F (537°C)	1.15	0.17
1500°F (815°C)	1.93	0.28
1800°F (982°C)	2.51	0.36
2000°F (1093°C)	2.94	0.43

Linear Shrinkage (24 hrs at 2012°F (1000°C)): 1.2%

Noise Reduction Coefficient (ASTM C 423): 0.80

5. Design Listings

Grease Duct Listings – ASTM E 2336 / ICC-ES AC101

Fire Resistive Rating	Enclosure System	Third-Party Testing Services Design Listing	Description
1- and 2-hour	2 layers of 3M™ Fire Barrier Duct Wrap 615+	ICC-ES ESR-1255 Intertek 3MU/FRD 120-18 Intertek 3MU/FRD 120-19	Rectangular Rectangular Round

Ventilation Duct Listings – ISO 6944-85

Fire Resistive Rating	Enclosure System	Third-Party Testing Services Design Listing	Description
1- and 2-hour	1 layer of 3M™ Fire Barrier Duct Wrap 615+	Intertek 3MU/DI 60-01 Intertek 3MU/DI 120-01 Underwriters Laboratories HNLJ.V-27 Underwriters Laboratories HNLJ.V-31	Rectangular/Round (1 hour) Rectangular/Round (2 hour) Rectangular (2 hour) 2- & 3-sided Rectangular (2 hour)

This document only contains a partial list of Design Listings. For the latest information go to www.3M.com/firestop or speak to your authorized 3M distributor or sales representative at (800) 328-1687.

6. Codes & Test Standards

3M™ Fire Barrier Duct Wrap 615+ has been tested in accordance with the following:

ASTM E 2336	Standard Test Methods for Fire Resistive Grease Duct Enclosure Systems
ICC-ES AC101	Acceptance Criteria for Grease Duct Enclosure Assemblies
ASTM E 119	Standard Test Methods for Fire Tests of Building Construction
ASTM E 814	Standard Test Method for Fire Tests of Penetration Firestop Systems
ASTM E 136	Standard Test Method for Behavior of Material in a Vertical Tube Furnace at 750ºC (1382°F)
ASTM C 518	Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus
ASTM E 84	Standard Test Method for Surface Burning Characteristics of Building Materials
ISO 6944-85	Fire Resistance Tests – Ventilation Ducts

3M™ Fire Barrier Duct Wrap 615+, when installed per ASTM E 2336 tested Grease Duct Design Listings, addresses the following code requirements:

New York City OTCR	Buildings Bulletin 2010-021
NFPA 96	2008/2011
International Mechanical Code®	2003/2006/2009/2012
Uniform Mechanical Code	2003/2006/2009/2012

3M™ Fire Barrier Duct Wrap 615+, when installed per ISO 6944 tested Ventilation Duct Design Listings, can help to satisfy the following code requirements:

New York City OTCR	Buildings Bulletin 2012-011
NFPA 92A	Standard for Smoke-Control System Utilizing Barriers and Pressure Differences, 2009 Edition – Section 6.6.2
NFPA 92B	Standard for Smoke Management Systems in Malls, Atria, and Large Spaces, 2009 Edition – Section 7.5.2
International Mechanical Code®	2006/2009/2012 – Section 513.10.2
International Building Code®	2006/2009/2012 – Section 909.10.2

7. Packaging, Storage, Shelf Life

3M™ Fire Barrier Duct Wrap 615+ rolls are packaged in corrugated cardboard boxes. Product is stable under normal storage conditions. Normal stock and stock rotation practices are recommended. 3M™ Fire Barrier Duct Wrap 615+ shelf life is indefinite when stored in original unopened packaging in a dry warehouse environment. Pallets should not be stacked. 3M™ Fire Barrier Water Tight Sealant 1000 NS or 1003 SL or 3M™ Fire Barrier Silicone Sealant 2000+ must be also stored in a dry warehouse environment.

9. Ventilation Air Duct Installation Techniques

3M™ Fire Barrier Duct Wrap 615+ should be installed per the application design listing in accordance with the following basic installation instructions.

1-Layer Ventilation Duct Method (ISO 6944)

Note: This general instruction for applying 3M™ Fire Barrier Duct Wrap 615+ details a one-layer wrap installation of 3M™ Fire Barrier Duct Wrap 615+ blanket applied directly to a ventilation duct. To minimize waste, the 3M™ Fire Barrier Duct Wrap 615+ material should be rolled out tautly before measuring. The single layer of 3M™ Fire Barrier Duct Wrap 615+ blanket is wrapped around the perimeter of the duct and is cut to a length to overlap itself not less than 3" (76.2mm), this is known as the "circumferential" or "lateral" joint. The interface between adjacent blankets forms the "longitudinal" joint. The minimum overlap required at the longitudinal joints is a minimum 3" (76.2mm) overlap. Aluminum foil tape or FSK tape is used to seal all cut edges of the blanket and any tears in the foil scrim. As an installation aide, the blanket may be temporarily held in place using filament tape. The 3M™ Fire Barrier Duct Wrap 615+ requires permanent fastening with stainless (or carbon) steel banding, or with rows of weld, pins (impaling or cup head style).

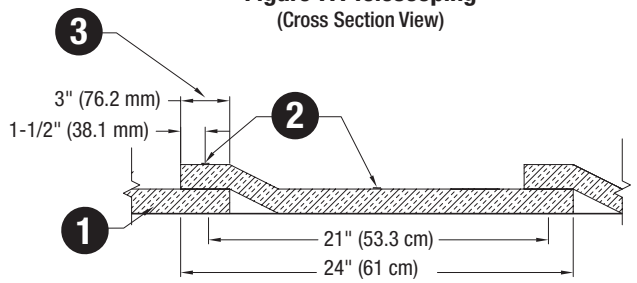
Three approved ventilation duct installation techniques: 3M™ Fire Barrier Duct Wrap 615+

7A. Telescoping 3" (76.2mm) Overlap Wrap

With the Telescoping Overlap Wrap method, each blanket overlaps one adjacent blanket. Each blanket has one edge initially exposed which is then covered by the edge of the next blanket as shown in Figure 2A.

1. Single layer of 3M™ Fire Barrier Duct Wrap 615+
2. Steel banding 1/2" (12.7mm) wide min. typical
3. 3" (76.2mm) min. longitudinal overlap

Figure 7A Telescoping
(Cross Section View)

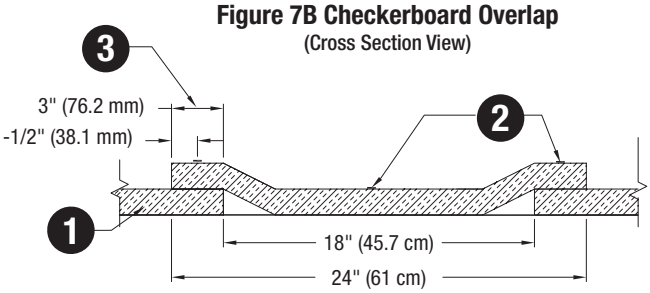


7B. Checkerboard 3" (76.2mm) Overlap Wrap

With the 3" (76.2mm) Checkerboard Overlap Wrap method, blankets with both edges exposed alternate with blankets with covered edges, as shown in Figure 2B.

1. Single layer of 3M™ Fire Barrier Duct Wrap 615+
2. Steel banding 1/2" (12.7mm) wide min. typical
3. 3" (76.2mm) min. longitudinal overlap

Figure 7B Checkerboard Overlap
(Cross Section View)

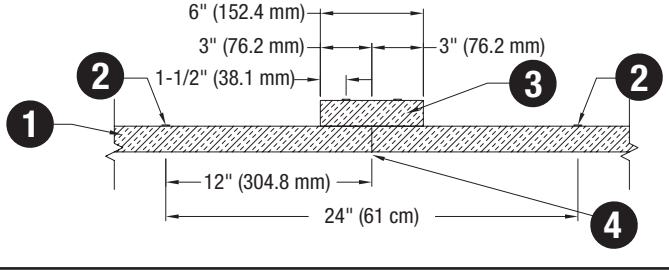


7C. Butt Joint with Collar

With the Butt Joint and Collar method, adjacent blankets are butted tightly together and 6" (152.4mm) wide collar of duct wrap is centered over the joint, overlapping each blanket by 3" (76.2mm) minimum as shown in Figure 2C.

1. Single layer of 3M™ Fire Barrier Duct Wrap 615+
2. Steel banding 1/2" (12.7mm) wide min. typical
3. 6" (152.4mm) min. wide 3M™ Fire Barrier Duct Wrap 615+ Collar
4. Tightly butted joint

Figure 7C Butt Joint with Collar
(Cross Section View)

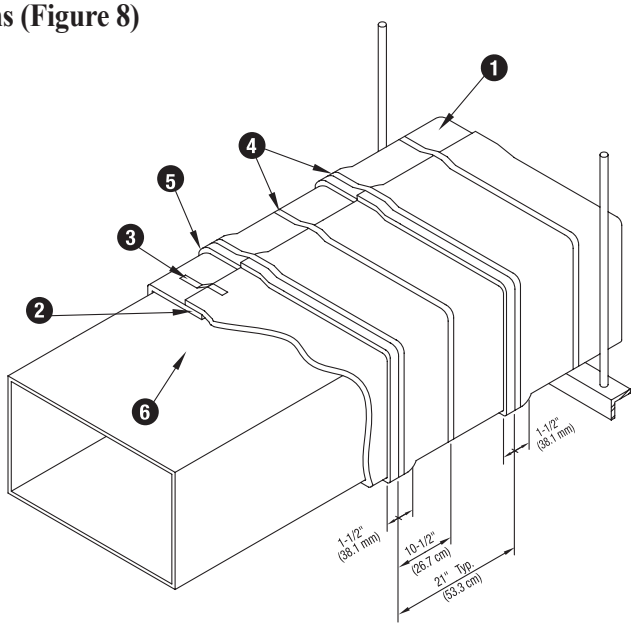


9. Ventilation Air Duct Installation Techniques cont.

3M™ Fire Barrier Duct Wrap 615+Ventilation Duct Systems (Figure 8)

1. 3M™ Fire Barrier Duct Wrap 615+, 1-layer
2. Perimeter (lateral) joint min. 3" (76.2mm) overlap
3. 3/4" (19mm) wide filament tape
4. Steel banding 1/2" (12.7mm) wide min. typical for permanent fastening
5. Longitudinal joint min. 3" (76.2mm) overlap
6. Metallic ventilation duct

Note: System integrity is limited by quality of installation. Ducts ≥ 24" (60.9cm) wide require pinning on the bottom side of horizontal ducts and on a minimum of one of the wider sides of a vertical duct. Vertical ducts require pinning on all sides > 48" (121.8cm).



Note: System integrity is limited by quality of installation. Consult current independent testing laboratories (e.g. Intertek, UL) for Design or System Details.

10. Grease Duct & Ventilation Air Duct Installation Techniques

Duct Support (Grease & Ventilation)

Horizontal duct assemblies with maximum cross-sectional areas of 24" x 24" (610mm x 610mm) must be supported with min. 3/8" diameter (9.5mm), all-thread steel rod and 2" x 2" x 1/8" (51mm x 51mm x 3.2mm) steel angle, spaced a maximum of 60" (1524mm) on center. A min. clearance of 0" (0mm) and a max. clearance of 6" (152mm) is required between the vertical edge of the blanket material surrounding the duct and the steel rod. Horizontal duct assemblies with max. dimensions of 24" x 48" (610mm x 1219mm) must be supported with min. 1/2" diameter (12.7mm), all-thread steel rod and 2" x 2" x 1/4" (51mm x 51mm x 6.4mm) steel angle spaced a max. of 60" (1524mm) on center. A min. clearance of 0" (0mm) and a max. clearance of 6" (152mm) is required between the vertical edge of the blanket material surrounding the duct and the steel rod. Vertical ducts must be supported at every floor line on the top of the slab.

Pinning & Banding Requirements

Duct Width	Banding Only	Banding with Bottom-Side Pinning	Pinning Only (All 4 sides)
width ≤ 24"	✔		✔
24" < width ≤ 48"		✔	✔
width > 48"			✔

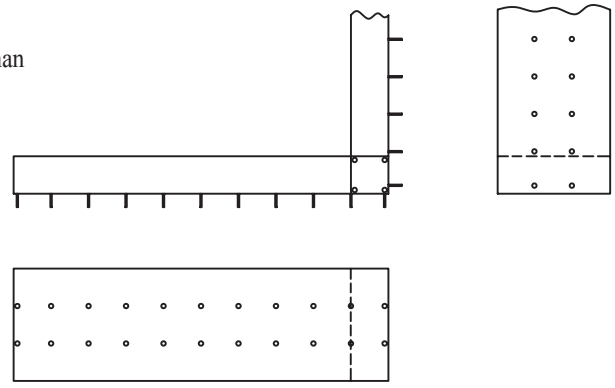
3M™ Fire Barrier Duct Wrap 615+ Pinning guide (Figure 9)

Additional pinning to prevent sagging of the duct wrap. For all ducts greater than 24" (60cm) in width, pinning is required to support the blanket on the bottom horizontal surface and on the outside face of a vertical duct run. Space pins a max. of 10-1/2" (26.7cm) apart in the direction of the blanket width, and a max. 12" (30cm) apart in the direction of the blanket length.

Materials and Equipment

- Minimum 12 gauge copper-coated steel insulation pins used with minimum 2-1/2" (63.5mm) square galvanized steel or stainless speed clips or 1-1/2" (38.1mm) dia. round or equivalent sized insulated cup-head pins
- Capacitor discharge stud gun

Note: Either apply min. 12 gauge copper-coated impaling pins to the bare duct using a capacitor discharge gun or apply min. 12 gauge cup-head pins after the duct wrap is installed.

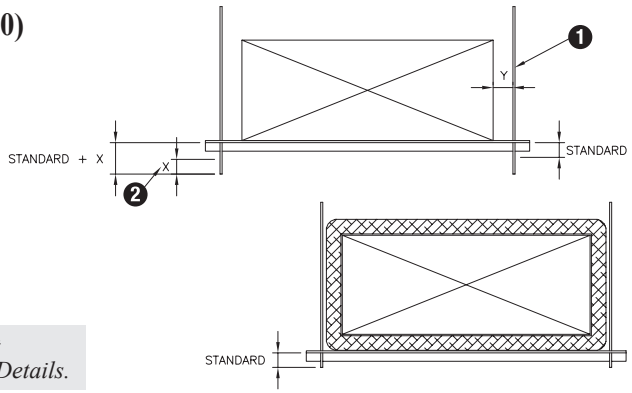


Note: System integrity is limited by quality of installation. Consult current independent testing laboratories (e.g. Intertek, UL) for Design or System Details.

3M™ Fire Barrier Duct Wrap 615+ Hanging Support Details for Fire-Rated Ductwork (Figure 10)

Note: To facilitate the application of 3M Fire Barrier Duct Wrap 615+ so that the rods & trapeze hangers are outside the wrap envelope, the following dimensions are recommended:

	1-layer	2-layer
1. Rod-to-bare duct clearance (Y)	4" (102mm)	6" (152mm)
2. Added rod length (X)	2" (51mm)	4" (102mm)

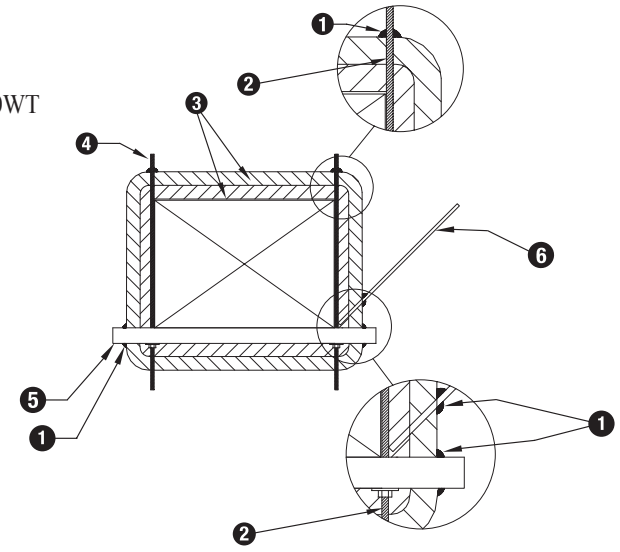


Note: System integrity is limited by quality of installation. Consult current independent testing laboratories (e.g. Intertek, UL) for Design or System Details.

3M™ Fire Barrier Duct Wrap 615+ Hanger Penetrations of Wrap Envelope for Grease or Ventilation Duct Systems (Figure 11)

1. Min. 1/2" (12.7mm) crown of 3M™ Fire Barrier Sealant CP 25WB+ or 3000WT
2. Tape seams – min. 3" (76.2mm) wide aluminum tape, 3M™ FSK Facing Tape 3320 (or equivalent)
3. 1 or 2 layers of 3M™ Fire Barrier Duct Wrap 615+ (application dependent)
4. All Threaded Rod
5. C-channel or angle iron trapeze support
6. Seismic bracing wire

Note: The inclusion of metallic items penetrating out of the wrap envelope may diminish the T-Rating of the enclosure.

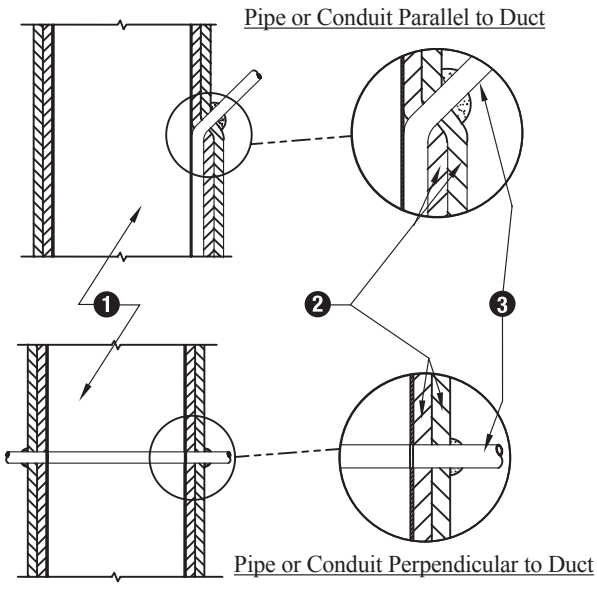


Note: System integrity is limited by quality of installation. Consult current independent testing laboratories (e.g. Intertek, UL) for Design or System Details.

