Additional Exhibit to accompany the HDC Exemplary Buildings Balanced Ventilation with Heat Recovery Guidelines

Many thanks to Runberg Architecture Group, Rushing, and DESC for their willingness to share this example code alteration/modification request used for the Hobson Place - South project. This document is provided as reference information only, and is not to be used for any other purpose. Code references, interpretations, and design criteria are all subject to your own design team and authority having jurisdiction (AHJ) interpretations.

City of Seattle
Department of Construction and Inspections
www.seattle.gov/sdci
700 Fifth Ave, Suite 2000, P.O. Box 34019, Seattle, WA 98124-4019
Phone: 206-684-8850

Code Modification or Alternate Request

Date Requested: October 18, 2019

Contact Information:
Name: Eric Vander Mey
Mailing Address: 1725 Westlake Ave N, Ste 300, Seattle, WA 98109
Phone Number: (206) 285-7114
Fax Number:
E-mail Address: ericv@rushingco.com

Relationship to Project:
☐ Owner
☑ Design Professional
☐ Contractor

Project Information:
A/P Number: 6707386
Address: 1911/1923 22nd Ave S
Code Edition: 2015

Structure Information:
Project Description: 4 floors of residential dwelling units over 3 floors of clinic/residential entry
Occupancy Group(s)/ Character: R-2
Type of Construction: Type IIIA over Type IA
Number of Stories: 7
Basements/ Mezzanines: 0
Sprinkler Location: Fully sprinklered

Code Modification Request:

Ref. SBC 104.4. A code modification is a waiver of a code requirement, and is intended to provide flexibility to the building official where there are practical difficulties meeting specific code requirements so long as the intent of the code is accomplished.

The requestor is expected to demonstrate:

1. *There are practical difficulties involved in strictly conforming to the provisions of the code; and*
2. *The modification conforms with the intent and purpose of the code; and*
3. *Together with other safety features of the building or other relevant circumstances, the modification will provide a reasonable level of strength, effectiveness, fire resistance, durability, safety, accessibility and sanitation.*

When engaged for the project, the registered design professional in responsible charge shall submit the request for a code modification under their seal and signature, including a statement that in their professional opinion, the proposal is in conformance with the intent and purpose of the code and the modification will provide a reasonable level of strength, effectiveness, fire resistance, durability, safety, accessibility and sanitation.

Please attach plans showing your proposal.

Code Alternate Request:

Ref. SBC 104.5. A code alternate is intended to provide for introduction of alternate materials, systems and methods for which the code did not anticipate, provisional upon the alternate complying with the code and providing an equivalent solution. Essentially, a code alternate is intended to meet a performance standard rather than a prescriptive standard.

The requestor is expected to demonstrate that the alternate does not conflict with the code and together with other safety features of the building or other relevant circumstances, will provide an equivalent level of strength, effectiveness, fire resistance, durability, safety, accessibility and sanitation.

When engaged for the project, the registered design professional in responsible charge shall submit the request for a code alternate under their seal and signature, including a statement that in their professional opinion, the alternate is equivalent to the code provisions.

Please attach plans showing your proposal.

Washington State Seal and Signature
ERIC K. VANDER MEY — STATE OF WASHINGTON — 40007 — REGISTERED PROFESSIONAL ENGINEER
2019-10-18

Seattle DCI Use Only
☐ Approved
☐ Approved with Amendment
☐ Denied
Reasons:
Approved Subject to Errors & Omissions
Digitally signed by Richard Pellinger
Date: 2019.10.18 17:12:30 -07'00'

Description of Alternate/ Modification (include reason for request):

REFER TO THE ATTACHED MEMO FROM RUSHING FOR COMPLETE DETAILS

Allow 4" round supply and exhaust duct runs for each residential dwelling unit to connect to the supply and exhaust horizontal duct mains above a 1-hour rated horizontal ceiling assembly above the corridor on the upper floor of the building (L7). See attached drawings for proposed ceiling assembly.

4" round duct runs to comply with all other requirements of Exception to 2015 SBC Section 717.6.1.

Description of Code Requirement (include section):

REFER TO THE ATTACHED MEMO FROM RUSHING FOR COMPLETE DETAILS

Item #2 of Exception to 2015 SBC Section 717.6.1 states the 4" duct runs need to be continuous from the residential dwelling unit to the exterior of the building.

Exception to 2015 SBC Section 717.6.1 does not require legally required standby power.

Justification (attach copies of any reference, test reports, expert opinions, etc.):

Item #2 of the exception requires that "the duct system shall be continuous from the unit to the exterior of the building" to lessen the potential for spreading fire and smoke from one dwelling unit to another.
The 1-hour horizontal ceiling assembly in the corridor and the 1-hour vertical corridor fire partition walls provide a rated boundary between the dwelling units and the supply/exhaust duct mains above the corridor (See "Section through Level 7 Corridor" clip below). Additionally, by providing legally required standby power (similar to what is required for subduct exhaust fans systems at shaft penetrations without fire/smoke dampers) this provides a more reliable power source to maintain continuous supply air and exhaust airflow for the duct systems which will help to remove any smoke from the occupied spaces. In our professional opinion, the legally required standby power at the unit and the 1-hour fire-rated horizontal ceiling assembly (not required by other provisions of the SBC) separation provides an equivalent level of protection to the 1-hour rated horizontal roof/ceiling assembly required for Type IIIA construction to separates the outdoor ducts and the upper floor and outdoors.

MEMO

TO: Seattle DCI, Building & Mechanical
DATE: October 18, 2019
PROJECT: DESC Hobson Place 22nd Ave S (South Phase) – Supportive Housing
SUBJECT: 4" Duct Run Connection to Supply & Exhaust Mains inside Building
FROM: Eric Vander Mey, PE (206-285-7114, ericv@rushingco.com)
Anthony Savedra, EIT (206-462-7668, anthonys@rushingco.com)

Rushing, Runberg Architecture Group, and DESC Supportive Housing would like to request that Seattle DCI review the following proposal for a variance from the requirement for 4" supply and exhaust duct to connect within the building envelope to supply and exhaust duct mains instead of outside the building as required by Item #2 of Exception to 2015 SBC Section 717.6.1.

Building Names/Addresses are as follows:

- DESC Hobson Place 22nd Ave S (South Phase): 1911/1923 22nd Ave S
- SDCI Building Permit #6707386

General Description:
The project is utilizing high-efficiency central ERV/HRV rooftop units that are mounted outside on the roof. Supply and exhaust/return ERV/HRV ductwork must be installed to be within the building envelope to meet energy efficiency and air barrier requirements for Passive House sustainability standard.
Project has 4-stories of Residential Group R-2 Dwelling units. The residential units are on the upper floors (Levels 4, 5, 6, 7) of the building. Building has (4) floors of Type IIIA wood frame construction over (3) floors of Type IA construction. The floors below the L4 3-hour horizontal assembly includes all non-residential occupancies that utilize separate heat/energy recovery ventilation systems for the clinic areas and residential entry.
Based on the building having 4 stories of residential it is an ideal application for the Exception to 2015 SBC Section 717.6.1 to utilize the 4" supply/exhaust ductwork via the homerun rule and not require rated shafts and fire/smoke dampers.