3M™ Fire Barrier Duct Wrap 615+ Conduit Penetrations of Wrap Envelope for Grease or Ventilation Duct Systems (Figure 12)

1. Duct
2. 1 or 2 layers of 3M™ Fire Barrier Duct Wrap 615+ (application dependent)
3. Min. 1/2" (12.7mm) crown of 3M™ Fire Barrier Sealant CP 25WB+ or 3000WT

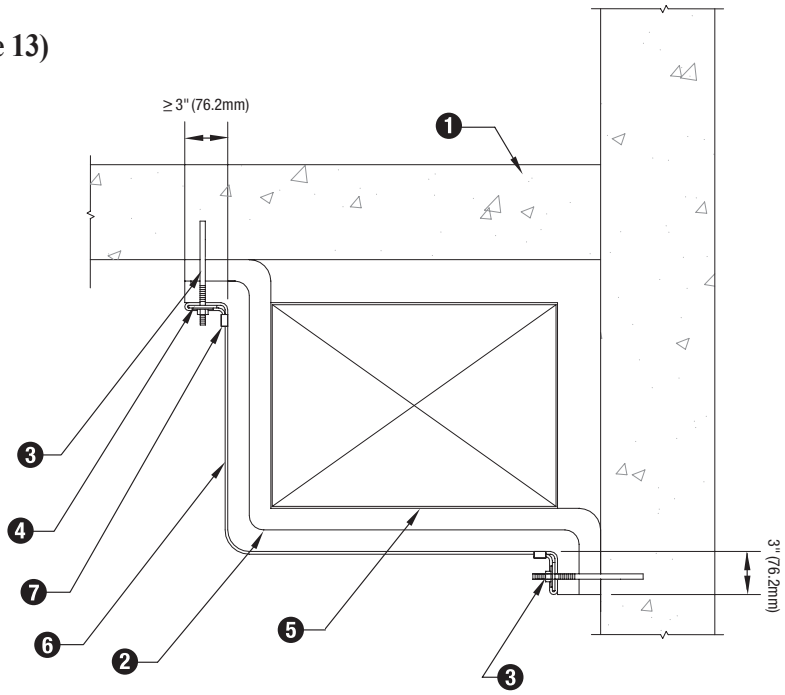
Note: The inclusion of metallic items penetrating out of the wrap envelope may diminish the T-Rating of the enclosure. Penetrants within the wrap envelope are not protected from the effects of a grease fire.



Note: System integrity is limited by quality of installation. Consult current independent testing laboratories (e.g. Intertek, UL) for Design or System Details.

3M™ Fire Barrier Duct Wrap 615+ Suggested Two-Sided Wrap Installation (Figure 13)

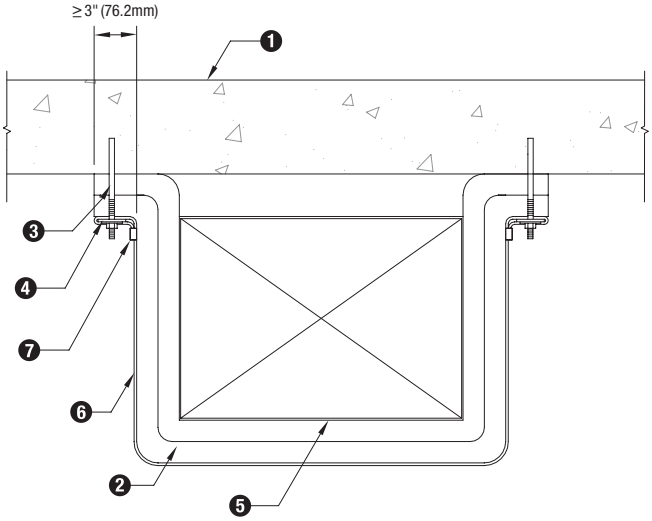
1. Concrete slab
2. 1 or 2 layers of 3M™ Fire Barrier Duct Wrap 615+ (application dependent)
3. Concrete fasteners – min. 1/4" (6.35mm) dia. steel concrete anchors
4. 1/8" (3.18mm) thick x 2" to 3" (50.8mm to 76.2mm) wide bar stock perforated 12" (30.5cm) O.C.
5. Duct
6. Steel banding 1/2" (12.7mm) wide min. typical for permanent fastening
7. Banding clips



Note: System integrity is limited by quality of installation. Consult current independent testing laboratories (e.g. Intertek, UL) for Design or System Details.

3M™ Fire Barrier Duct Wrap 615+ Suggested Three-Sided Wrap Installation (Figure 14)

1. Concrete slab assembly
2. 1 or 2 layers of 3M™ Fire Barrier Duct Wrap 615+ (application dependent)
3. Concrete fasteners – min. 1/4" (6.35mm) dia. steel concrete anchors
4. 1/8" (3.18mm) thick x 2" to 3" (50.8mm to 76.2mm) wide bar stock perforated 12" (30.5cm) O.C.
5. Duct
6. Steel banding 1/2" (12.7mm) wide min. typical for permanent fastening
7. Banding clips



Note: System integrity is limited by quality of installation. Consult current independent testing laboratories (e.g. Intertek, UL) for Design or System Details.

3M™ Fire Barrier Duct Wrap 615+ Elbow and Banding Installations (Figure 15) Suggested Elbow Pattern Installation (A)

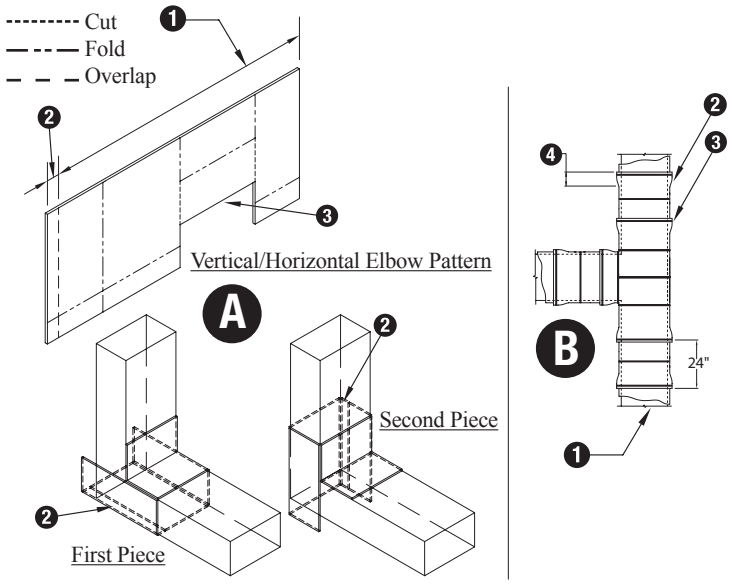
1. Perimeter
2. 3" (76.2mm) min. overlap
3. Hole cut (off-center)

Note: Place overlap on opposite side of horizontal pattern.

Suggested Banding Pattern Installation (B)

1. Grease of ventilation duct
2. 1 or 2 layers of 3M™ Fire Barrier Duct Wrap 615+ (application dependent)
3. Steel or stainless steel banding 1/2" (12.7mm) wide min. typical for permanent fastening with max. 10-1/2" (26.7cm) spacing
4. 3" (76.2mm) overlay (typical throughout application)
5. Min. 3" (76.2mm) perimeter overlap (not shown)

Note: 1-layer application depicted. When 2-layer application is required, replicate these steps with outer joints staggered a min. 3" (76.2mm) from inner joints. Banding is required on outermost layer only.



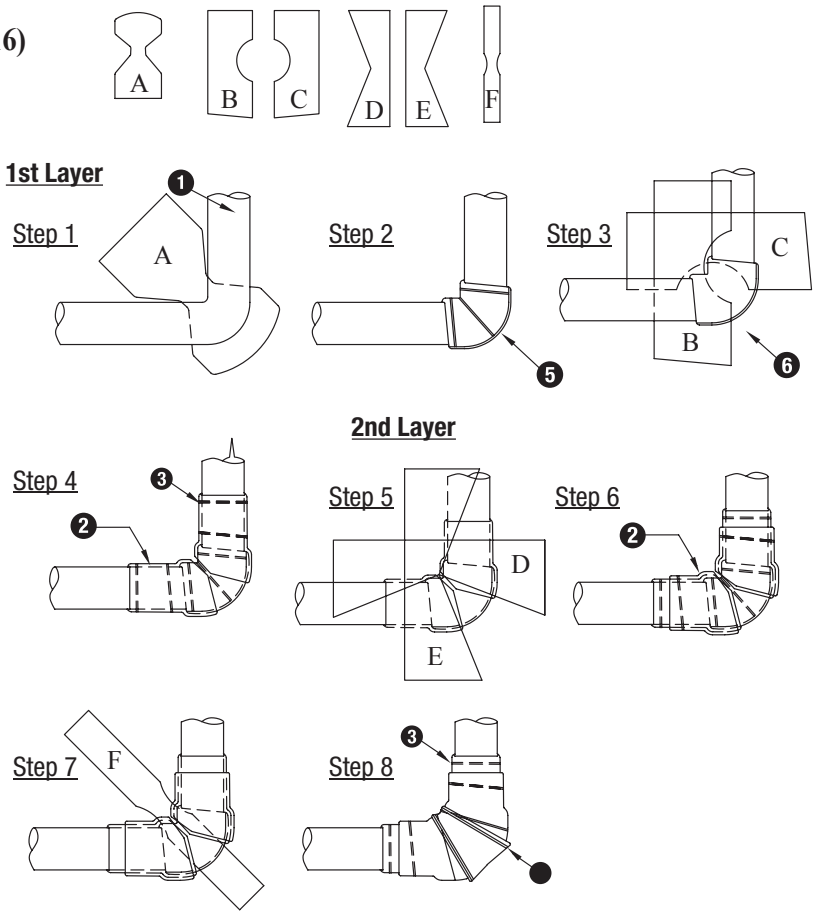
Note: System integrity is limited by quality of installation. Consult current independent testing laboratories (e.g. Intertek, UL) for Design or System Details.

3M™ Fire Barrier Duct Wrap 615+ Suggested Installation for 90° Turn (Figure 16)

A-F (representative field-cut duct wrap sections)

1. Duct
2. 1 or 2 layers of 3M™ Fire Barrier Duct Wrap 615+ (application dependent)
3. Scotch® Filament Tape 898 (or equivalent)
4. Steel banding 1/2" (12.7mm) wide min. typical for permanent fastening
5. Min. 3" (76.2mm) perimeter overlap
6. Min. 3" (76.2mm) longitudinal overlap

Note: 2-layer application depicted. When 1-layer application is used, install banding (item 4) as a permanent hold.

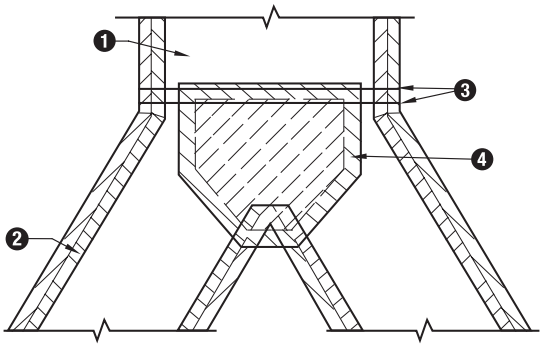


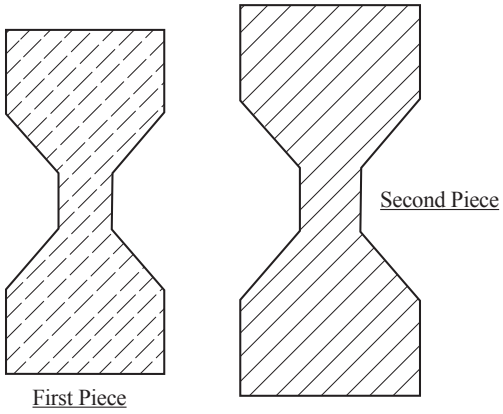
Note: System integrity is limited by quality of installation. Consult current independent testing laboratories (e.g. Intertek, UL) for Design or System Details.

3M™ Fire Barrier Duct Wrap 615+ Suggested Branching Duct Details (Figure 17)

1. Duct
2. Full width pieces of 1 or 2 layers of 3M™ Fire Barrier Duct Wrap 615+ (application dependent)
3. Steel banding 1/2" (12.7mm) wide min. typical for permanent fastening
4. 3M™ Fire Barrier Duct Wrap 615+ (field cut)

Note: Install first piece onto the inside of the inner duct area and then install the adjacent pieces so they overlap at the edges a minimum of 3" (76.2mm). When an application requires a second layer of duct wrap, install the second piece over the first piece and overlap at the edges a minimum of 3" (76.2mm).

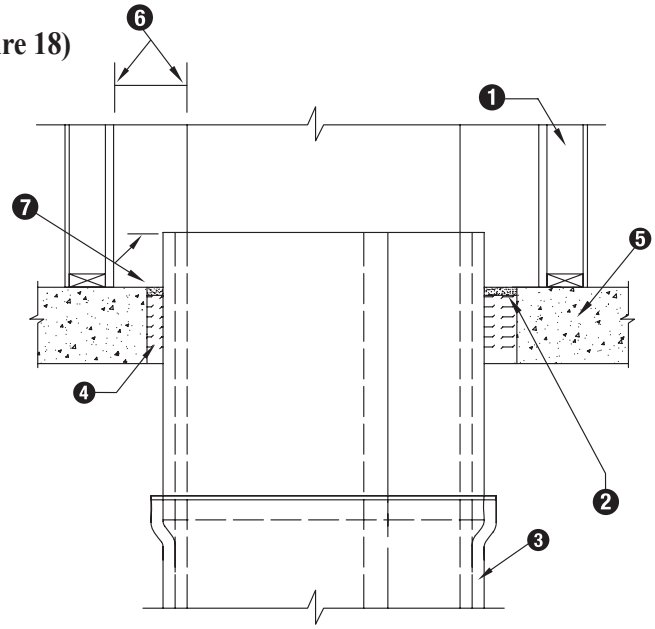




Note: System integrity is limited by quality of installation. Consult current independent testing laboratories (e.g. Intertek, UL) for Design or System Details.

3M™ Fire Barrier Duct Wrap 615+ Suggested Duct Wrap / Shaft Transition Installations (Figure 18)

1. Fire barrier gypsum shaft assembly
2. 5/8" (15.88mm) depth of 3M™ Fire Barrier Sealant 1000NS, 1003SL or 2000+
3. 1 or 2 layers of 3M™ Fire Barrier Duct Wrap 615+ (application dependent)
4. 3M™ Fire Barrier Duct Wrap 615+ (use small scrap piece)
5. Fire barrier concrete floor assembly
6. Air gap as required by local mechanical code (grease ducts)
7. Extend duct wrap into shaft a min. distance that meets local code requirements for clearance to combustibles



Note: System integrity is limited by quality of installation. Consult current independent testing laboratories (e.g. Intertek, UL) for Design or System Details.

10. Grease Duct & Ventilation Air Duct Installation Techniques cont.

Penetrations

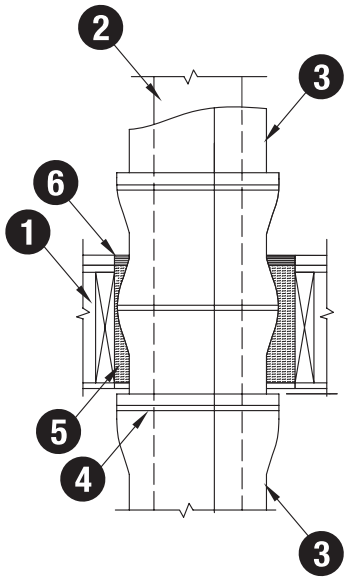
When the duct penetrates a fire rated wall, ceiling or floor, an approved firestop system must be employed. Figures 19–21 illustrate typical conditions. To firestop the wrapped duct, follow the installation parameters detailed in a compatible ASTM E 814 tested through-penetration firestop design. Note: Through-penetration designs in which the duct is bare where it passes through combustible or limited-combustible construction (e.g. gypsum walls or wood joist floor-ceiling assemblies) are appropriate for ventilation duct scenarios only. It is not appropriate for bare, uninsulated grease ducts to pass through combustible assemblies. Intertek 3MU/DI design listings contain through penetration details. See system details of UL System HNLJ.V-27, Section 3.C. for applicable UL through penetration systems.

3M™ Fire Barrier Duct Wrap 615+ Typical Through Penetration Firestop System (Figure 19)

1-Hour Through Penetration Systems Fire-Rated Wood/Gypsum Floor/Ceiling Assembly

1. Floor/ceiling assembly
2. Duct
3. One or two layers 3M™ Fire Barrier Duct Wrap 615+
4. Banding or pinning
5. 3M™ Fire Barrier Packing Material PM 4, 4 pcf mineral wool, or scrap duct wrap (min. 33% compressed)
6. 3M™ Fire Barrier Water Tight Sealant 1000 NS, 3M™ Fire Barrier Water Tight Sealant 1003 SL, or 3M™ Fire Barrier Silicone Sealant 2000+

Note: Sealant to be applied at a minimum 5/8" (15.9mm) depth.



Note: System integrity is limited by quality of installation. Consult current independent testing laboratories (e.g. Intertek, UL) for Design or System Details.

3M™ Fire Barrier Duct Wrap 615+ Typical Through Penetration Firestop System (Figure 20)

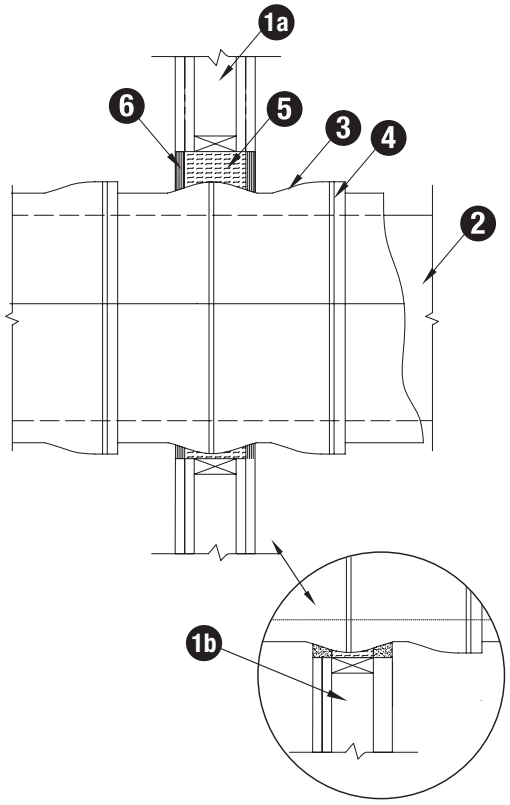
1- or 2-Hour Through Penetration Systems — Gypsum Wall or Gypsum Shaftwall

1a. Gypsum wall assembly

1b. Gypsum shaftwall assembly

2. Duct
3. One or two layers 3M™ Fire Barrier Duct Wrap 615+ (layering dependant on application)
4. Banding or pinning
5. 3M™ Fire Barrier Packing Material PM 4, 4 pcf mineral wool, or scrap duct wrap (min. 33% compressed)
6. 3M™ Fire Barrier Sealant 1000NS or 2000+ applied at a min. 5/8" (15.9mm) depth

Note: The assembly can be either a symmetrical gypsum wall or an asymmetrical gypsum shaftwall.



Note: System integrity is limited by quality of installation. Consult current independent testing laboratories (e.g. Intertek, UL) for Design or System Details.

For technical data and properties of 3M™ Fire Barrier Water Tight Sealant 1000 NS, 3M™ Fire Barrier Water Tight Sealant 1003 SL or 3M™ Fire Barrier Silicone Sealant 2000+, see separate product data sheets available from your 3M representative or go to www.3M.com/firestop.

10. Grease Duct & Ventilation Air Duct Installation Techniques cont.

3M™ Fire Duct Wrap 615+ Typical Through Penetration Firestop System (Figure 21)

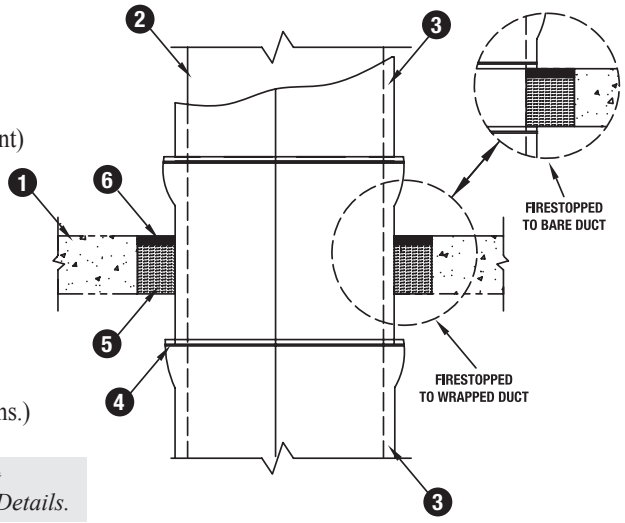
1- or 2-Hour Through Penetration Systems
4-1/2" (11.4cm) Concrete Floor or Wall

1. Floor/ceiling or wall assembly
2. Duct
3. One or two layers 3M™ Fire Barrier Duct Wrap 615+ (application dependent)
4. Banding or pinning
5. 3M™ Fire Barrier Packing Material PM 4, 4 pcf mineral wool or scrap duct wrap (min. 33% compressed)
6. 3M™ Fire Barrier Water Tight Sealant 1000 NS, 3M™ Fire Barrier Water Tight Sealant 1003 SL, or 3M™ Fire Barrier Silicone Sealant 2000+

Note: Sealant to be applied at a minimum 5/8" (15.9mm) depth.

For wall assembly apply sealant to both sides of wall.
(3M™ Fire Barrier Water Tight Sealant 1003 SL not suited for wall applications.)

Note: System integrity is limited by quality of installation. Consult current independent testing laboratories (e.g. Intertek, UL) for Design or System Details.



For technical data and properties of 3M™ Fire Barrier Water Tight Sealant 1000 NS, 3M™ Fire Barrier Water Tight Sealant 1003 SL or 3M™ Fire Barrier Silicone Sealant 2000+, see separate product data sheets available from your 3M representative or go to www.3M.com/firestop.

11. Maintenance

No maintenance is expected when installed in accordance with the applicable Intertek, UL or other third-party listed system and in accordance with 3M™ Fire Barrier Duct Wrap 615+ Installation Guidelines. Once installed, if any section of the 3M™ Fire Barrier Duct Wrap 615+ is damaged such that the blanket requires repair, the following procedure will apply:

1. If the blanket has not been damaged but the foil has ripped, seal the rips with aluminum foil tape.
2. If the blanket has been damaged:
   a. The damaged section should be removed by cutting the steel banding or removing the clips holding it in place.
   b. A new section of the same dimension should be cut from a roll of 3M™ Fire Barrier Duct Wrap 615+, either 24" (60.9cm) or 48" (121cm) wide.
   c. The new section should be placed and fitted ensuring the same overlap that existed previously (i.e. the original installation method).
   d. The steel banding should be placed around the material and tensioned so as to sufficiently hold the 3M™ Fire Barrier Duct Wrap 615+ in place.

12. Availability

3M™ Fire Barrier Duct Wrap 615+ is available from 3M Authorized Fire Protection Products Distributors and Dealers. 3M™ Fire Barrier Duct Wrap 615+ is available in 24" x 25 ft, Roll (1/case), 48" x 25 ft, Roll (1/case). 3M™ Fire Barrier Duct Wrap Collars 615+ are available in 1.5" x 6" x 25 ft, Rolls (4/case). For additional technical and purchasing information regarding this and other 3M™ Fire Protection Products, please call: 1-800-328-1687 or visit www.3M.com/firestop.

13. Safe Handling Information

Prior to handling or disposal of 3M™ Fire Protection Products, consult all relevant Material Safety Data Sheets (MSDS).

Important Notice to User:

Technical Information: The technical information, recommendations and other statements contained in this document are based upon tests or experience that 3M believes are reliable, but the accuracy or completeness of such information is not guaranteed.

Product Use: Many factors beyond 3M's control and uniquely within user's knowledge and control can affect the use and performance of a 3M product in a particular application. Given the variety of factors that can affect the use and performance of a 3M product, user is solely responsible for evaluating the 3M product and determining whether it is fit for a particular purpose and suitable for user's method of application.

Warranty and Limited Remedy: 3M warrants that each 3M™ Fire Protection Product will be free from defects in material and manufacture for 90 days from the date of purchase from 3M's authorized distributor. 3M MAKES NO OTHER EXPRESS OR IMPLIED WARRANTIES, INCLUDING ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. If a 3M product does not conform to this warranty, the sole and exclusive remedy is, at 3M's option, replacement of the 3M product or refund of the purchase price.

Limitation of Liability: Except where prohibited by law, 3M will not be liable for any loss or damage arising from the 3M product, whether direct, indirect, special, incidental or consequential, regardless of the legal theory asserted.

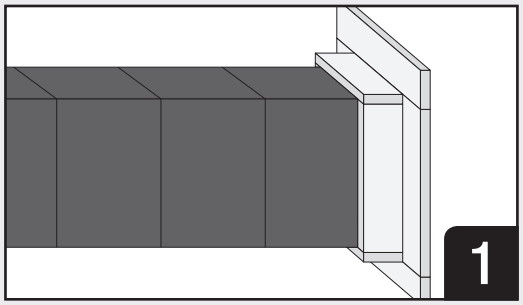
Building and Commercial Services Division
3M Center, Building 223-2N-21
St. Paul, MN 55144-1000 USA
1-800-328-1687
www.3M.com/firestop

Literature Order Info: 98-0213-4662-6

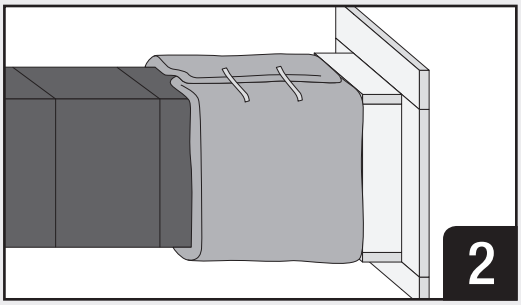
Installation Guide

June 2015

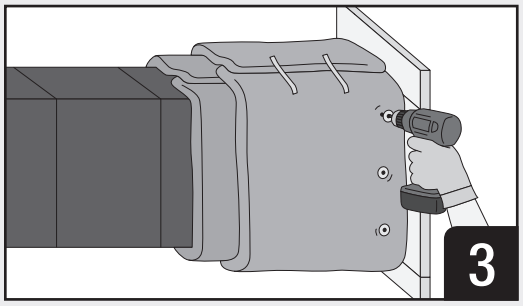
3M™ Fire Barrier Duct Wrap 615+



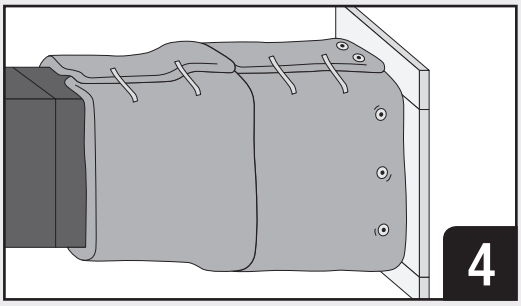
At the opening, install a penetration seal collar constructed of PROMATECT®-L500 board as per Item 7a of ETA 13-1061, either on the top surface of the floor or on both sides of the wall.



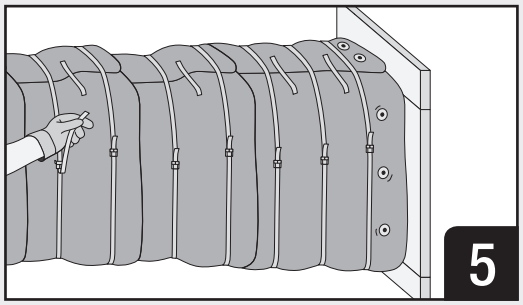
At the opening, install 3M™ Fire Barrier Duct Wrap 615+ in a single width wrap around the duct, tightly butted up to the collar. Overlap the cut edge a minimum of 100mm. Close all cut edges with 3M™ Aluminum Foil Tape. Duct wrap may be temporarily retained with 19mm wide filament tape.



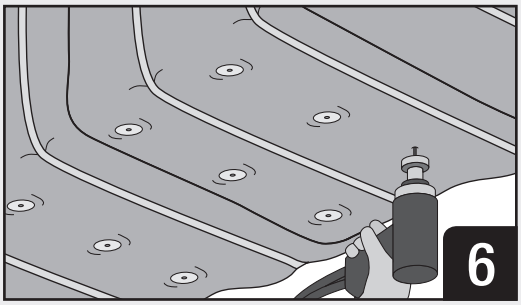
Install a second layer, fully overlapping the first and onto the collar. Overlap the cut edge a minimum of 100mm. Close all cut edges with 3M™ Aluminum Foil Tape. Duct wrap may be temporarily retained with 19mm wide filament tape. Secure second layer to collar on all four edges using 45mm drywall screws with 30mm washers, 225mm on center.



Install subsequent sections of wrap so as to overlap the previous section a minimum of 100mm and onto the cut edge a minimum of 100mm. Close all cut edges with 3M™ Aluminum Foil Tape. Duct wrap may be temporarily retained with 19mm wide filament tape.



Tightly clamp steel retention bands around duct wrap at mid width of overlapping sections and at mid width of each duct wrap section.



Install retention pins on either the underside (horizontal applications) or a single wide side (vertical applications) midway between retention bands. A minimum of three pins to be used, one centrally and two 350mm on center, no more than 170mm from the duct edge.

Installation Guide

This installation guide highlights requirements for 3M™ Fire Barrier Duct Wrap 615+ for firestopping shaft alternative ventilation and other safety duct applications. This guide is intended only to highlight general steps or methods and is not intended to describe all details and requirements. System specifications should comply with local and federal regulations. Examples of system specifiers include UL, Intertek, and European Technical Approvals and Assessments. Installer should confirm that the field conditions (such as opening size, pipe size and material, insulation type and thickness, and annular space) comply with the system specifications.

Repair Procedure in Case of Damage

Damaged seals shall be removed and replaced.

Precautionary Information

Refer to product label and Safety Data Sheet for health and safety information before using the product.
For information please contact your local 3M Office. www.3M.com/SDS

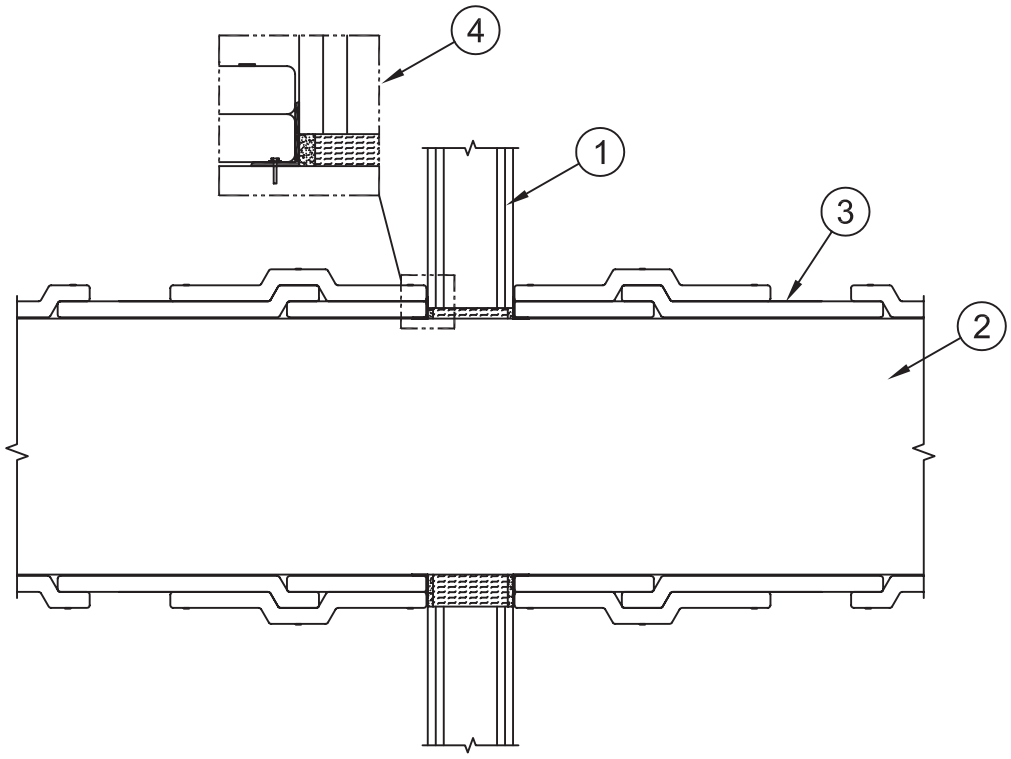
3M Industrial Adhesives and Tapes Division
3M Center, Building 225-3S-06
St. Paul, MN 55144-1000
1-800-328-1687
www.3M.com/firestop

EXHIBIT 3

System No. W-L-7180

System No. W-L-7180

July 24, 2009
F Rating – 2 Hr
T Rating – 2 Hr



1. **Wall Assembly** – The 2 hr fire-rated gypsum board/stud wall assembly shall be constructed of the materials and in the manner specified in the individual U400 or V400 Series Wall and Partition Designs in the UL Fire Resistance Directory and shall include the following construction features:

   A. **Studs** – Wall framing shall consist of steel "C" studs min 3-5/8 in. (92 mm) wide and spaced max 24 in. (610 mm) OC. Additional framing members shall be used to completely frame around opening.

   B. **Gypsum Board*** – Min 5/8 in. (15.9 mm) thick, 4 ft (1220 mm) wide with square or tapered edges as specified in the individual U400 or V400 Wall and Partition Design.

   Max size of opening is 17.3 sq ft (1.61 m^2) with a max width of 89 in. (2.26 m).

   See **Gypsum Board** (CKNX) category in the Fire Resistance Directory for names of manufacturers.

2. **Steel Air Duct** – Max 85 by 24 in. (2160 by 610 mm) 0.030 in. (0.76) mm thick (22 GA) galvanized steel duct to be installed either concentrically or eccentrically within the opening. The annular space shall be min 1 in. (25 mm) to max 3 in. (76 mm) within the framed opening. The duct shall be constructed and reinforced in accordance with SMACNA HVAC Duct Construction Standards - Metal and Flexible. Steel duct to be rigidly supported on both sides of wall assembly.

3. **Duct Wrap Materials*** – Nom 1-1/2 in. (38 mm) thick ceramic fiber batt or blanket (min 6 pcf or 96 kg/m^3) jacketed on the outside with a foil-scrim-poly facing, installed in a telescope, checkerboard or butt-joint-and-collar pattern with 3 in. (76 mm) transverse and longitudinal overlaps, in accordance with the requirements of Ventilation Assembly No. V-20. See Ventilation Duct Assemblies in Vol. 2 of the UL Fire Resistance Directory. Longitudinal and transverse joints sealed with aluminum foil tape.

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   3M FIRE PROTECTION PRODUCTS – 3M FireBarrier Duct Wrap 615 or 3M FireBarrier Duct Wrap 615+

4. **Firestop System** – The firestop system shall consist of the following:

   A. **Packing Material** – Min 4-3/4 (121 mm) thickness of min 6 pcf (96 kg/m^3) duct insulation firmly packed into opening as a permanent form. Packing material to be recessed from both surfaces of wall as required to accommodate the required thickness of fill material.

   3M COMPANY
   3M FIRE PROTECTION PRODUCTS – 3M FireBarrier Duct Wrap 615 or 3M FireBarrier Duct Wrap 615+

   B. **Fill Void or Cavity Material*** – **Sealant** – Min 5/8 in. (16 mm) thickness of fill material applied within annulus, flush with both surfaces of wall.

   3M COMPANY
   3M FIRE PROTECTION PRODUCTS – 3M FB-1000 NS

   C. **Steel Retaining Angles** – Stiffening angle 1-1/2 by 2 by 1/8 in. (38 by 52 by 3.2 mm), applied around the perimeter of the duct with the 2 in. (52 mm) leg against the sealant (Item 4B above). Angles attached to steel duct on both sides of wall with min No. 10 steel sheet metal screws spaced a max of 1 in. (25 mm) from each end of steel duct and spaced a max of 6 in. (152 mm) OC.