Description of Code Alternate:
Allow 4" round supply and exhaust duct runs for each residential dwelling unit to connect to the supply and exhaust horizontal duct mains above a 1-hour rated horizontal ceiling assembly above the corridor on the upper floor of the building (L7) instead of being continuous to the exterior of the building. See attached drawings for proposed ceiling assembly.
List of attachments:

- Section through level 7 corridor
- DESC South Code Alternate – Layout
  - Includes level 6 and 7 residential duct layout
  - Fire Caulking Detail
  - Code alternate rationale

4" round duct runs to comply with all other requirements of Exception to 2015 SBC Section 717.6.1.

Additionally, legally required standby power (tap ahead of the main) will be provided to the ERV/HRV to provide a more reliable power source and maintain continuous supply and exhaust airflow to the rooftop unit.

Description of Code Requirement:

Item #2 of Exception to 2015 SBC Section 717.6.1 states the 4" duct runs need to be continuous from the residential dwelling unit to the exterior of the building.

Exception to 2015 SBC Section 717.6.1 does not require legally required standby power.

Justification:

Exception 2 requires that "the duct system shall be continuous from the unit to the exterior of the building" to lessen the potential for spreading fire and smoke from one dwelling unit to another.

The 1-hour horizontal ceiling assembly in the corridor and the 1-hour vertical corridor fire partition walls provide a rated boundary between the dwelling units and the supply/exhaust duct mains above the corridor (See "Section through Level 7 Corridor" clip below).

Additionally, by providing legally required standby power (similar to what is required for subduct exhaust fans systems at shaft penetrations without fire/smoke dampers) this provides a more reliable power source to maintain continuous supply air and exhaust airflow for the duct systems which will help to remove any smoke from the occupied spaces.

In our professional opinion, the legally required standby power at the unit and the 1-hour fire-rated horizontal ceiling assembly (not required by other provisions of the SBC) separation provides an equivalent level of protection to the 1-hour rated horizontal roof/ceiling assembly required for Type IIIA construction to separates the outdoor ducts and the upper floor and outdoors.

Overview:
1-hour rated ceiling is not required by 2015 SBC on the upper floor of the building and is being added to protect the duct connections that need to occur inside the building to meet the Passive House requirements for a highly efficient building construction. Passive House requires the ERV/HRV ductwork to be contained within the building envelope (below the roof) to meet the energy efficiency and air barrier requirements.

Each of the homeruns are located in 2x10 stud wall and are fire caulked at the top and bottom plate where they penetrate the rated horizontal assemblies. Additionally, the ducts will be fire caulked when they penetrate the vertical walls of the 1-hour rated residential corridor fire partition walls above the 1-hour rated horizontal assembly ceiling in the corridor. Based on this configuration the horizontal supply and exhaust duct mains above the corridor ceiling are separated from the rest of the building.

If ducts are required to be above the roof assembly this adds significant cost for over-framing the roof which also adds height to the building which is not preferred by the land use code.

See attached section, corridor horizontal rated assembly detail, and mechanical L6 and L7 floorplan drawings. Floorplan drawings include notes to show compliance with Exception to 2015 SBC Section 717.6.1 in regard to fire caulking, duct sizes, location of duct runs, and allowable areas of duct penetrations through floor ceiling assembly in 100 sq ft area of floor.

As discussed above legally required standby power is not required for this SBC exception but is being voluntarily provided to ensure a more reliable power source to the rooftop ERV/HRV to provide continuous exhaust from the occupied spaces.

2015 Seattle Building Code Excerpt

717.6 Horizontal assemblies. Penetrations by ducts and air transfer openings of a floor, floor/ceiling assembly or the ceiling membrane of a roof/ceiling assembly shall be protected by a shaft enclosure that complies with Section 713 or shall comply with Sections 717.6.1 through 717.6.3.

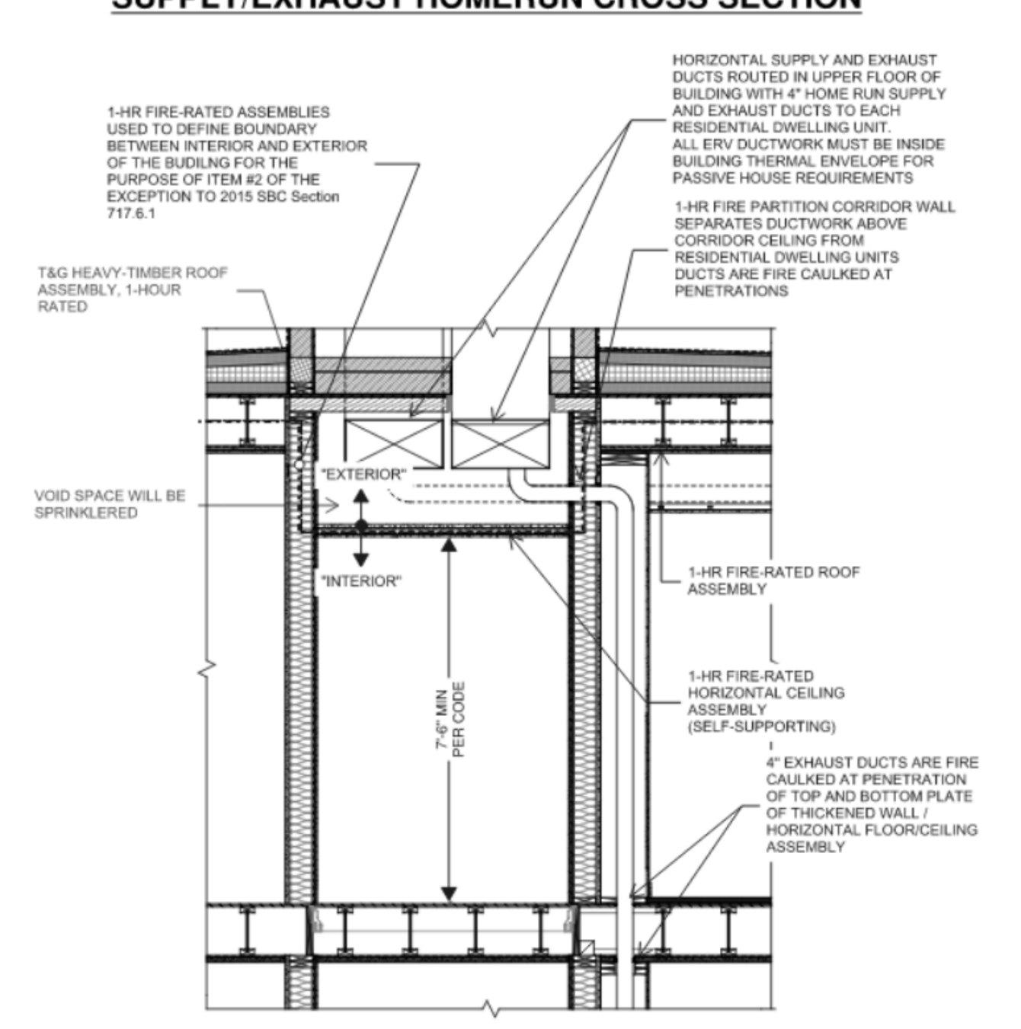
717.6.1 Through penetrations. In occupancies other than Groups I-2 and I-3, a duct constructed of *approved* materials in accordance with the *International Mechanical Code* that penetrates a fire-resistance-rated floor/ceiling assembly that connects not more than two *stories* is permitted without shaft enclosure protection, provided a *listed fire damper* is installed at the floor line or the duct is protected in accordance with Section 714.4. For air transfer openings, see Section 712.1.9.