*Bearing the UL Classification Mark

EXHIBIT 4

Design No. 3MU/DI 120-01

Design No. 3MU/DI 120-01
VENTILATION DUCT PROTECTION
3M Company
3M™ Fire Barrier™ Duct Wraps: 615 and 615+
3M™ Fire Barrier™ Sealants: Water-Tight 1000-NS Silicone, Water-Tight 1003-SL Silicone (floors only), 2000+ Silicone, and CP 25 WB+
ISO 6944 (1985) Duct A
Stability – 2 hr
Insulation – 2 hr
Integrity – 2 hr
ASTM E 814
F-Rating – 2 hr
T-Rating – 2 hr

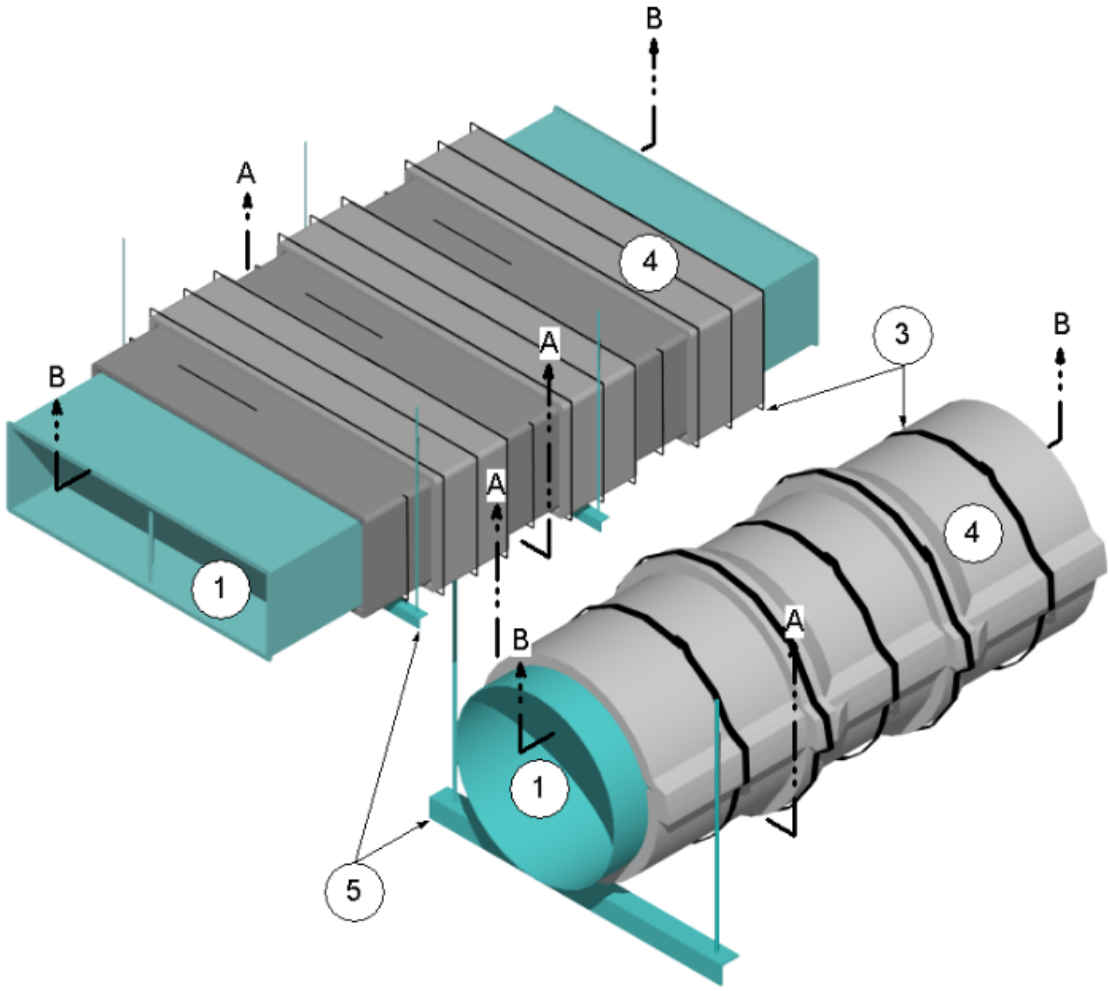


Figure 1

1. VENTILATION DUCT: Refer to Figure 1. Continuous, air-tight, rectangular or circular duct system with either horizontally or vertically oriented shafts constructed of sheet steel with a maximum area and a maximum dimension as referenced in the Table 1. When required, equip the ventilation duct with transition

fittings, e.g. elbows, tees, reducers, etcetera.

Table 1 – Ventilation Duct Requirements					
Ventilation Duct for Items 6, 7 and 8 References	**Shape**	**Minimum Gauge**	**Maximum Dimension**	**Maximum Diameter**	**Maximum Area**
R1	Rectangular	26	12	--	144
R2	Rectangular	24	40	--	400
R3	Rectangular	22	60	--	1440
R4	Rectangular	22	85	--	2040
C1	Circular	20	--	40	1257

A. Construct the ventilation duct using sections affixed to each other with seams or flanges.

B. Reinforce the ventilation duct to IMC, SMACNA or NFPA 90A requirements designed to carry the weight of the ventilation duct assembly covered with insulation (Item 4) under a fire load equivalent to ASTM E 119 time-temperature curve.

C. Rigidly support the ventilation duct in accordance with IMC, SMACNA or NFPA 90A requirements designed to carry the weight of the ventilation duct assembly covered with insulation (Item 4) under a fire load equivalent to ASTM E 119 time-temperature curve or as specified in Item 5.

D. Protect the annular space around the ventilation duct passing through a fire rated wall assembly with an Intertek certified, compatible, 3M, penetration firestop system, refer to Section 8, having the same fire rating as the wall assembly.

2. FASTENERS: Refer to Figure 2. Weld minimum 12 GA, 4-1/2-inch long, copper-coated steel insulation pins or 12 GA insulated cup head pins to the ventilation duct (Item 1). Match fastener method with corresponding insulation (Item 4) method.

A. Compression Butt Joint: Refer to 4A Section View B-B. Locate pins at all blanket overlaps, on all sides of the ventilation duct (Item 1), and meet the following requirements.

I. Space pins maximum 12 inches apart in rows across the width of ventilation duct (Item 1). Locate pins maximum 6-3/4 inches from the edges of the rectangular ventilation duct (Item 1).

II. Space the rows of pins maximum 9-1/2 inches apart along the length ventilation duct (Item 1). Where pieces of insulation (Item 4A) are to be butted together, space the pins a maximum of 2 inches apart.

III. After insulation (Item 4A) is installed, place minimum 2.5 in. x 2.5 in. square, galvanized steel, self locking washer clips onto all insulation pins.

IV. After clips are installed, cut off or bend flush with insulation (Item 4) the pins that are too long.

B. Butt Joint with Collar: Refer to 4B Section View B-B. Locate pins at all blanket overlaps, on all sides of the ventilation duct (Item 1), and meet the following requirements.

I. Space pins maximum 12 inches apart in rows around the circumference for circular

ventilation ducts (Item 1) or on all sides for rectangular ventilation ducts (Item 1). For rectangular ventilation ducts (Item 1), locate pins maximum 6-3/4 inches from the edges.

II. Space the rows of pins maximum 9 inches apart along the length ventilation duct (Item 1). Where pieces of insulation (Item 4B) are to be butted together, space pins a maximum of 3 inches apart.

III. After insulation (Item 4B) is installed, place minimum 2.5 in. x 2.5 in. square, galvanized steel, self locking washer clips onto all insulation pins.

IV. After clips are installed, cut off or bend flush with insulation (Item 4B) the pins that are too long.

C. Single End Overlap (Telescope): Refer to 4C Section View B-B. Locate pins at all blanket overlaps, on all sides of the ventilation duct (Item 1), and meet the following requirements.

I. Space pins maximum 12 inches apart in rows across the width of ventilation duct (Item 1). Locate pins maximum 6-3/4 inches from the edges of the rectangular ventilation duct (Item 1).

II. Space the rows of pins maximum 10-1/2 inches apart along the length ventilation duct (Item 1). Where pieces of insulation (Item 4C) are to be butted together, space the pins a maximum 1-1/2 inches apart.

III. After insulation (Item 4C) is installed, place minimum 2.5 in. x 2.5 in. square, galvanized steel, self locking washer clips onto all insulation pins.

IV. After clips are installed, cut off or bend flush with insulation (Item 4C) the pins that are too long.

D. Dual End Overlap (Checkerboard): Refer to 4D Section View B-B. Locate pins at all blanket overlaps, on all sides of the ventilation duct (Item 1), and meet the following requirements.

I. Space pins maximum 12 inches apart in rows across the width of ventilation duct (Item 1). Locate pins maximum 6-3/4 inches from the edges of the rectangular ventilation duct (Item 1).

II. Space the rows of pins maximum 10-1/2 inches apart along the length ventilation duct (Item 1). Where pieces of insulation (Item 4D) are to be butted together, space the pins a maximum of 1-1/2 inches apart.

III. After insulation (Item 4D) is installed, place minimum 2.5 in. x 2.5 in. square, galvanized steel, self locking washer clips onto all insulation pins.

IV. After clips are installed, cut off or bend flush with insulation (Item 4D) the pins that are too long.

3. BANDING: Do not use banding for the installation of insulation method (Item 4A), Compression Butt Joint. Banding is an option to fastener methods (Items 2B, 2C and 2D) but not fastener method (Item 2A). After insulation (Item 4) is installed, apply minimum 1/2 inch wide, 0.015-inch thick stainless steel bands or minimum 1/2 inch wide, 0.020-inch thick carbon steel bands and secured with minimum 1-inch long stainless or carbon steel crimp clamps to be used with corresponding banding type. When needed to ease installation, use filament tape as a temporary hold for the insulation (Item 4) prior to banding. Place banding a maximum 1-1/2 inches from all insulation (Item 4) edges and a maximum of 10-1/2 inches on center (O.C.). Tension the banding to hold the insulation (Item 4) in place without cutting or damaging the insulation (Item 4) or ventilation duct (Item 1).

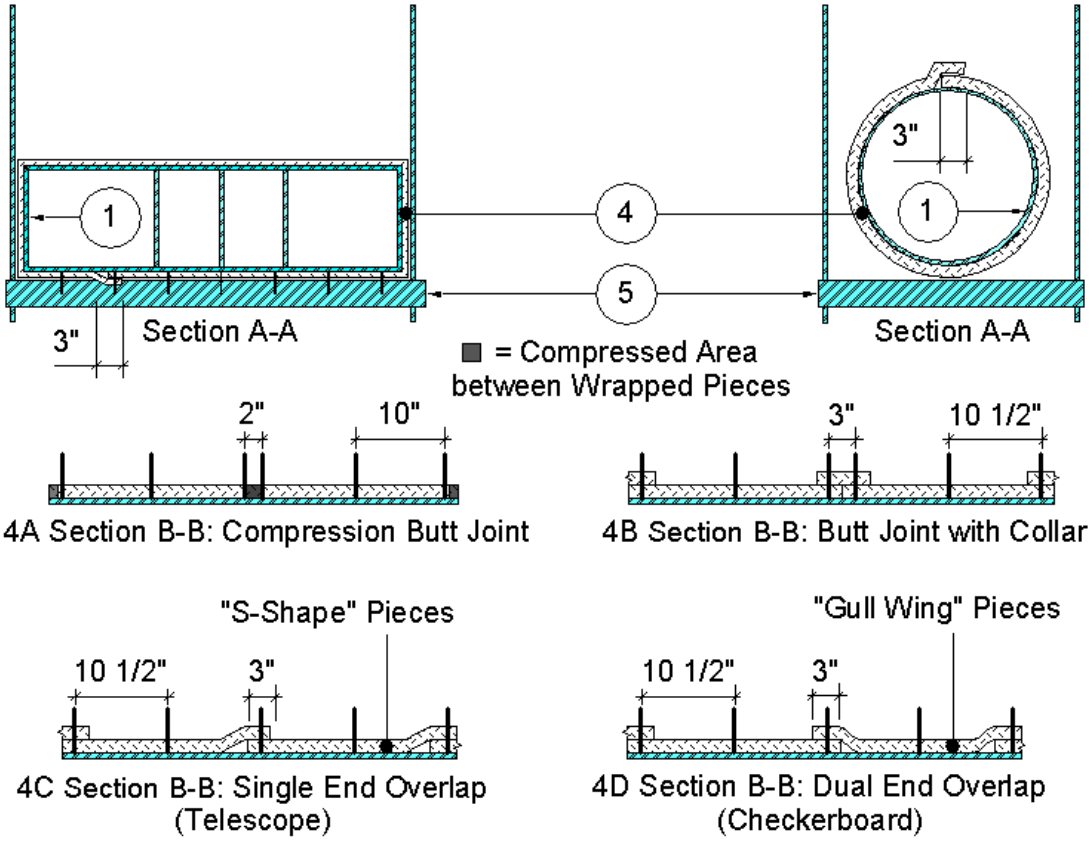


Figure 2

4. CERTIFIED MANUFACTURER: 3M Company

   CERTIFIED PRODUCT: 3M™ Fire Barrier Duct Wrap

   MODEL: 615 or 615+

   INSULATION: Refer to Figure 2. Apply one layer of nominal 1-1/2 in. thick, 6-pcf blanket, made of fibers, encapsulated with foil scrim over the entire surface of the ventilation duct (Item 1) and a collar on each side of the penetration firestop (Item 1D). Apply the insulation in accord with one of the four methods (A, B, C, or D) that follow. Use blanket that is encapsulated with a polypropylene/foil scrim or an aluminized polyester/scrim/foil. Wrap one layer of insulation around the ventilation duct (Item 1) perimeter so that each terminating end of insulation overlaps onto the starting end of insulation a minimum of 3 inches at all transverse joints. Alternate the transverse overlap location so that no two consecutive adjacent overlaps align. Refer to Section View A-A for transverse overlap section view. Cover and seal all visually exposed ends and edges of insulation with nominal 4-inch wide pressure-sensitive aluminum foil tape.

   A. Compression Butt Joint: Refer to 4A Section View B-B. Wrap the ventilation duct (Item 1) with one layer of insulation installed with compression butt joints at all

longitudinal joints. Compress each end of each piece of insulation together and butt to preceding edge of insulation. Each piece of installed insulation width is 2 inches less than insulation nominal width. (Example: each piece of nominal 24-inch wide insulation when installed is 22-inches wide.) Install the insulation overlap in contact (pressed against) with the insulation being overlapped. Verify all insulation butt joints are a minimum 1-1/2 inches in overall thickness at compression butt joints.

B. Butt Joint with Collar: Refer to 4B Section View B-B. Wrap the ventilation duct (Item 1) with one layer of insulation installed with butt joints at all longitudinal joints. Butt each end of each piece of insulation together with preceding edge of insulation. Each piece of installed insulation width is its nominal width. (Example: each piece of nominal 24-inch wide insulation when installed is 24-inches wide.) Install the insulation overlap in contact (pressed against) with the insulation being overlapped. Place and center 6-inch wide collar of insulation over the butt joint. Overlap 6-inch wide collar onto each adjacent insulation 3-inches. Verify all insulation butt joints with collars are a minimum 3 inches in overall thickness.

C. Single End Overlap (Telescope): Refer to 4C Section View B-B. Wrap the ventilation duct (Item 1) with one layer of insulation installed with 3-inch minimum overlaps at all longitudinal joints. Overlap each adjacent insulation edge with the edge of the next piece of insulation. Install the insulation overlap in contact (pressed against) with the insulation being overlapped. Verify all insulation overlaps are nominally 3 inches in overall thickness.

I. Starting at one end of the ventilation duct (Item 1), apply the first piece of insulation around the ventilation duct (Item 1) to overlap fasteners (Item 2C). Refer section view A-A.

II. Position and overlap the leading edge of the second piece of insulation nominally 3 inches over the flush edge of the first piece of insulation. Place the opposite edge of the second piece of insulation flush against the surface of the ventilation duct (Item 1). An “S-shaped” cross section of the insulation is created. Refer to 4C section view B-B.

III. Apply all additional pieces of insulation as “S-shaped” cross section of the insulation in compliance with Item 4CII.

D. Dual End Overlap (Checkerboard): Refer to 4D Section View B-B. Verify all insulation overlaps are a minimum 3 inches in overall thickness. Do not align two consecutive insulation end overlaps. Overlap each full-width insulation edge with the edge of the “Gull Wing”, ⎽U⎽ shaped insulation. Install the insulation overlap in contact (pressed against) with the insulation being overlapped. Verify all insulation overlaps are nominally 3 inches in overall thickness.

I. Wrap the first piece of insulation around the ventilation duct (Item 1) so that the insulation is flush against the surface of the ventilation duct (Item 1). Position the starting end of the insulation to overlap pins (Item 2A) a minimum of 1-1/2 inches while the edges of the insulation overlap the rows of pins (Item 2B) a minimum of 1-1/2 inches.

II. Position the second piece of insulation nominally 18 inches from the edge of the first piece of insulation. Install the second piece in the same manner as the first.

III. Cover the ventilation duct (Item 1) that is exposed between the edges of the first two pieces of insulation with another piece of insulation. Position the starting end of the insulation to overlap pins (Item 2A) a minimum of 1-1/2 inches while the edges of the insulation overlap the adjacent edges of the two pieces installed insulation a minimum of 1-1/2 inches.

5. SUPPORTS: Support the ventilation duct (Item 1) with insulation (Item 4) using a “trapeze” system composed of a minimum 2 x 2 x 1/4-inch steel angle as the trapeze cross-member and minimum 3/8-inch diameter rods. Connect all-thread steel rods (insulation (Item 4) not required) to the trapeze cross-member using nuts and washers. Connect the all-thread steel rods to the bottom of the floor assembly using an attachment method designed to carry the weight of the ventilation duct (Item 1) with insulation (Item 4) under a fire load equivalent to ASTM E119 time-temperature curve. Center ventilation duct (Item 1) with insulation (Item 4) on trapeze cross-member. Space all-thread steel rods a maximum distance of 6 inches from surface of the insulated ventilation duct or allowing all-thread steel rods to contact with the insulation (Item 4) at the minimum distance. Extend trapeze cross-member at least 2-inches past each all-thread steel rod. Space trapeze supports a maximum 60-inches O.C.