Exception: A duct is permitted to penetrate three floors or less without a *fire damper* at each floor, provided such duct meets all of the following requirements:

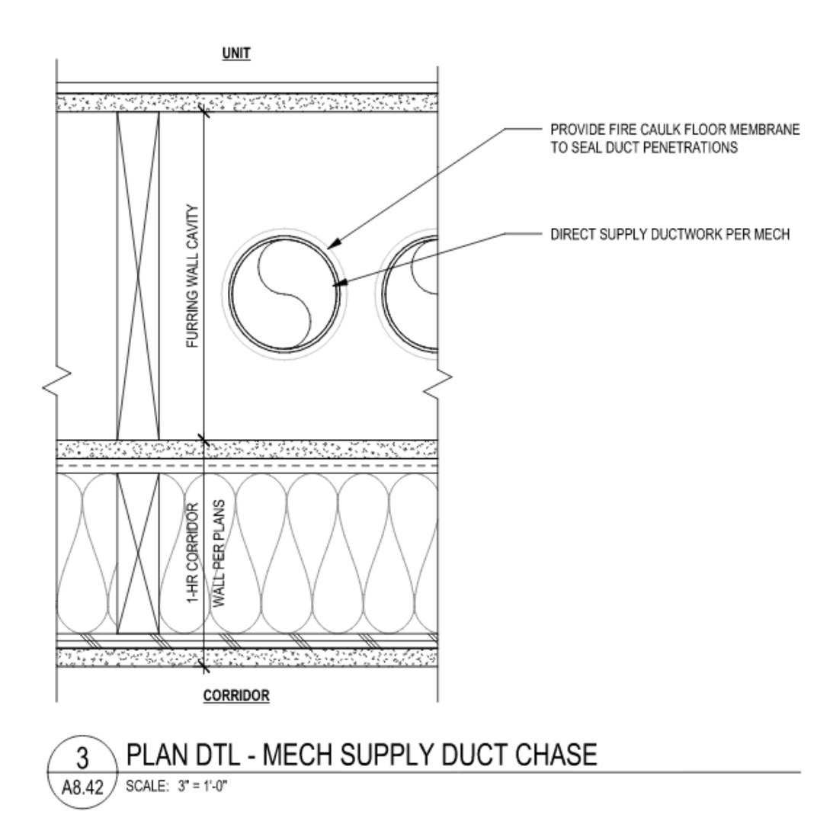
1. The duct shall be contained and located within the cavity of a wall and shall be constructed of steel having a minimum wall thickness of 0.0187 inches (0.4712 mm) (No. 26 gage).
2. The duct shall open into only one *dwelling or sleeping unit* and the duct system shall be continuous from the unit to the exterior of the building.
3. The duct shall not exceed 4-inch (102 mm) nominal diameter and the total area of such ducts shall not exceed 100 square inches (0.065 m^2) in any 100 square feet (9.3 m^2) of floor area.
4. The *annular space* around the duct is protected with materials that prevent the passage of flame and hot gases sufficient to ignite cotton waste where subjected to ASTM E119 or UL 263 time-temperature conditions under a minimum positive pressure differential of 0.01 inch (2.49 Pa) of water at the location of the penetration for the time period equivalent to the *fire-resistance rating* of the construction penetrated.
5. Grille openings located in a ceiling of a fire-resistance-rated floor/ceiling or roof/ceiling assembly shall be protected with a *listed ceiling radiation damper* installed in accordance with Section 717.6.2.1.

SECTION THROUGH LEVEL 7 CORRIDOR
SHOWS 4" DUCT CONNECTION LOCATION WITHIN BUILDING ENVELOPE

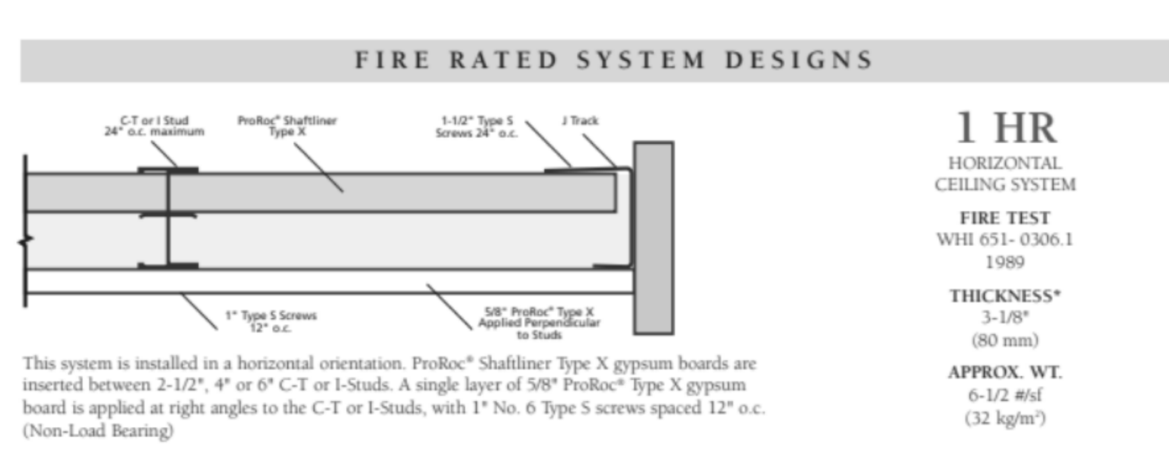
SUPPLY/EXHAUST HOMERUN CROSS SECTION

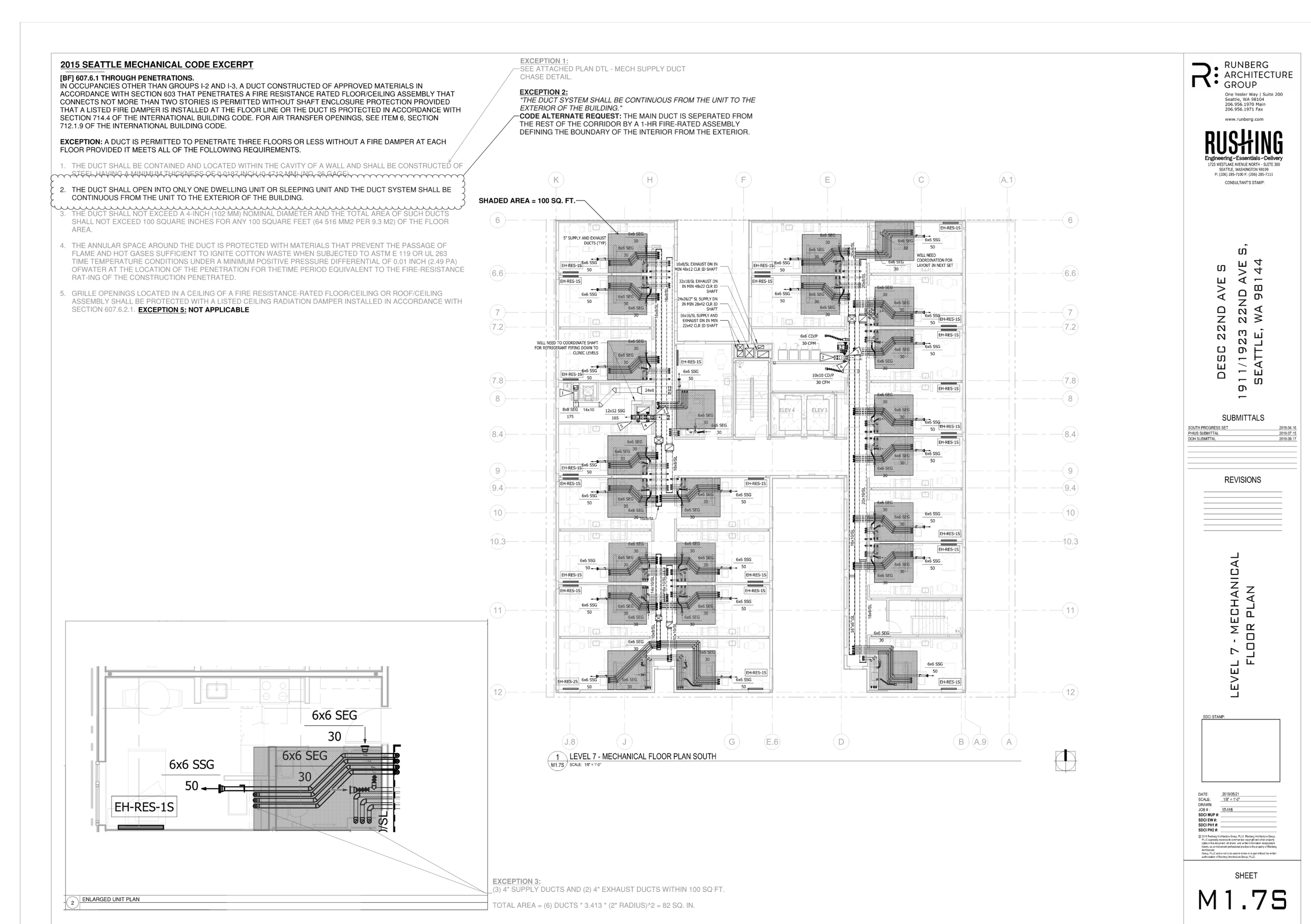


END OF MEMO



3 PLAN DTL - MECH SUPPLY DUCT CHASE





RUNBERG ARCHITECTURE GROUP
One Yesler Way | Suite 200
Seattle, WA 98104
206.956.1970 Main
206.956.1971 Fax
www.runberg.com

RUSHING
Engineering - Essentials - Delivery
1725 WESTLAKE AVENUE NORTH - SUITE 300
SEATTLE, WASHINGTON 98109
P: (206) 285-7100 F: (206) 285-7111

CONSULTANT'S STAMP:
ERIC K. VANDER MEY — STATE OF WASHINGTON — 40007 — REGISTERED PROFESSIONAL ENGINEER
01/14/2020

DESC 22ND AVE S
1911/1923 22ND AVE S,
SEATTLE, WA 98144

SUBMITTALS

SOUTH PROGRESS SET	2019.04.16
PHIUS SUBMITTAL	2019.07.15
DOH SUBMITTAL	2019.09.17
75% CD	2019.11.07
BID SET	2020.01.14

REVISIONS

MECHANICAL CODE
ALTERNATE FORMS

SDCI STAMP:

DATE: 2020.01.14
SCALE:
DRAWN:
JOB # : 17-115
SDCI MUP #:
SDCI EW #:
SDCI PH1 #:
SDCI PH2 #:

SHEET
M0.4S

aDD

SECTION 711
FLOOR AND ROOF ASSEMBLIES

711.1 General. *Horizontal assemblies* shall comply with Section 711.2. Nonfire-resistance-rated floor and roof assemblies shall comply with Section 711.3.

711.2 Horizontal assemblies. *Horizontal assemblies* shall comply with Sections 711.2.1 through 711.2.6.

711.2.1 Materials. Assemblies shall be of materials permitted by the building type of construction.

711.2.2 Continuity. Assemblies shall be continuous without vertical openings, except as permitted by this section and Section 712.

711.2.3 Supporting construction. The supporting construction shall be protected to afford the required *fire-resistance rating* of the *horizontal assembly* supported.

Exception: In buildings of Type IIB, IIIB or VB construction, the construction supporting the *horizontal assembly* is not required to be *fire-resistance rated* at the following:

1. *Horizontal assemblies* at the separations of incidental uses as specified by Table 509 provided the required *fire-resistance rating* does not exceed 1 hour.
2. *Horizontal assemblies* at the separations of *dwelling units* and *sleeping units* as required by Section 420.3.
3. *Horizontal assemblies* at *smoke barriers* constructed in accordance with Section 709.

711.2.4 Fire-resistance rating. The *fire-resistance rating* of *horizontal assemblies* shall comply with Sections 711.2.4.1 through 711.2.4.6 but shall be not less than that required by the building type of construction.