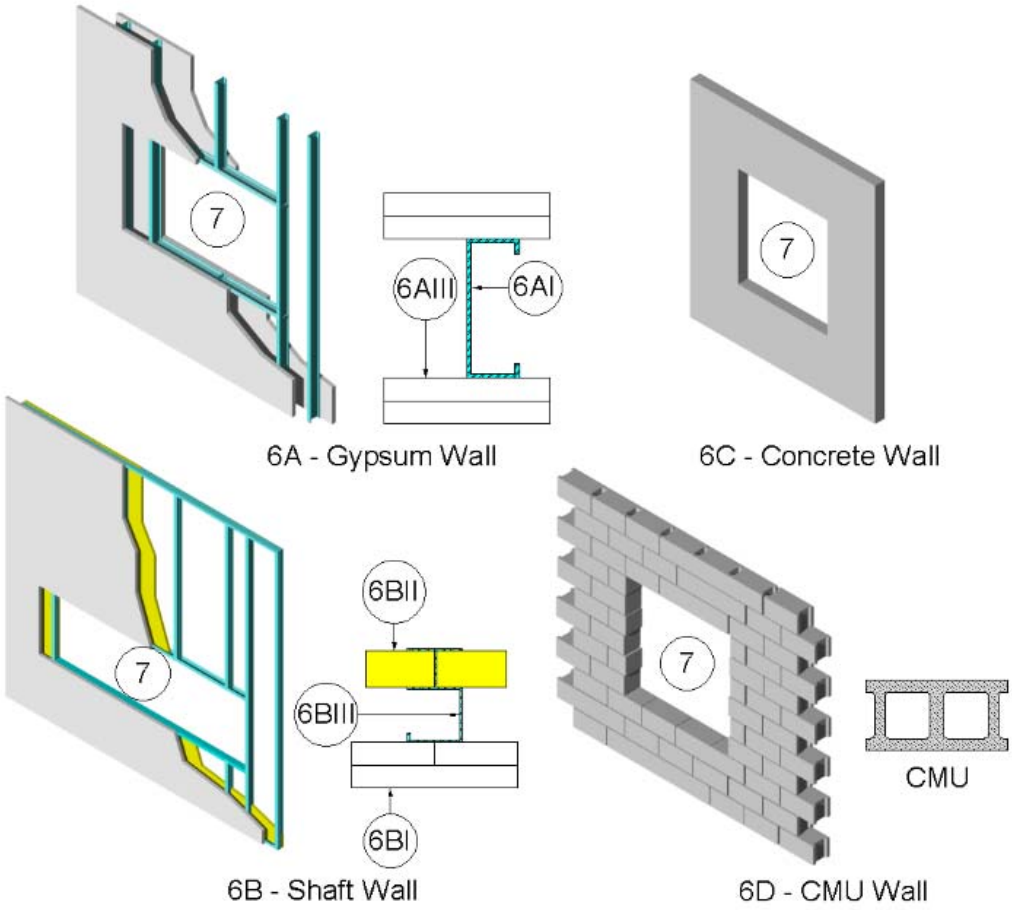


Figure 3

6. SUPPORTING CONSTRUCTION: Refer to Figures 3 and 4. Use one of the following wall or floor assemblies.
   A. GYPSUM WALL ASSEMBLY: Symmetrical two-hour rated gypsum wall assembly, which may also be used as a shaft wall assembly, constructed of the following:
      I. Steel Studs – Minimum 25 GA galvanized steel studs measuring 3-5/8 inch wide with 1-1/4-inch legs spaced maximum 24 inch on center (O.C.). Attach studs with minimum #6 x 3/8-inch steel stud framing screws to floor and ceiling tracks.
      II. Tracks – Channel U-shaped floor and ceiling runners measuring 1/2-inch deep by 3-5/8-inch wide, which are secured to floor and ceiling with 1-inch long fasteners suitable for the mounting to substrate and spaced maximum 18-inch O.C.
      III. Gypsum Board – Cover studs and runners with two layers of 5/8 inch thick, Type X gypsum board on each face. Fasten base layer of gypsum board to steel studs with #6 1-1/8 inch bugle head phillips drywall screws spaced maximum 12 inch O.C. Fasten face layer of gypsum board with #6, 1-5/8 inch

long bugle phillips drywall screws spaced maximum 8 inches O.C. Apply vinyl or casein, dry or premixed joint compound to face layers of gypsum board in two coats to all exposed screw heads and gypsum board joints. Embed minimum 2 inch wide paper, plastic or fiberglass tape in first layer of joint compound over joints in gypsum board. Minimum wall assembly thickness of 6 inches measured from face layer of gypsum board to opposite face layer of gypsum board.

B. SHAFT WALL ASSEMBLY: Asymmetrical two-hour rated gypsum shaft wall assembly constructed of the following:

I. Visual Gypsum Board – Cover studs and runners with two layers of minimum 1/2 inch thick, Type X gypsum board on each face. Fasten base layer of gypsum board to steel studs with #6 1-1/8 inch bugle head phillips drywall screws spaced maximum 12 inch O.C. Fasten face layer of gypsum board with #6, 1-5/8 inch long bugle phillips drywall screws spaced maximum 8 inches O.C. Apply vinyl or casein, dry or premixed joint compound to face layers of gypsum board in two coats to all exposed screw heads and gypsum board joints. Embed minimum 2 inch wide paper, plastic or fiberglass tape in first layer of joint compound over joints in gypsum board. Minimum wall assembly thickness of 4-1/2 inches measured from face layer of gypsum board to opposite face layer of gypsum board.

II. Interior Gypsum Board – Cut 1-inch thick Type X gypsum board 1-inch less than floor to ceiling height. Insert the longitudinal edges of the 1-inch thick Type X gypsum board into the C-T or C-H studs. Secure the transverse edge of the 1-inch thick Type X gypsum board to the long leg of J-runner using its tabs or minimum 1-5/8-inch long Type S self-tapping bugle head steel screws spaced maximum 12 inches on center.

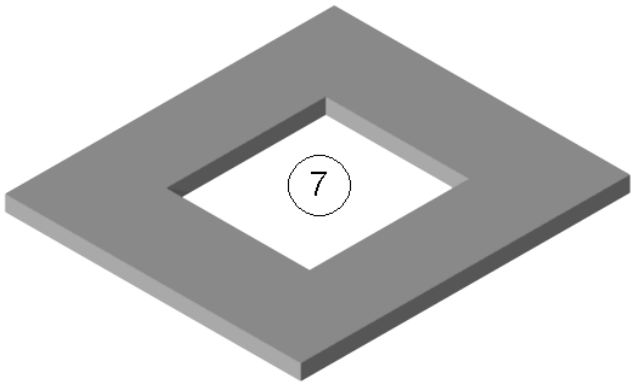
III. Steel Studs – Cut minimum 25 GA galvanized steel C-T or C-H studs measuring minimum 2-1/2 inches wide with minimum 1-1/2-inch flanges 3/4-inches less than floor to ceiling height and spaced maximum 24 inch on center (O.C.) in runners with T or H section abutting long leg of runner.

IV. Runners – Use minimum 2-1/2-inch wide J-runner compatible with studs and having unequal vertical legs: minimum 1-inch short leg and minimum 2-inch long leg. Position J-runners with short leg towards visual face of shaft wall. Attach to floor and ceiling using steel fasteners located a maximum of 2-inches from each end and a maximum of 24 inch O.C.

C. CONCRETE WALL ASSEMBLY: Symmetrical, two-hour rated, solid concrete, wall assembly made from reinforced lightweight or normal weight (100-150 pcf or 1600-2400 kg/m^3) concrete, which may also be used as a shaft wall assembly. Constructed of solid concrete with a minimum concrete thickness measured from exposed face to exposed face using one of the following:

I. lightweight concrete is 3.6 inches;
II. sand-lightweight concrete is 3.8 inches;
III. carbonate aggregate concrete is 4.6 inches; and
IV. siliceous aggregate concrete is 5.0 inches.

D. MASONRY WALL ASSEMBLY: Symmetrical, two-hour rated, nominal 8 x 8 x 16 CMU, wall assembly made from lightweight or normal weight (100-150 pcf or 1600-2400 kg/m^3) concrete, which may also be used as a shaft wall assembly.



6E - Concrete Floor

Figure 4

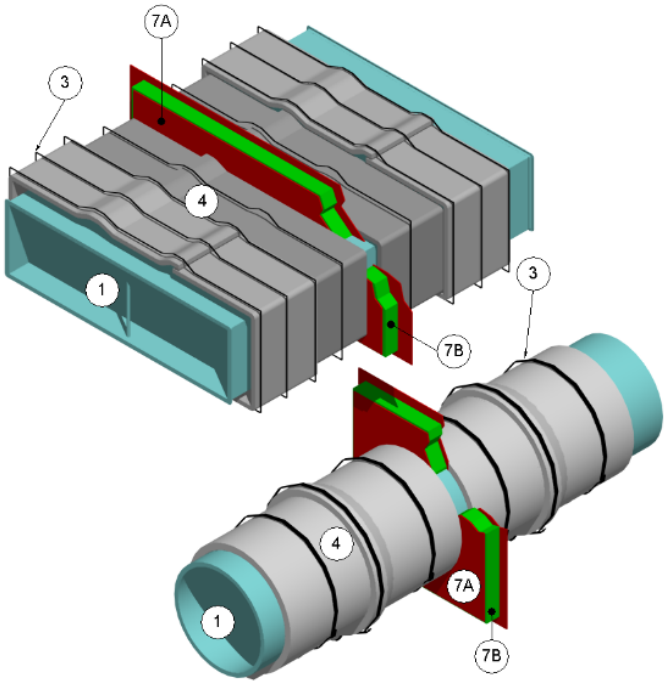
E. CONCRETE FLOOR ASSEMBLY: Symmetrical two-hour rated solid concrete floor assembly made from reinforced lightweight or normal weight (100-150 pcf or 1600-2400 kg/m^3) concrete. Constructed of solid concrete with a minimum concrete thickness measured from exposed face to exposed face using one of the following:
   I. lightweight concrete is 3.6 inches;
   II. sand-lightweight concrete is 3.8 inches;
   III. carbonate aggregate concrete is 4.6 inches; and
   IV. siliceous aggregate concrete is 5.0 inches.

7. OPENING: – Refer to Figures 3 and 4. Create an opening in the supporting construction (wall or floor assembly). Determine the opening shape and size to house the ventilation duct's (Item 1), whether with or without insulation (item 4) passing through the opening, shape and size. Position the penetrating item (Item 1) concentrically or eccentrically in the opening so that the annular space ranges from minimum to maximum as in Table 2. Make the opening with in accord with the following:

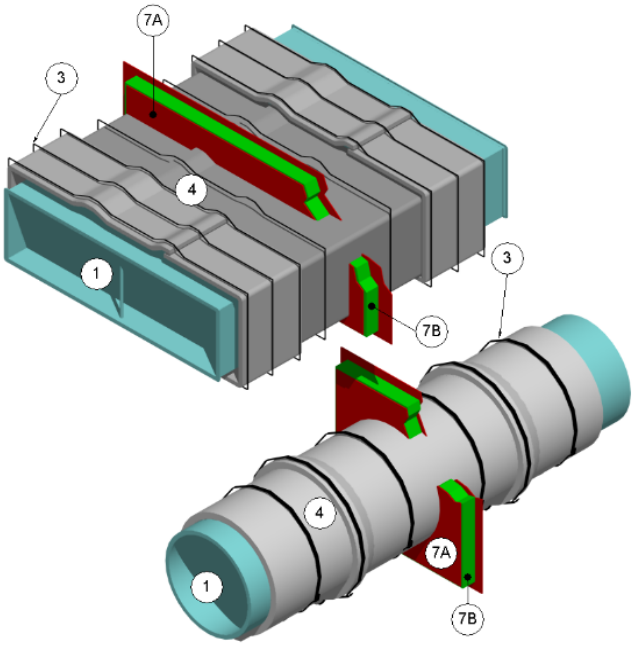
   A. For gypsum wall assemblies (Item 6A) and shaft wall assembles (Item 6B), frame the opening with steel studs (Item 6AI) and tracks (Item 6AII).

Table 2 – Opening Information

Ventilation Duct Requirements Refer to Table 1	Maximum		Annular Space	
	Cross Sectional Area (Inches^2)	Dimension (Inches)	Minimum (Inches)	Maximum (Inches)
R1	506	22.5	1	3-1/2
R2	1035	50.5	1	3-1/2
R3	2432	70.5	1	3-1/2
R4	2492	89	1	3
C1	1555	44.5	1	3-1/2

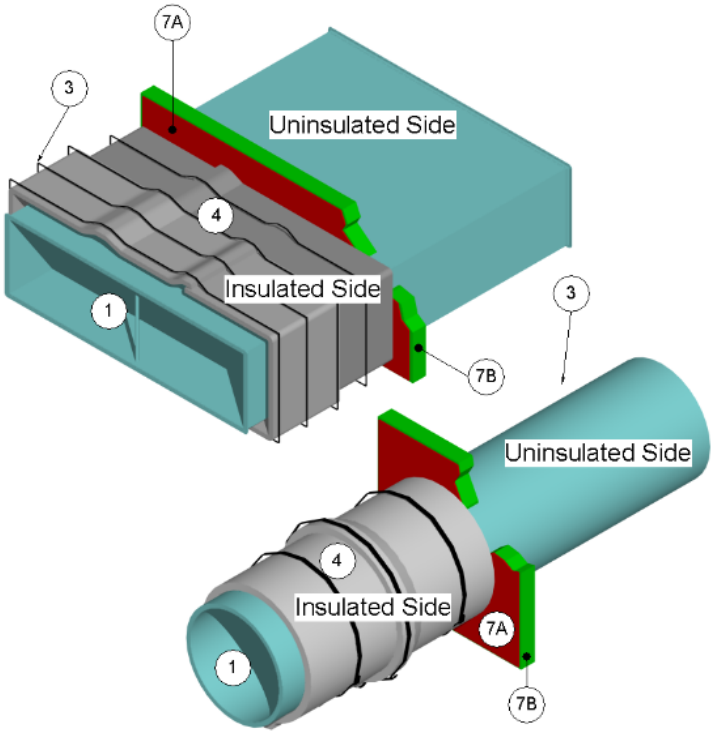


Symmetrical Firestops for Horizontal Ventilation Ducts
without Insulation Through Wall Assemblies



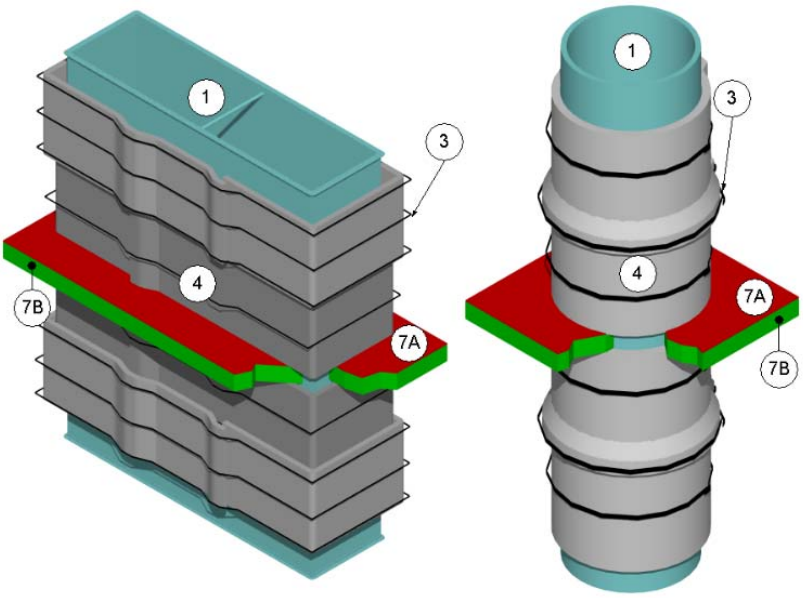
Symmetrical Firestops for Horizontal Ventilation Ducts
with Insulation Through Wall Assemblies

Figure 5

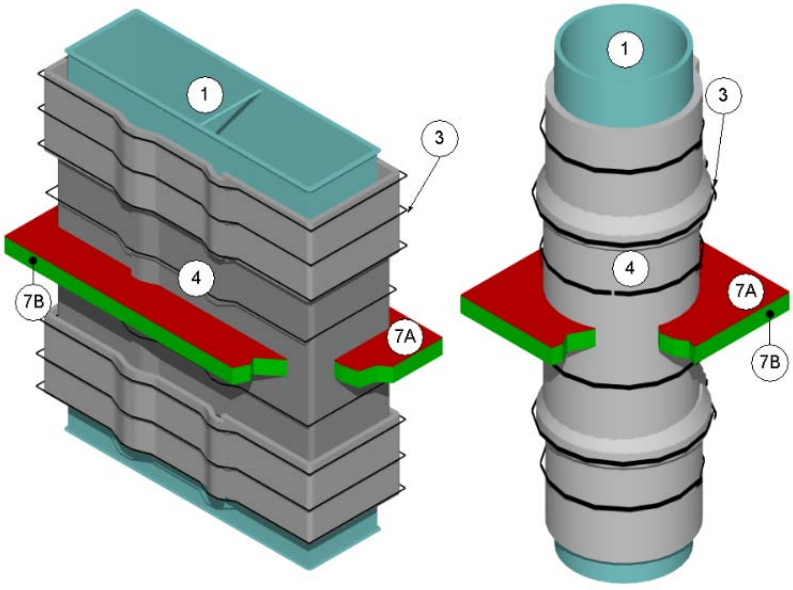


Asymmetrical Firestops for Horizontal Ventilation Ducts
without Insulation Through or Into Shaft Assemblies

Figure 6



Asymmetrical Firestops for Vertical Ventilation Ducts
without Insulation Through Floor Assemblies



Asymmetrical Firestops for Vertical Ventilation Ducts
with Insulation Through Floor Assemblies

Figure 7

Table 3 – Fire Ratings for ONLY Figure 6: *Asymmetrical Firestops for Horizontal Ventilation Ducts without Insulation Through or Into Shaft Assemblies*		
All other Figures and Assemblage References are 2 Hour F-Rating & T-Rating		
Fire Exposure	**F-Rating (Hours)**	**T-Rating (Hours)**
"Uninsulated Side" Designation on Drawing	2	2
Insulated Side	2	0

8. PENETRATION FIRESTOP: Install firestop between the supporting construction (Item 6) and the ventilation duct (Item 1) or the ventilation duct (Item 1) protected with the insulation (Item 4). Use a symmetrical wall penetration firestop, an asymmetrical shaft penetration firestop, or an asymmetrical floor penetration firestop constructed of the following components:

   A. CERTIFIED MANUFACTURER: 3M Company

      CERTIFIED PRODUCT: 3M™ Fire Barrier Duct Wrap Insulation

      MODEL: 615 or 615+

      PACKING MATERIAL: Fill the entire annular space's width and a minimum depth of 4-inches with minimum 4-pcf density mineral wool or certified insulation without the encapsulation (foil scrim).

      Cut the packing material into strips not less than one and one half (1-1/2) times the width of the annular space to be filled. Compress packing material nominally 33% and insert packing material into the annual space.

      For wall assemblies, recess the surface of packing material nominally 5/8 inches from surfaces of both faces of the supporting construction (Item 6).

      For floor and shaft wall assemblies, recess the surface of packing material nominally 5/8 inches from the visual surface of the supporting construction (Items 6).

   B. CERTIFIED MANUFACTURER: 3M Company

      CERTIFIED PRODUCT: 3M™ Fire Barrier™ Sealant

      MODEL: Water-Tight 1000-NS Silicone, Water-Tight 1003-SL Silicone (floors only), 2000+ Silicone, or CP 25 WB+

   FILL, VOID OR CAVITY MATERIAL: Install minimum 5/8-inch depth of fill material into the recess over the entire surface of the packing material (Item 7A). Screed the fill material flush with the surface of the supporting construction (Item 6). Overlap a minimum of 1/4 inches, the fill material onto face of supporting construction (Item 6).