711.2.4.1 Separating mixed occupancies. Where the *horizontal assembly* separates mixed occupancies, the assembly shall have a *fire-resistance rating* of not less than that required by Section 508.4 based on the occupancies being separated.

711.2.4.2 Separating fire areas. Where the *horizontal assembly* separates a single occupancy into different fire areas, the assembly shall have a *fire-resistance rating* of not less than that required by Section 707.3.10.

711.2.4.3 Dwelling units and sleeping units. *Horizontal assemblies* serving as dwelling or sleeping unit separations in accordance with Section 420.3 shall be not less than 1-hour *fire-resistance-rated* construction.

Exception: *Horizontal assemblies* separating *dwelling units* and *sleeping units* shall be not less than $^1/_2$-hour fire-resistance-rated construction in a building of Type IIB, IIIB and VB construction, where the building is equipped throughout with an *automatic sprinkler system* in accordance with Section 903.3.1.1.

711.2.4.4 Separating smoke compartments. Where the *horizontal assembly* is required to be a *smoke barrier*, the assembly shall comply with Section 709.

SECTION 712
VERTICAL OPENINGS

712.1 General. Each vertical opening shall comply in accordance with one of the protection methods in Sections 712.1.1 through ~~((712.1.16))~~ 712.1.17.

712.1.1 Shaft enclosures. Vertical openings contained entirely within a shaft enclosure complying with Section 713 shall be permitted. Elevator hoistways shall be protected in accordance with Section 713.14.2.

712.1.2 Individual dwelling unit. Unconcealed vertical openings totally within an individual residential *dwelling unit* and connecting four *stories* or less shall be permitted.

712.1.3 Escalator openings. Where a *building* is equipped throughout with an *automatic sprinkler system* in accordance with Section 903.3.1.1, vertical openings for escalators shall be permitted where protected in accordance with Section 712.1.3.1 or 712.1.3.2.

712.1.3.1 Opening size. Protection by a draft curtain and closely spaced sprinklers in accordance with NFPA 13 shall be permitted where the area of the vertical opening between *stories* does not exceed twice the horizontal projected area of the escalator. In other than Groups B and M, this application is limited to openings that do not connect more than four *stories*.

712.1.4 Penetrations. Penetrations, concealed and unconcealed, shall be permitted where protected in accordance with Section 714.

712.1.5 Joints. Joints shall be permitted where complying with Section 712.1.5.1 or 712.1.5.2, as applicable.

712.1.5.1 Joints in or between horizontal assemblies. Joints made in or between *horizontal assemblies* shall comply with Section 715. The void created at the intersection of a floor/ceiling assembly and an exterior curtain wall assembly shall be permitted where protected in accordance with Section 715.4.

712.1.5.2 Joints in or between nonfire-resistance-rated floor assemblies. Joints in or between floor assemblies without a required *fire-resistance rating* shall be permitted where they comply with one of the following:

1. The joint shall be concealed within the cavity of a wall.
2. The joint shall be located above a ceiling.
3. The joint shall be sealed, treated or covered with an *approved* material or system to resist the free passage of flame and the products of combustion.

Exception: Joints meeting one of the exceptions listed in Section 715.1.

712.1.6 Ducts and air transfer openings. Penetrations by ducts and air transfer openings shall be protected in accordance with Section 717. Grease ducts shall be protected in accordance with the *International Mechanical Code*.

SECTION 713
SHAFT ENCLOSURES

713.1 General. The provisions of this section shall apply to shafts required to protect openings and penetrations through floor/ceiling and roof/ceiling assemblies. *Interior exit stairways* and *ramps* shall be enclosed in accordance with Section 1023.

713.2 Construction. Shaft enclosures shall be constructed as *fire barriers* in accordance with Section 707 or horizontal assemblies in accordance with Section 711, or both.

713.3 Materials. The shaft enclosure shall be of materials permitted by the building type of construction.

713.4 Fire-resistance rating. *Shaft enclosures* shall have a *fire-resistance rating* of not less than 2 hours where connecting more than four *stories* ((~~or more~~)), and not less than 1 hour where connecting ((~~less than~~)) four and fewer *stories*. The number of *stories* connected by the *shaft enclosure* shall include any basements but not any *mezzanines*. *Shaft enclosures* shall have a *fire-resistance rating* not less than the floor assembly penetrated, but need not exceed 2 hours. *Shaft enclosures* shall meet the requirements of Section 703.2.1.

713.5 Continuity. 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.

713.6 Exterior walls. Where *exterior walls* serve as a part of a required shaft enclosure, such walls shall comply with the requirements of Section 705 for *exterior walls* and the fire-resistance-rated enclosure requirements shall not apply.

Exception: Exterior walls required to be fire-resistance rated in accordance with Section 1021.2 for exterior egress balconies, Section 1023.7 for interior *exit* stairways and ramps and Section 1027.6 for exterior *exit* stairways and ramps.

713.7 Openings. Openings in a shaft enclosure shall be protected in accordance with Section 716 as required for *fire barriers*. Doors shall be self- or automatic-closing by smoke detection in accordance with Section 716.5.9.3.

713.7.1 Prohibited openings. Openings other than those necessary for the purpose of the shaft shall not be permitted in shaft enclosures.

713.8 Penetrations. Penetrations in a *shaft enclosure* shall be protected in accordance with Section 714 as required for *fire barriers*. Structural elements, such as beams or joists, where protected in accordance with Section 714 shall be permitted to penetrate a *shaft enclosure*. See Section 3022 for installation of pipes and ducts in elevator hoistways.

713.8.1 Prohibited penetrations. Penetrations other than those necessary for the purpose of the shaft shall not be permitted in *shaft enclosures*.

713.9 Joints. Joints in a shaft enclosure shall comply with Section 715.

713.10 Duct and air transfer openings. Penetrations of a shaft enclosure by ducts and air transfer openings shall comply with Section 717.

713.11 Enclosure at the bottom. Shafts that do not extend to the bottom of the building or structure shall comply with one of the following:

1. They shall be enclosed at the lowest level with construction of the same *fire-resistance rating* as the lowest floor through which the shaft passes, but not less than the rating required for the shaft enclosure.
2. They shall terminate in a room having a use related to the purpose of the shaft. The room shall be separated from the remainder of the building by *fire barriers* constructed in accordance with Section 707 or *horizontal assemblies* constructed in accordance with Section 711, or both. The *fire-resistance rating* and opening protectives shall be not less than the protection required for the shaft enclosure.
3. They shall be protected by *approved fire dampers* installed in accordance with their listing at the lowest floor level within the shaft enclosure.

Exceptions:

1. The fire-resistance-rated room separation is not required, provided there are no openings in or penetrations of the shaft enclosure to the interior of the building except at the bottom. The bottom of the shaft shall be closed off around the penetrating items with materials permitted by Section 716.3.1 for draftstopping, or the room shall be provided with an *approved automatic sprinkler system*.
2. A shaft enclosure containing a waste or linen chute shall not be used for any other purpose and shall discharge in a room protected in accordance with Section 713.13.4.
3. The fire-resistance-rated room separation and the protection at the bottom of the shaft are not required provided there are no combustibles in the shaft and there are no openings or other penetrations through the shaft enclosure to the interior of the building.

713.12 Enclosure at top. A shaft enclosure that does not extend to the underside of the roof sheathing, deck or slab of the building shall be enclosed at the top with construction of the same *fire-resistance rating* as the topmost floor penetrated by the shaft, but not less than the *fire-resistance rating* required for the shaft enclosure.

703.3 Methods for determining fire resistance. The application of any of the methods listed in this section shall be based on the fire exposure and acceptance criteria specified in ASTM E 119 or UL 263. The required *fire resistance* of a *building element*, component or assembly shall be permitted to be established by any of the following methods or procedures:

1. *Fire-resistance* designs documented in *approved* sources.
2. Prescriptive designs of *fire-resistance-rated building elements*, components or assemblies as prescribed in Section 721.
3. Calculations in accordance with Section 722.
4. Engineering analysis based on a comparison of building element, component or assemblies designs having *fire-resistance ratings* as determined by the test procedures set forth in ASTM E 119 or UL 263.
5. Alternative protection methods as allowed by Section ((~~104.11~~)) 104.5.
6. *Fire-resistance* designs certified by an *approved agency*.

717.3.3 Damper actuation. *Damper* actuation shall be in accordance with Sections 717.3.3.1 through 717.3.3.5 as applicable.

717.3.3.1 Fire damper actuation device. The *fire damper* actuation device shall meet one of the following requirements:

1. The operating temperature shall be approximately 50°F (10°C) above the normal temperature within the duct system, but not less than 160°F (71°C).
2. The operating temperature shall be not more than 350°F (177°C) where located in a smoke control system complying with Section 909.

Interpretation I717.3: Dampers associated with exhaust fans used for hoistway and stair pressurization are permitted to comply with Section 717.3.3.1, item 2.

717.3.3.2 Smoke damper actuation. The *smoke damper* shall close upon actuation of a *listed* smoke detector or detectors installed in accordance with Section 907.3 and one of the following methods, as applicable:

1. Where a *smoke damper* is installed within a duct, a smoke detector shall be installed inside the duct or outside the duct with sampling tubes protruding into the duct. The detector or tubes within the duct shall be within 5 feet (1524 mm) of the *damper*. Air outlets and inlets shall not be located between the detector or tubes and the *damper*. The detector shall be *listed* for the air velocity, temperature and humidity anticipated at the point where it is installed. Other than in mechanical smoke control systems, *dampers* shall be closed upon fan shutdown where local smoke detectors require a minimum velocity to operate.
2. Where a *smoke damper* is installed above *smoke barrier* doors in a *smoke barrier*, a spot-type detector shall be installed on either side of the *smoke barrier* door opening. The detector shall be listed for releasing service if used for direct interface with the damper.
3. Where a *smoke damper* is installed within an air transfer opening in a wall, a spot-type detector shall be installed within 5 feet (1524 mm) horizontally of the *damper*. The detector shall be listed for releasing service if used for direct interface with the damper.
4. Where a *smoke damper* is installed in a *corridor* wall or ceiling, the *damper* shall be permitted to be controlled by a smoke detection system installed in the *corridor*.
5. Where a smoke detection system is installed in all areas served by the duct in which the damper will be located, the *smoke dampers* shall be permitted to be controlled by the smoke detection system.

717.3.3.3 Combination fire/smoke damper actuation. *Combination fire/smoke damper* actuation shall be in accordance with Sections 717.3.3.1 and 717.3.3.2. *Combination fire/smoke dampers* installed in smoke control system shaft penetrations shall not be activated by local area smoke detection unless it is secondary to the smoke management system controls.

717.5.3 Shaft enclosures. Shaft enclosures that are permitted to be penetrated by ducts and air transfer openings shall be protected with *approved* fire and smoke *dampers* installed in accordance with their listing.

DUCT PENETRATIONS AT SHAFTS REQUIRE FIRE/SMOKE DAMPERS

Exceptions:

1. *Fire dampers* are not required at penetrations of shafts where any of the following criteria are met:
   1.1. Steel exhaust subducts are extended not less than 22 inches (559 mm) vertically in exhaust shafts, provided there is a continuous airflow upward to the outside.
   1.2. Penetrations are tested in accordance with ASTM E 119 or UL 263 as part of the *fire-resistance-rated* assembly.
   1.3. Ducts are used as part of an *approved* smoke control system designed and installed in accordance with Section 909 and where the *fire damper* will interfere with the operation of the smoke control system.
   1.4. The penetrations are in parking garage exhaust or supply shafts that are separated from other building shafts by not less than 2-hour *fire-resistance-rated* construction.

EXCEPTION 1.1 ALLOWS FOR OMISSION OF FIRE DAMPERS AT EXHAUST DUCTS WHERE STEEL SUBDUCTS ARE PROVIDED

2. In Group B and R occupancies equipped throughout with an *automatic sprinkler system* in accordance with Section 903.3.1.1, *smoke dampers* are not required at penetrations of shafts where all of the following criteria are met:
   2.1. Kitchen, clothes dryer, bathroom, ((~~and~~)) toilet room, accessory storage, and accessory trash room exhaust openings are installed with steel exhaust subducts, having a minimum wall thickness of 0.0187-inch (0.4712 mm) (No. 26 gage).
   2.2. The subducts extend not less than 22 inches (559 mm) vertically.
   2.3. An exhaust fan is installed at the upper terminus of the shaft that is ((~~powered continuously in accordance with the provisions of Section 909.11.~~)) provided with a *legally required standby power system* in accordance with Seattle Electrical Code Section 701 so as to maintain a continuous upward airflow to the outside.

EXCEPTION 2 ALLOWS FOR OMISSION OF SMOKE DAMPERS AT EXHAUST DUCTS WHERE STEEL SUBDUCTS ARE PROVIDED FOR CERTAIN USES AS LONG AS LEGALLY REQUIRED STANDBY POWER IS PROVIDED AT SUBDUCT EXHAUST FAN

3. *Smoke dampers* are not required at penetration of exhaust or supply shafts in parking garages that are separated from other building shafts by not less than 2-hour *fire-resistance-rated* construction.
4. *Smoke dampers* are not required at penetrations of shafts where ducts are used as part of an *approved* mechanical smoke control system designed in accordance with Section 909 and where the *smoke damper* will interfere with the operation of the smoke control system.
5. *Fire dampers* and *combination fire/smoke dampers* are not required in kitchen and clothes dryer exhaust systems where ((~~installed in accordance with~~)) dampers are prohibited by the *International Mechanical Code*.