   C. CERTIFIED MANUFACTURER: 3M Company

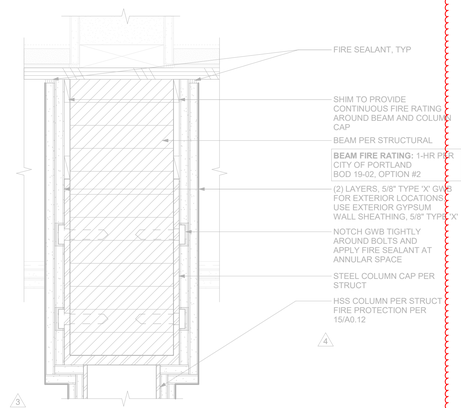
      CERTIFIED PRODUCT: 3M™ Fire Barrier Duct Wrap Insulation

      MODEL: 615 or 615+

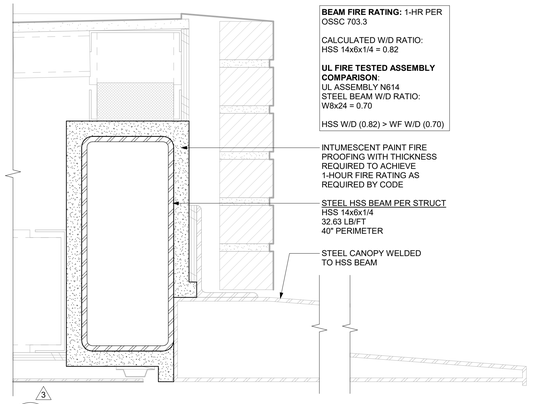
   D. COLLAR: Required for R4 ventilation ducts (Item 1) in Table 1. After the ventilation duct (Item 1) is covered with insulation (Item 4), install a collar, which is another layer of minimum 24-inch wide, minimum 6-pcf density, insulation (Item 4) over the insulated ventilation duct (Item 1) on each side of the supporting construction (Item 6). Match and use the same installation method as used to install the insulation (Item 4) applied to the ventilation duct (Item 1) creating two (2) layers of insulation (Item 4) on the ventilation duct (Item 1) adjacent to the supporting construction (Item 6). Abut one perimeter edge of each collar to the exposed surface supporting construction (Item 6).

   E. STEEL ANGLE: Required for R4 ventilation ducts (Item 1) in Table 1.

Before the ventilation duct (Item 1) is covered with insulation (Item 4) and after the packing material (Item 7A) and fill material (Item 7B) are installed, install a nominal 16 GA 2 x 1-1/2-inch steel angle around the perimeter of the ventilation duct (Item 1) with notched ends to create a continuous frame. Place the 1-1/2-inch leg of the steel angle flush against the surface of the supporting construction (Item 6). Attach the 2-inch leg of the steel angle to the ventilation duct (Item 1) using self drilling, 12-24x2 hex head, screws with a #5 point, spaced a maximum of 6 inches on center.



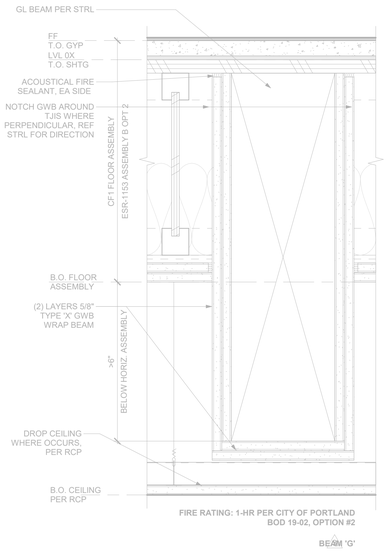
16 A0.15 1-HR RATED WD BEAM PROTECTION AT COLUMN CAP
3" = 1'-0"



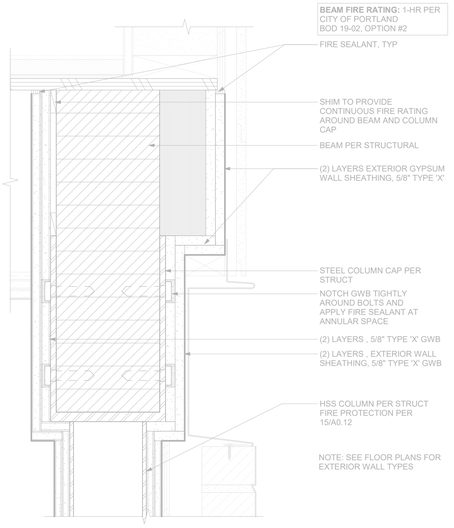
12 A0.15 1-HR HSS BEAM PROTECTION @ EXTERIOR
3" = 1'-0"

ASSEMBLY NOTES

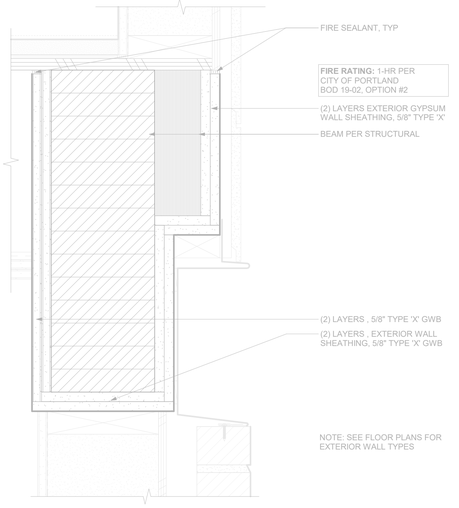
1. ALL ASSEMBLY DETAILS DRAWN AT 3" = 1'-0".
2. SEE A0.16 & A0.17 FOR TYPICAL INTERIOR ASSEMBLY TRANSITION DETAILS.
3. SEE FLOOR PLANS DRAWINGS FOR WALL TYPE LOCATIONS.
4. SEE REFLECTED CEILING PLANS FOR HORIZONTAL ASSEMBLY LOCATIONS.
5. SEE FINISH SCHEDULE, INTERIOR ELEVATIONS, AND DETAILS FOR SPECIAL CONDITIONS AND APPLIED WALL FINISHES.
6. FRAME AROUND BEAMS AND OTHER STRUCTURAL ELEMENTS WHEN THEY OCCUR WITHIN THE SPACE OF A FIRE RATED OR ACOUSTICAL ASSEMBLY.
7. PROVIDE ACOUSTICAL SEAL AT FLOOR / CEILING / WALL TRANSITIONS, RECESSED BOXES, AND PENETRATIONS OF SOUND RATED ASSEMBLIES AND OTHER CONSTRUCTION AS REQUIRED TO ACHIEVE WALL TYPE STC RATING.
8. PROVIDE A FIRE SEAL AT FLOOR / CEILING / WALL TRANSITIONS, RECESSED BOXES, & PENETRATIONS OF FIRE RATED ASSEMBLIES.
9. PROVIDE MOISTURE RESISTANT GYPSUM BOARD TYPICAL AT ALL RESTROOMS AND BATHROOMS
10. ALL FRAMING AND FINISHES OF INTERIOR WALLS TO EXTEND TO THE UNDERSIDE OF STRUCTURE ABOVE U.N.O.
11. METAL STUD TO BE 22GA @ 24" O.C. UNLESS NOTED OTHERWISE ON ARCHITECTURAL OR STRUCTURAL DRAWINGS



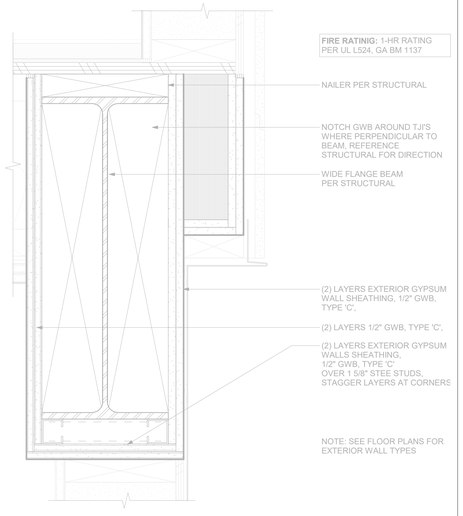
18 A0.15 BEAM PROTECTION @ SECONDARY STRUCTURE - INDIVIDUAL WRAP
3" = 1'-0"



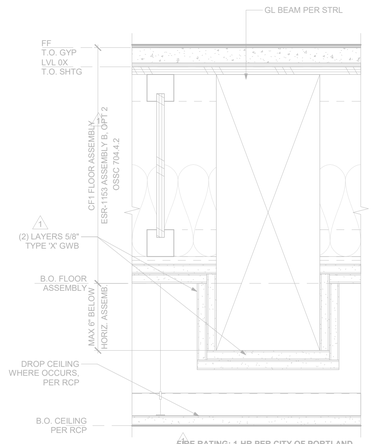
10 A0.15 1-HR RATED WD BEAM PROTECTION AT COLUMN CAP
3" = 1'-0"



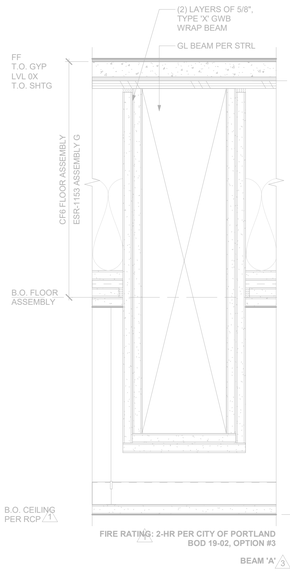
6 A0.15 1-HR RATED WD BEAM PROTECTION AT EXTERIOR
3" = 1'-0"

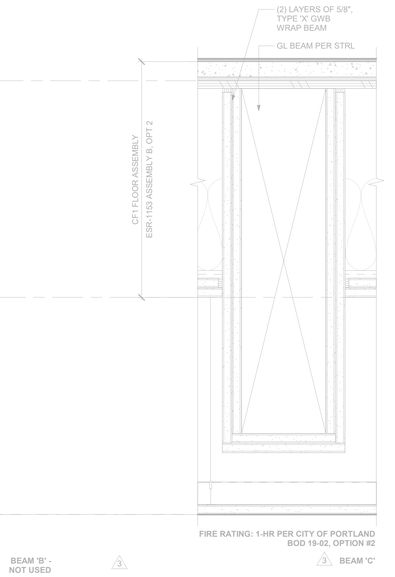


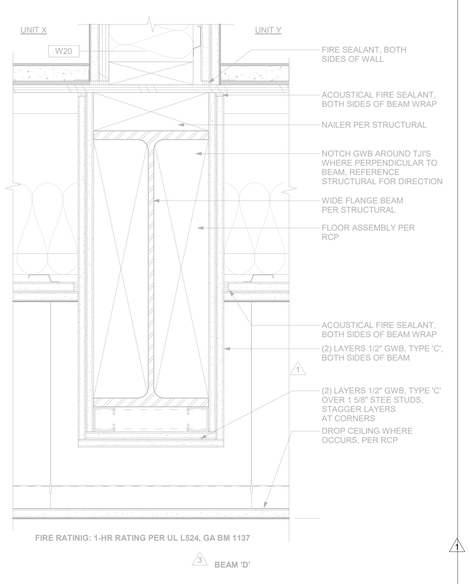
2 A0.15 1-HR RATED STL BEAM PROTECTION AT EXTERIOR
3" = 1'-0"



17 A0.15 BEAM PROTECTION @ SECONDARY STRUCTURE - ASSEMBLY
3" = 1'-0"







9 A0.15 BEAM PROTECTION @ PRIMARY STRUCTURE
3" = 1'-0"

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50% SD SET	04.01.2022
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PERMIT SET	12.05.2022
BID SET	02.13.2023
ADD 1	03.03.2023

#	revision:	date:
1	PERMIT REV 1	02.08.2023
3	PERMIT REV 2	03.14.2023
4	PERMIT REV 3	04.12.2023

EXHIBIT 5

title:
TRANSITION ASSEMBLIES

sheet:
A0.15

4/6/2023 7:27:23 AM

LEGEND

W	SEE A0.10 & A0.12 FOR ASSEMBLY TYPES
X	SEE A0.20 FOR DOOR SCHEDULE AND TYPES
XXX-#	SEE A0.40 FOR MATERIAL AND FINISH SCHEDULE
ISF-#	INTERIOR STOREFRONT
ISF-#*	INTERIOR STOREFRONT W/ SPRINKLER PROTECTION

GENERAL NOTES

1. DIMENSIONS ARE TO GRIDLINE, FACE OF STUD AND WINDOW ROUGH OPENINGS, AND CENTER OF COLUMNS, U.N.O.
2. SEE A0.10 - A0.14 FOR VERTICAL AND HORIZONTAL ASSEMBLIES. ALL WALL TYPES TO BE W21 U.N.O.
3. REFER TO SHEET A0.15 FOR ASSEMBLY TRANSITION DETAILS
4. SEE A0.20 FOR DOOR SCHEDULE AND TYPES. JAMB SIDE OF DOORS TO BE 4" FROM ADJACENT WALL, U.N.O.
5. FURNITURE SHOWN FOR REFERENCE ONLY, OFOI.
6. MECHANICAL, ELECTRICAL, AND PLUMBING SUBCONTRACTORS TO COMPLY W/ FIRE BLOCKING AND FIRE STOPPING REQUIREMENTS AT ALL PENETRATIONS OF RATED WALL AND FLOOR/CEILING ASSEMBLIES.
7. SEE MECHANICAL PLANS FOR KITCHEN, BATH, DRYER VENT ROUTING COORDINATE W/ FIRE SPRINKLER, PLUMBING, ELECTRIC, AND RADON SERVICES.
8. INTERCONNECTED SMOKE ALARMS TO BE INSTALLED IN EACH ROOM USED FOR SLEEPING PURPOSES, OUTSIDE EACH SLEEPING AREA, IN IMMEDIATE VICINITY, AND ON EACH LEVEL OF A DWELLING UNIT.
9. CARBON MONOXIDE ALARMS TO BE INSTALLED IN OR WITHIN 15' OF EACH BEDROOM, ON EACH LEVEL WITH BEDROOMS, AND IN ANY ENCLOSED COMMON AREAS CONTAINING 3 OR MORE DWELLINGS UNITS.
10. PROVIDE BLOCKING AT ALL IN-UNIT BIKE RACK LOCATIONS.
11. PROVIDE BLOCKING FOR ALL MOUNTED FIXTURES AND CABINETS. PROVIDE BLOCKING IN ALL UNIT BATHROOMS AT FUTURE GRAB BAR LOCATIONS.
12. ALL WALL BASE TO BE B-1 U.N.O.
13. ALL WALL FINISH TO BE PI-1 U.N.O.

1 LEVEL 01 FLOOR PLAN
A1.01 1/4" = 1'-0"

NORTH

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JOB NO. 21-008

REGISTERED ARCHITECT
KIMBERLEY A. WILSON
PORTLAND, OR
STATE OF OREGON

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02.13.2023

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1	PERMIT REV	02/08/2023
2	REV2	TBD

EXHIBIT 5

title:
LEVEL 01 - FLOOR PLAN

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A1.01

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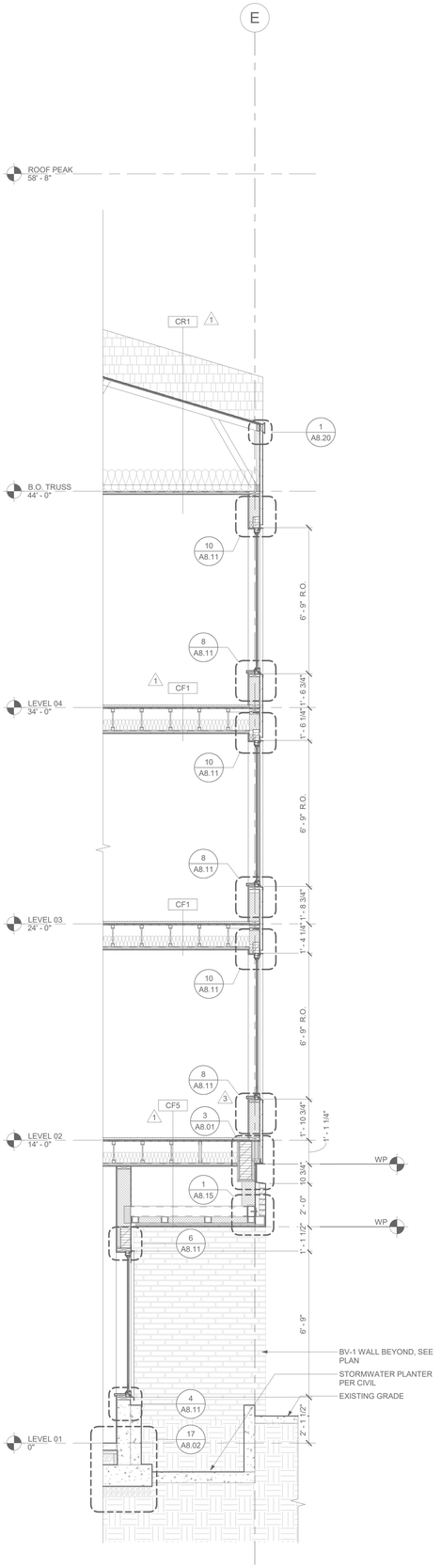
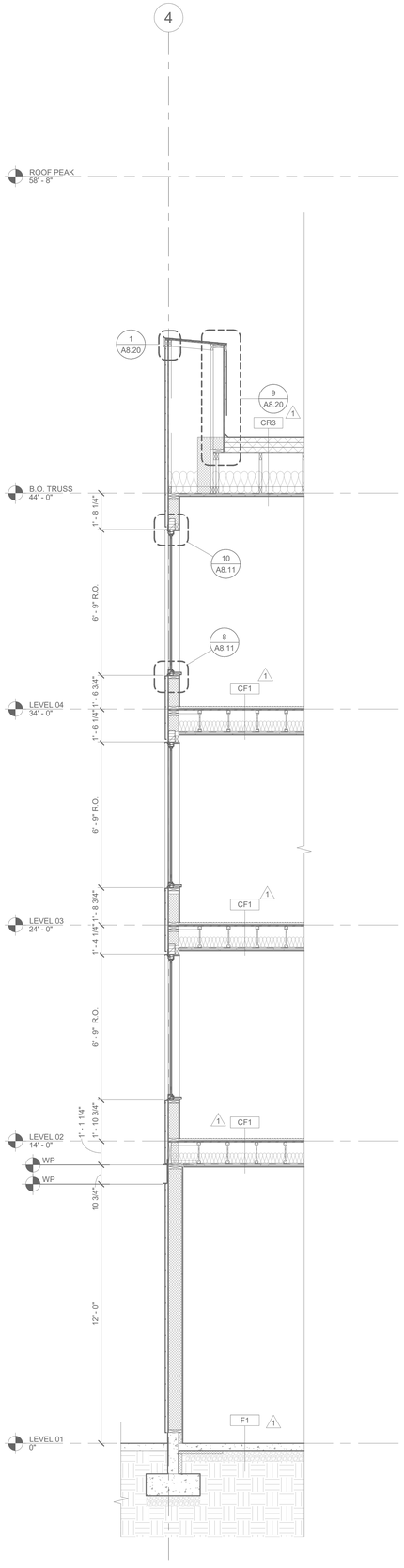
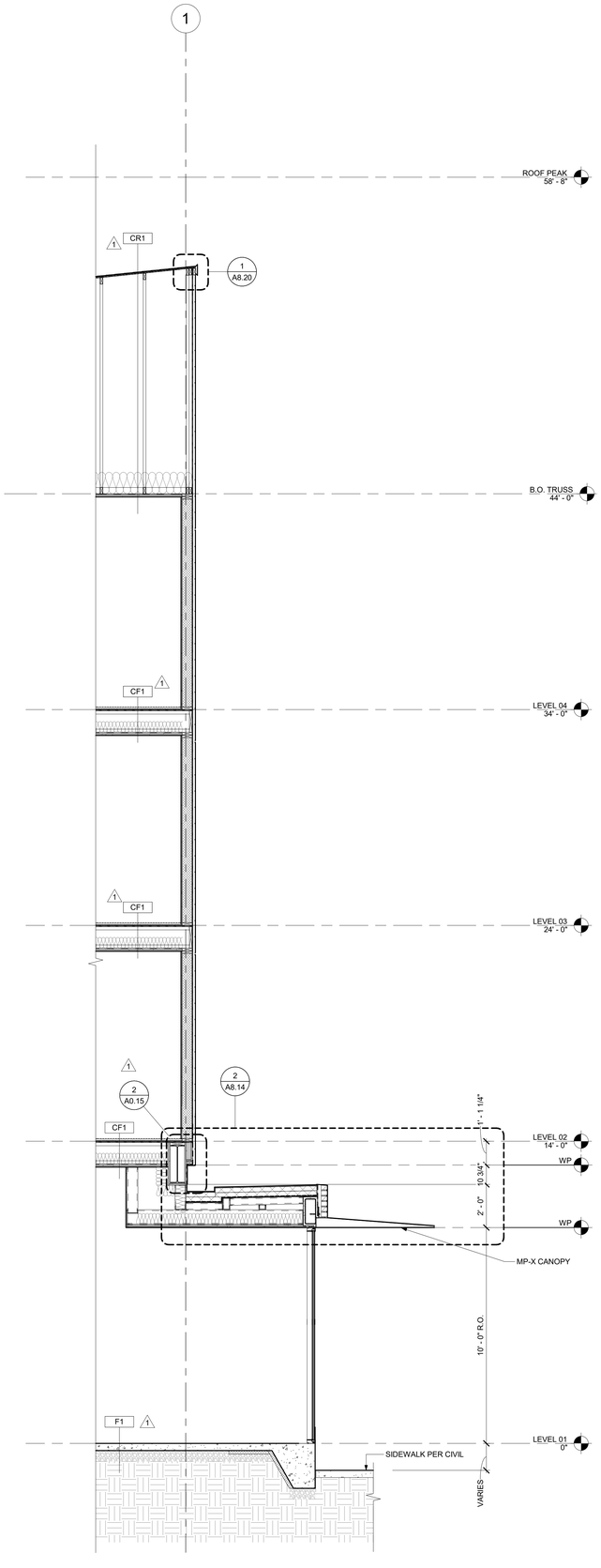