717.6 Horizontal assemblies. Penetrations by ducts and air transfer openings of a floor, floor/ceiling assembly or the ceiling membrane of a roof/ceiling assembly shall be protected by a shaft enclosure that complies with Section 713 or shall comply with Sections 717.6.1 through 717.6.3.

717.6.1 Through penetrations. In occupancies other than Groups I-2 and I-3, a duct constructed of *approved* materials in accordance with the *International Mechanical Code* that penetrates a fire-resistance-rated floor/ceiling assembly that connects not more than two *stories* is permitted without shaft enclosure protection, provided a *listed fire damper* is installed at the floor line or the duct is protected in accordance with Section 714.4. For air transfer openings, see Section 712.1.9.

Exception: A duct is permitted to penetrate three floors or less without a *fire damper* at each floor, provided such duct meets all of the following requirements:

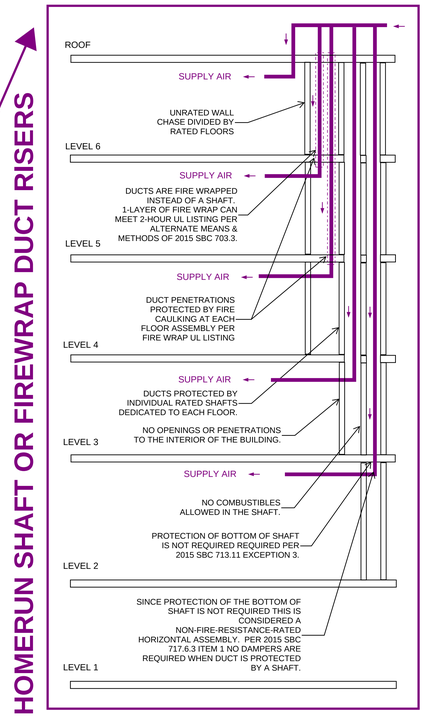
1. The duct shall be contained and located within the cavity of a wall and shall be constructed of steel having a minimum wall thickness of 0.0187 inches (0.4712 mm) (No. 26 gage).
2. The duct shall open into only one *dwelling or sleeping unit* and the duct system shall be continuous from the unit to the exterior of the building.
3. The duct shall not exceed 4-inch (102 mm) nominal diameter and the total area of such ducts shall not exceed 100 square inches (0.065 m^2) in any 100 square feet (9.3 m^2) of floor area.
4. The *annular space* around the duct is protected with materials that prevent the passage of flame and hot gases sufficient to ignite cotton waste where subjected to ASTM E119 or UL 263 time-temperature conditions under a minimum positive pressure differential of 0.01 inch (2.49 Pa) of water at the location of the penetration for the time period equivalent to the *fire-resistance rating* of the construction penetrated.
5. Grille openings located in a ceiling of a fire-resistance-rated floor/ceiling or roof/ceiling assembly shall be protected with a *listed ceiling radiation damper* installed in accordance with Section 717.6.2.1.

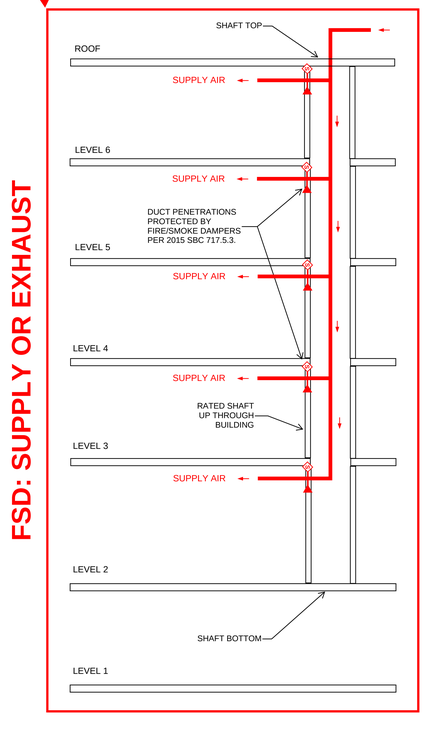
EXCEPTION TO 717.6.1 ALLOWS THROUGH PENETRATIONS OF RATED HORIZONTAL ASSEMBLIES WITHOUT FIRE DAMPERS AS LONG AS ALL THE FOLLOWING ARE TRUE:
a.) DUCT DOES NOT PENETRATE MORE THAN 3 FLOOR ASSEMBLIES
b.) DUCT IS WITHIN A WALL CAVITY (NOT IN A SHAFT)
c.) DUCT IS ONLY OPEN TO ONE DWELLING UNIT
d.) DUCT HAS MAX DIAMETER OF 4" ROUND
e.) TOTAL DUCT AREA DOES NOT EXCEED 100 SQ. INCHES IN 10'x10' FLOOR AREA
f.) DUCTS ARE FIRE CAULKED AT EACH FLOOR.

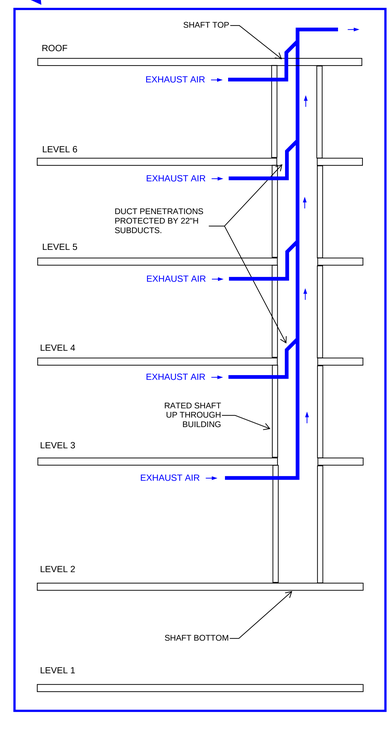
717.6.3 Nonfire-resistance-rated floor assemblies. Duct systems constructed of *approved* materials in accordance with the *International Mechanical Code* that penetrate nonfire-resistance-rated floor assemblies shall be protected by any of the following methods:

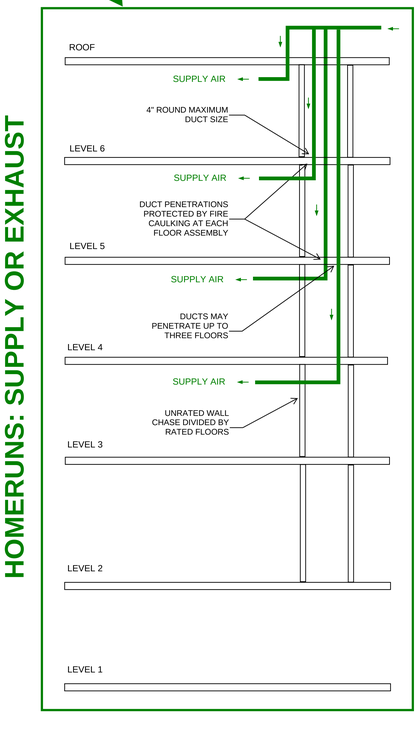
1. A shaft enclosure in accordance with Section 713.
2. The duct connects not more than two *stories*, and the *annular space* around the penetrating duct is protected with an *approved* noncombustible material that resists the free passage of flame and the products of combustion.
3. In floor assemblies composed of noncombustible materials, a shaft shall not be required where the duct connects not more than three stories, the annular space around the penetrating duct is protected with an *approved* noncombustible material that resists the free passage of flame and the products of combustion and a *fire damper* is installed at each floor line.

Exception: *Fire dampers* are not required in ducts within individual residential *dwelling units*.









Additional Exhibit to accompany the HDC Exemplary Buildings Balanced Ventilation with Heat Recovery Guidelines

Many thanks to Runberg Architecture Group, Rushing, and DESC for their willingness to share this example code alteration/modification request used for the Hobson Place - South project. This document is provided as reference information only, and is not to be used for any other purpose. Code references, interpretations, and design criteria are all subject to your own design team and authority having jurisdiction (AHJ) interpretations.

RUSHING

2015 SEATTLE BUILDING CODE
SHAFT & SHAFT PENETRATIONS

NOTE: THIS CODE BASIS SUMMARY WAS DEVELOPED BY RUSHING FOR THE DESC HOBSON PLACE SOUTH FOR DISCUSSION WITH SDCI BUILDING & MECHANICAL DEPARTMENTS. THE DIAGRAMS ARE RUSHING'S INTERPRETATION OF THE 2015 SEATTLE BUILDING & MECHANICAL CODE REQUIREMENTS FOR VERTICAL DUCT PROTECTION. IF APPLYING TO OTHER PROJECTS DESIGN CONSULTANTS NEED TO REVIEW THE APPLICABLE BUILDING & MECHANICAL CODE REQUIREMENTS AND VERIFY WITH THE AHJ HOW THE CODES WILL BE ENFORCED FOR THE VERTICAL DUCT PENETRATIONS OF HORIZONTAL FLOOR ASSEMBLIES.

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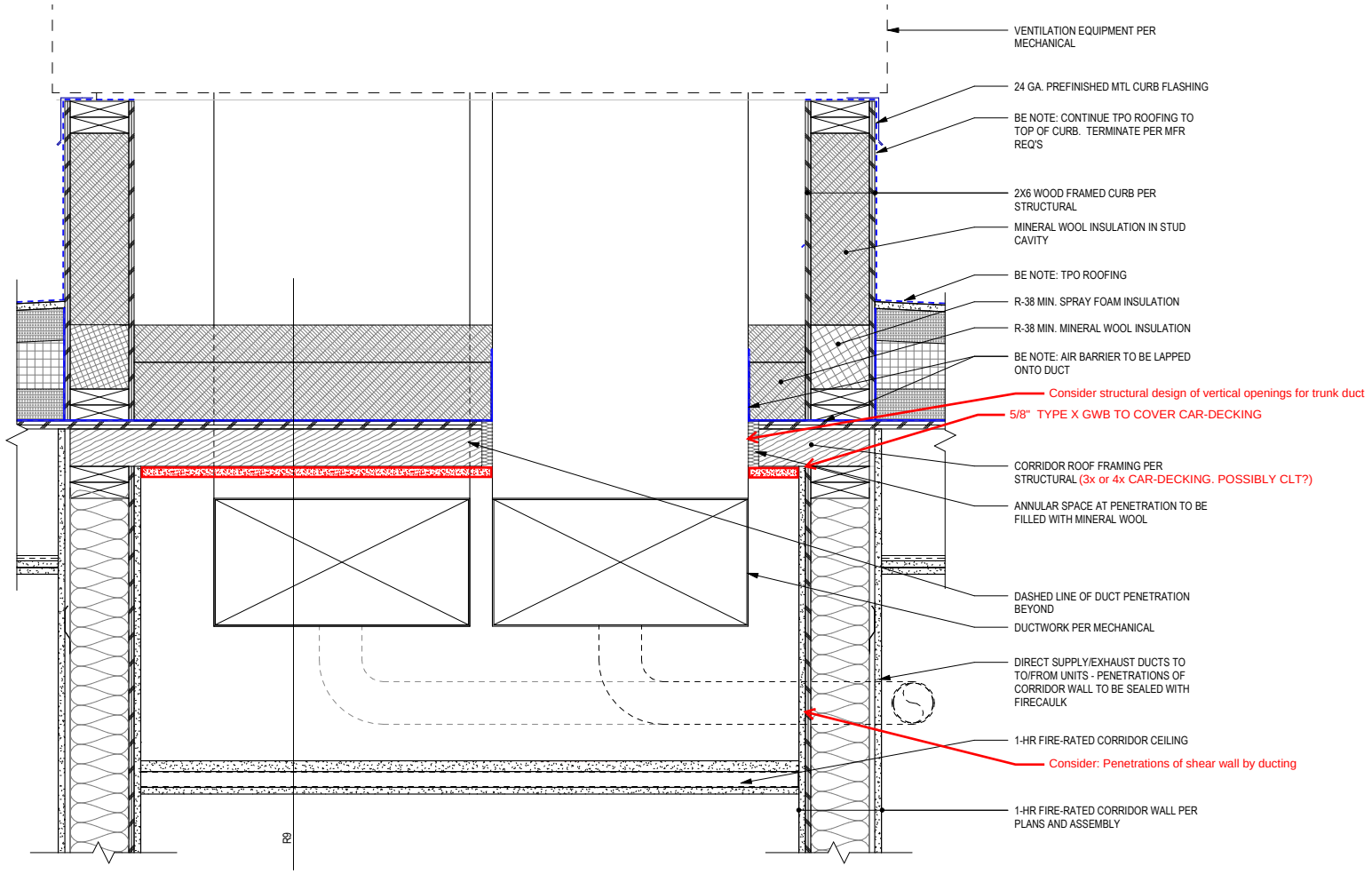

17 / A8.15 SECTION DTL - ROOF ERV EQUIPMENT SUPPORT CURB

SCALE: 1 1/2" = 1'-0"

Callouts/Mark-ups in red added by EBTF