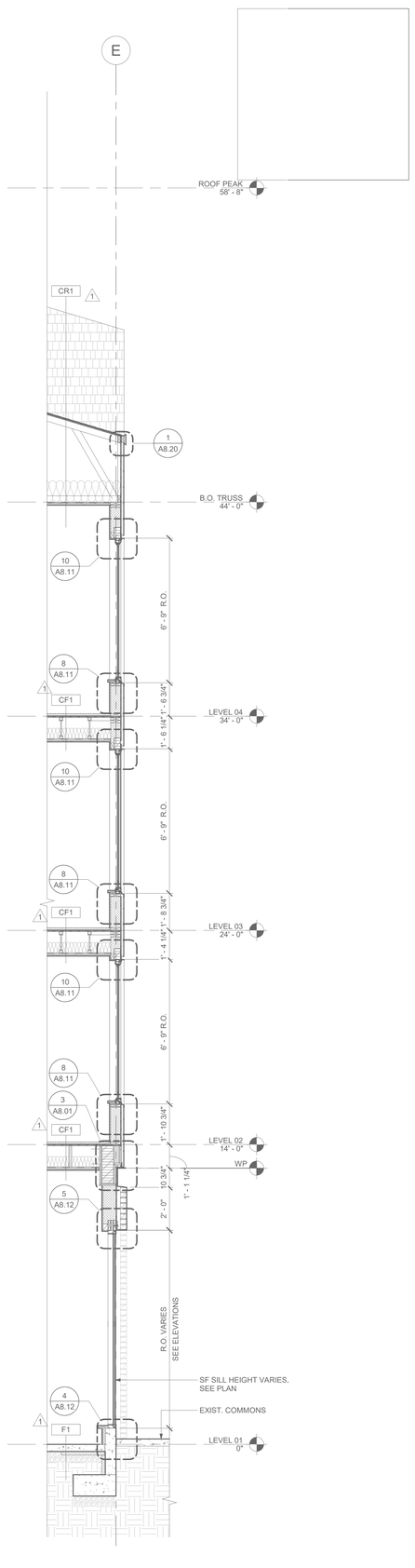
4 WALL SECTION @ UNITS
A4.00 3/8" = 1'-0"



3 WALL SECTION @ MECHANICAL WELL
A4.00 3/8" = 1'-0"



2 WALL SECTION @ CLASSROOM CANOPY
A4.00 3/8" = 1'-0"



1 WALL SECTION @ PROPERTY MANAGEMENT
A4.00 3/8" = 1'-0"

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1	PERMIT REV 1	02.08.2023
3	PERMIT REV 2	03.14.2023

EXHIBIT 5

title:
WALL SECTIONS

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A4.00

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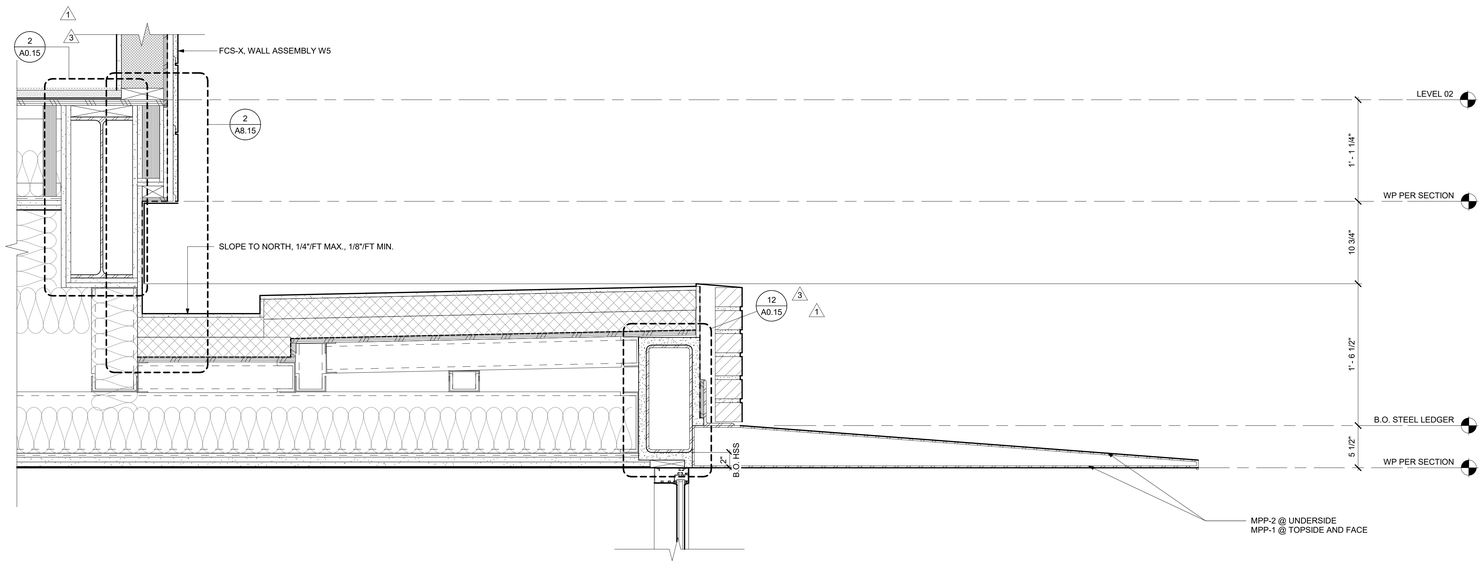
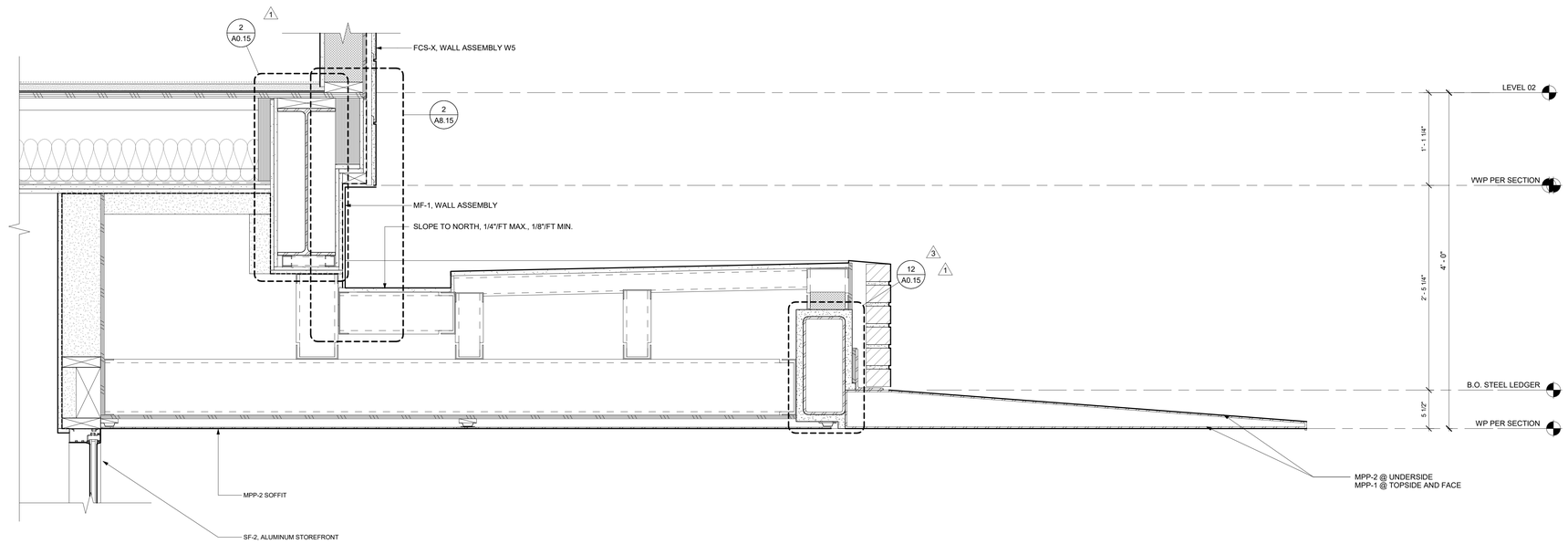


2 A8.14 SECTION DETAIL - CANOPY AT CLASSROOM

1 1/2" = 1'-0"



1 A8.14 SECTION DETAIL - CANOPY AT ENTRY

1 1/2" = 1'-0"

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EXHIBIT 5

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EXTERIOR DETAILS - CANOPY

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A8.14

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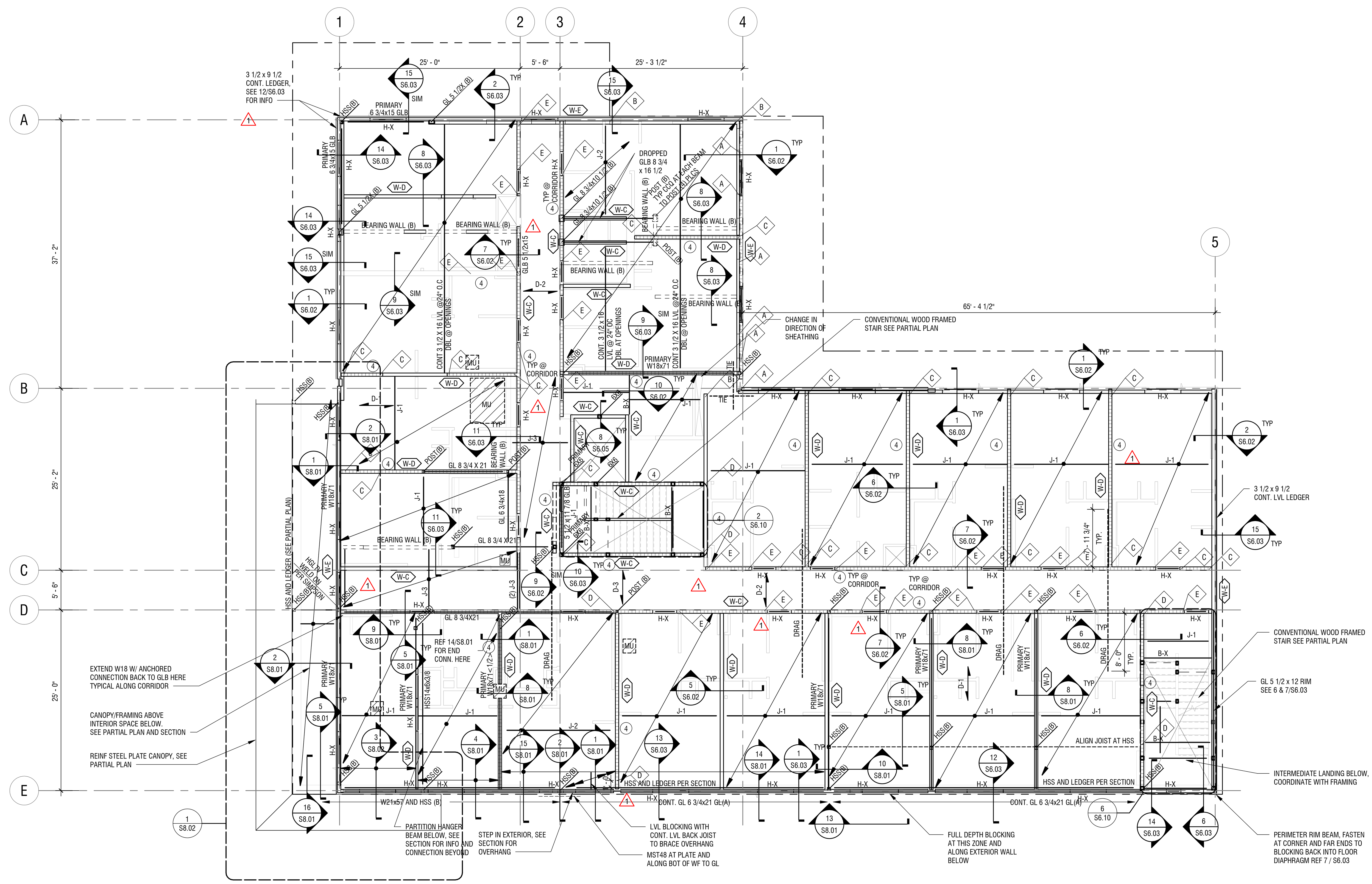

LEVEL 02 FRAMING PLAN

1/8" = 1'-0"

FLOOR FRAMING PLAN NOTES

1. NDICATES 2x SHEAR WALL WITH 15/32" SHEATHING TYPE. REF. 1/S6.06. PLYWOOD SHEATHING EXTENDS FROM HOLDOWN TO HOLDOWN.
2. (W-X) INDICATES BEARING WALL TYPE. REF. SCHEDULE. ALL OTHER WALLS NOT NOTED SHALL BE NON-LOAD BEARING PER ARCHITECTURAL REQUIREMENTS. ALLOCATE FOR CONNECTION TOP AND BOTTOM. ALL BEARING WALLS SHALL BE COMPRISED OF 2x6 @24" OC ON DOUBLE BOTTOM PLATES AND DOUBLE TOP PLATES UNLESS NOTED OTHERWISE ON PLAN. NOTE: NOT ALL ARCHITECTURAL WALLS SHOWN ON STRUCTURAL PLAN DRAWINGS.
3. ALL OTHER WALLS NOT NOTED SHALL BE NON-LOAD BEARING PER ARCHITECTURAL REQUIREMENTS. ALLOCATE FOR CONNECTION TOP AND BOTTOM. NOTE: NOT ALL ARCHITECTURAL WALLS ARE SHOWN ON THE STRUCTURAL PLAN DRAWINGS.
4. (X) INDICATES CONTINUOUS TIE DOWN SYSTEM LOCATION. CONTINUOUS TIE DOWN SYSTEM TO BE DESIGNED BY MANUFACTURER. REF. 2/S2.01 FOR SCHEDULE. ALIGN FULL HEIGHT.
5. J-X INDICATES FLOOR JOIST TYPE AND SPACING w/ TOP FLANGE HANGERS. SEE SCHEDULE FOR INFORMATION
6. SEE NOTES ON PLAN FOR LAYOUT ALONG WALLS TO ACCOMODATE FANS
7. D-1 INDICATES SPAN DIRECTION OF 7/8" T&G SHEATHING, GLUE AND FASTEN w/10d RING SHANK NAILS @4" OC @ EDGES AND 12" OC INTERIOR. REF. 4/S6.07
8. D-2 INDICATES SPAN DIRECTION OF 3X6 DFL CAR DECKING w/ CONTINUOUS D-1 SHEATHING OVER, BEAR ON WALL/RIM JOIST. REF. 7,8 & 9/S6.02
9. D-3 INDICATES SPAN DIRECTION OF 4X6 DFL CAR DECKING w/ CONTINUOUS D-1 SHEATHING OVER, BEAR ON WALL/RIM JOIST. REF. 7, 8, & 9 /S6.02
10. B-X INDICATES BEAM, REF. SCHEDULE U.N.O. ON PLAN.

    H-1 / H-2 / H-3 UNLESS OTHERWISE NOTED, ALL HEADERS ARE TO BE: OPENINGS LESS THAN 4'-0" SHALL BE A 4x10 DFL NO. 2 w/ (2) TRIMMERS AND (1) KING STUD. OPENINGS BETWEEN 4'-0" TO 8'-0" SHALL BE GL 5 1/2x12 w/ (2) 2X6 TRIMMERS AND (2) 2X6 KING STUDS INDICATES HEADER SHALL BE UPTURNED IN FLOOR ASSEMBLY
11. INDICATES DBL 2x FLAT IMMEDIATELY BELOW PLATES, SEE 1/S6.1 FOR DETAIL
12. REFERENCE S6.01 THRU S6.07 FOR TYPICAL WOOD DETAILS. REF S8.01 FOR TYP STEEL DETAILS.
13. ALL FLOORS TO BE TOPPED w/ 1" MAXIMUM GYP. CONCRETE TOPPING.
14. REFERENCE ARCHITECTURAL AND MEP DRAWINGS FOR SLEEVES, BLOCKOUTS,
15. EXTERIOR EXHAUST PENETRATIONS AND OTHER ITEMS TO BE COORDINATED WITH THE FRAMING. REF. S6.02 FOR SHAFT DETAILS.
16. REFERENCE ARCHITECTURAL DRAWINGS FOR DIMENSIONS.
17. PROVIDE DIAPHRAGM EDGE NAILING TO ALL JOISTS, PLATES OR BLOCKING IN LINE OR CONNECTED TO SHEAR WALLS.
18. COORDINATE LOCATIONS OF MECHANICAL PENETRATIONS, FLOOR DEPRESSIONS, OPENINGS, DRAINS OR STEPS WITH ARCHITECTURAL AND MECHANICAL DRAWINGS.
19. REF. DETAIL 3, 4 & 5/S6.01 FOR NOTCH AND HOLES ALLOWANCES AT STUDS, JOISTS, AND WALL PLATES.
20. REF. DETAIL 1&2/S6.05 FOR NON-BEARING PARTITION WALL DETAILS AT FLOOR AND ROOF.
21. REF. 9/S6.01 FOR THE HANGER SCHEDULE (U.N.O. ON PLANS).
22. PROVIDE DIAPHRAGM EDGE NAILING TO ALL JOISTS, PLATES OR BLOCKING IN LINE OR CONNECTED TO SHEAR WALLS.
23. INDICATES TO PROVIDE FULL DEPTH BLOCKING @24" OC (2) JOIST BAYS EACH SIDE OF CORNER. EXTEND 4'-0" EACH SIDE OF CORNER.
24. POST INDICATES POST LOCATION w/ SIZE PER PLAN. REF. 1/S6.01 FOR HEADERS AND OPENINGS TYPE U.N.O.
25. (B) INDICATES BELOW
26. PROVIDE I-JOIST WEB BLOCKING AT SHAFTS REFERNCE MANUFACTURER REQUIREMENTS.
27. INDICATES DBL JOIST. LOCATE AT ALL WALLS THAT DO NOT ALIGN BELOW. PROVIDE WEB STIFFENERS ALONG THE TOTAL LENGTH.
28. INDICATES TYPICAL SHEATHING BLOCKED. GLUE AND FASTEN w/ 10d NAILS @2" O.C. ALONG PANELS
29. (CSX) INDICATES SIMPSON STRAP TYPE CS14 ABOVE AND BELOW THE OPENING TYPICAL FOR ALL FLOOR AT THE SAME LOCATIONS. EXTEND 2' MIN. BEYOND THE OPENING WIDTH ON EACH SIDE OF THE OPENING. WHERE THERE ARE 2 OR MORE OPENING, CONTINUOUS STRAP IS ALLOWED TO BE USED WITH THE MINIMUM END DISTANCE INDICATED AT THE EDGE OPENING.
30. 'DRAG' INDICATES CMST14 DRAG, EXTEND MIN DISTANCE EACH OF WALL NOTED, LOCATE IMMEDIATELY ADJACENT TO SHEAR WALL FLAT BLOCKING OUT SIDE OF CORRIDOR
31. MU INDICATES LOCATION OF FAN COIL UNIT, COORDINATE SUPPORT REQUIREMENTS W/ MECH.
32. PRIMARY WX/ HSSX INDICATES STEEL MEMBER HAVING A 1-HOUR FIRE RATING. REF. ARCHITECTURAL DETAILED FIRE REQUIREMENTS TO MEET INTENT, INCLUDING GYPSUM WRAP OR INTUMESCENT PAINT. ALL INTUMESCENT PAINT SHALL BE APPROVED AND SPECIAL INSPECTED IN ACCORDANCE WITH THE SPECIAL INSPECTION REQUIREMENTS.
33. <X> INDICATES MID SPAN CAMBER OF BEAM.

JOIST SCHEDULE

	TYPE	SPACING	REMARKS
J-1	11 7/8" LOUISIANA-PACIFIC OR EQUIVALENT LPI-32 PLUS	24" OC	-
J-2	11 7/8" LOUISIANA-PACIFIC OR EQUIVALENT LPI-36	24" OC	-
J-3	5 1/2 x 11 7/8" GLB	24" OC	-

J-X INDICATES JOIST TYP. REF. SCHEDULE ABOVE FOR SIZE, TYPE AND SPACING. REF. GENERAL STRUCTURAL NOTES FOR MORE INFORMATION

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JOB NO. 22025

STRUCTURAL REGISTERED PROFESSIONAL ENGINEER 62948 OREGON SEPTEMBER 8, 2009 NORMAN J. FARIS

EXPIRES: 12/31/23

VALAR LLC
VALAR CONSULTING ENGINEERING
12042 SE SUNNYSIDE RD #357 503.758.8092
CLACKAMAS, OR 97015

BID SET

02.13.2023

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1	PERMIT REV	02/08/2023
2	BID REVISIONS	02/10/2023

EXHIBIT 5

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LEVEL 02 FRAMING PLAN

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S1.02

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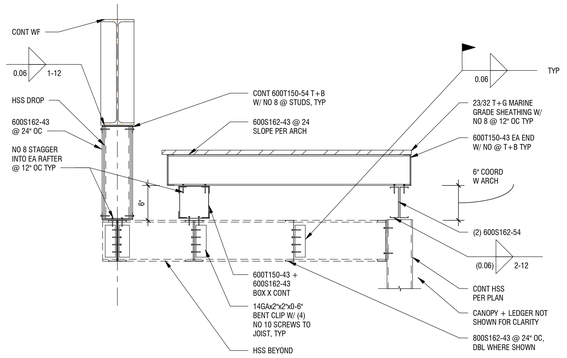
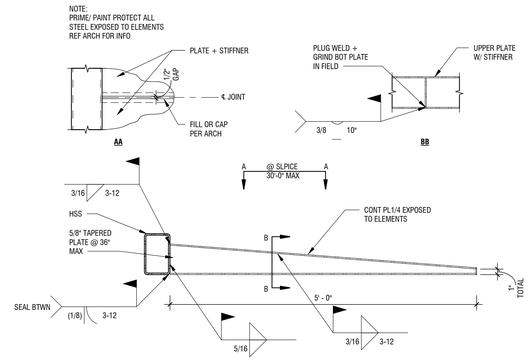
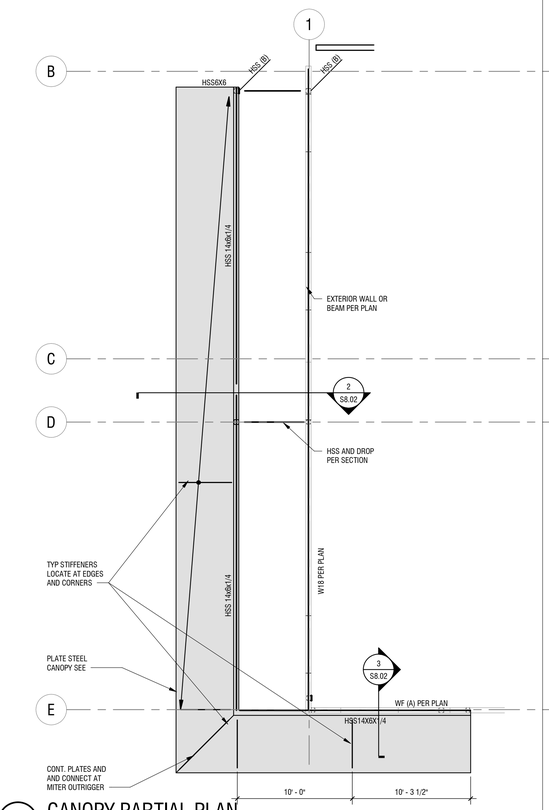


4 GUTTER FRAMING
1" = 1'-0"

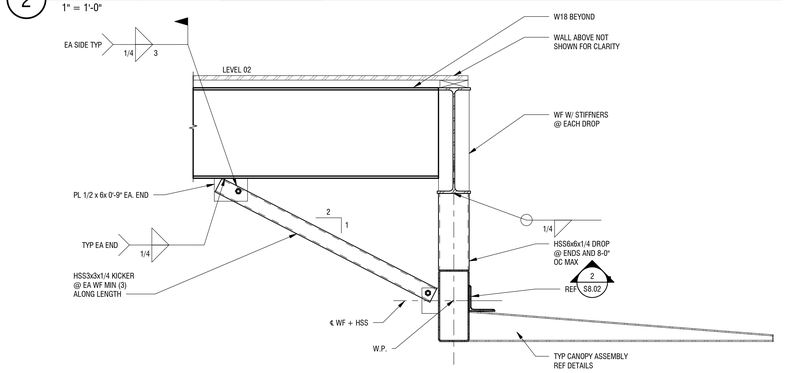


5 STEEL CANOPY @ CORNER
1" = 1'-0"



1 CANOPY PARTIAL PLAN
3/16" = 1'-0"

2 SECTION @ CANOPY - GRID 1
1" = 1'-0"



3 SECTION AT CANOPY GRID E
1" = 1'-0"

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JOB NO. 22025

STRUCTURAL
REGISTERED PROFESSIONAL ENGINEER
62948
OREGON
SEPTEMBER 8, 2000
NORMAN J. FARIS
EXPIRES: 12/31/ 23

VALAR LLC
VALAR CONSULTING ENGINEERING
12042 SE SUNNYSIDE RD #357 503.758.8092
CLACKAMAS, OR 97015

PERMIT SET
12.05.2022

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date: ISSUE DATE

revision: date:

EXHIBIT 5

title:
CANOPY
PARTIAL PLANS
AND DETAILS

sheet:
S8.02

12/5/2022 3:11:17 PM

UL Product iQ™

EXHIBIT 6

BXUV.N614 - FIRE-RESISTANCE RATINGS - ANSI/UL 263

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 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. N614

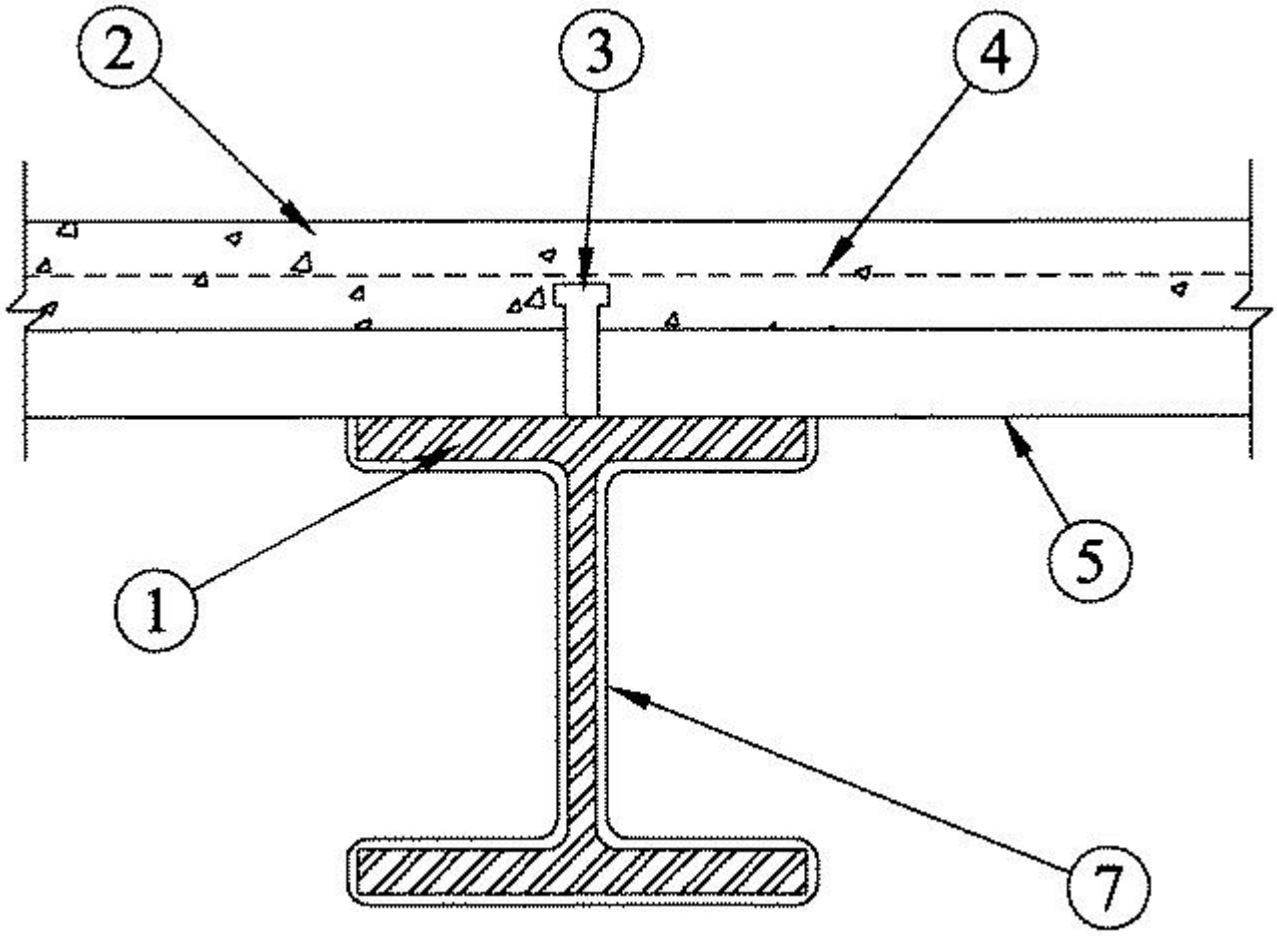
September 22, 2016

Restrained Beam Ratings - 1, 1-1/2, 2 and 3 Hr. (See Item 7)

Unrestrained Beam Ratings - 1, 1-1/2 and 2 Hr. (See Item 7)

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. **Steel Beam —** W8x24 or W6x12 or W6x16 or W8x28 min size. Beams shall be free of dirt, loose scale and oil. Beams shall be primed with a phenolic modified alkyd resin primer, a metal alkyd primer, an acrylic primer or an epoxy primer at a nominal thickness of 2 mil.

2. **Normal Weight or Lightweight Concrete —** Compressive strength 3500 psi. For normal weight concrete either carbonate or siliceous aggregate may be used. Unit weight 146 lbs/cu ft. for normal weight concrete and 116 lbs/cu ft. for lightweight concrete. Min concrete thickness, as measured from top plane of steel floor and form units is 2-1/2 in.

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

4. **Welded Wire Fabric —** 6x6-10/10 SWG

5. **Steel Floor or Form Units —** 1-1/2, 2 or 3 in. deep fluted units, welded to beam.

6. **Mineral Wool Insulation —** (Not Shown) — For the W6x12, W8x28 and W8x24 beams, min 6 pcf mineral wool insulation cut into pieces and firmly packed into, and completely filling the spaces between the flutes of the steel floor and form units and the top flange of the beam. For the W6x16 beam, min 4 pcf mineral wool insulation cut into pieces and firmly packed into, and completely filling the spaces between the flutes of the steel floor and form units and the top flange of the beam. Mineral wool is not required when the top flange of the beam is protected with intumescent coating at the same thickness shown in the table in Item 7.

7. **Mastic and Intumescent Coatings* —** Coating spray or brush applied in accordance with the manufacturer's instructions at the min dry thickness as shown in the table below. The thickness shown below includes the primer thickness. When mineral wool (Item 6) is used, the top surface of the beam need not be protected with coating.

Beam Size	Beam W/D	Unrestrained Beam Rating, Hr.	Minimum Dry Thickness	
			mils	mm
W6x16	0.58	1	39*	0.99*
W8x28	0.81	1	43	1.10
W8x24	0.70	1	53	1.34

W8x24	0.70	1-1/2	66	1.67
W8x24	0.70	2	115	2.92
W6x12	0.52	1	73	1.83
W6x12	0.52	1-1/2	99	2.50
W6x12	0.52	2	171	4.34
* NW concrete only (See Item 2).				

Beam Size	Beam W/D	Restrained Beam Rating, Hr.	Minimum Dry Thickness	
			mils	mm
W6x16	0.58	1	39*	0.99*
W8x24	0.70	1	53	1.34
W8x28	0.81	1	43	1.10
W8x24	0.70	1-1/2	53	1.34
W8x24	0.70	2	71	1.78
W8x24	0.70	3	158	4.00
W6x12	0.52	1	73	1.83
W6x12	0.52	1-1/2	73	1.83
W6x12	0.52	2	101	2.56
* NW concrete only (See Item 2).				

BERLIN CO LTD — Type WB3, Investigated for Interior General Purpose. Type WB4, Investigated for Interior General Purpose. Type WB4, Investigated for Exterior Use with top coat as described in Item 8

GREENTECH THERMAL INSULATION PRODUCTS MFG CO L L C — Type WB3, Investigated for Interior General Purpose. Type WB4, Investigated for Interior General Purpose. Type WB4, Investigated for Exterior Use with top coat as described in Item 8

ISOLATEK INTERNATIONAL — Type SprayFilm-WB 3 and Type WB3, Investigated for Interior General Purpose. Type SprayFilm-WB 4 and Type WB4, Investigated for Interior General Purpose. Type SprayFilm-WB 4 and Type WB4, Investigated for Exterior Use with top coat as described in Item 8

NEWKEM PRODUCTS CORP — Type WB3, Investigated for Interior General Purpose. Type WB4, Investigated for Interior General Purpose. Type WB4, Investigated for Exterior Use with top coat as described in Item 8

8. **Top Coat —** Type SprayFilm — TOPSEAL and Type TOPSEAL required for Exterior Use, applied at a minimum dry thickness of 14 mils (0.34 mm) over the intumescent material.

See Classification information in the **Mastic and Intumescent Coating** (CDWZ) category, Isolatek International, for mixing requirements.

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

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