

Development Services

From Concept to Construction

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APPEAL SUMMARY

Status: Decision Rendered

Appeal ID: 20424	Project Address: 7 SE Stark St
Hearing Date: 5/22/19	Appellant Name: Jared Diganci
Case No.: B-009	Appellant Phone: (503) 234-2945
Appeal Type: Building	Plans Examiner/Inspector: Brian McCall, Corey Stanley
Project Type: commercial	Stories: 10 Occupancy: B, M, S-2, S-1, A-3 Construction Type: I-B
Building/Business Name:	Fire Sprinklers: Yes - Entire Building
Appeal Involves: Erection of a new structure	LUR or Permit Application No.: 17-160571-CO
Plan Submitted Option: pdf [File 1] [File 2] [File 3]	Proposed use: Mixed Use Development

APPEAL INFORMATION SHEET

Appeal item 1

Code Section 704.2

Requires 704.2 – Column Protection
Where Columns are required to have protection to be fire-resistance rated, the entire column shall be provided individual encasement protection by protecting it on all sides for the full column length

Proposed Design The proposed building is a Type IB, Mixed-Use 10-story, 117ft high rise core and shell development containing 6 floors of open parking garage (S-2), Ground Level Retail (M), and 4 floors of office (B). The proposed structural frame is 5 levels of long-span post-tensioned concrete frame, with 5 levels of steel frame with composite steel deck above.

The top level of the parking garage has 1-HR FRR steel columns which support the composite steel deck above. Steel outriggers for cladding/guardrail cable attachment are connected to the 1-HR FRR columns. We propose wrapping the primary structure steel columns in (2) layers of ½" gypsum wallboard (Type X) to exceed the 1-HR minimum rated requirement (Refer to Exhibit 3 and Figure 722.5.1(4) "Fire Resistance of Structural Steel Columns Protected with Various Thicknesses of Type X Gypsum Wallboard"). Penetrations through the gypsum board by the outriggers and guardrail cable will be sealed with fire caulking. Spray-Fireproofing at the ceiling will overlap the rated gypsum column wrap to provide continuity of fire-resistance rating.

Reason for alternative Providing 1-HR FRR protection for the primary steel column was proving to have constructability problems regarding adhesion issues with spray fireproofing where the outriggers connected to the columns. Therefore, we are proposing to wrap the columns with (2) layers of ½" gypsum wallboard (Type X) and seal penetrations with fire caulking per manufacturers requirements to provide equivalency and more than the required minimum 1-HR FRR of the steel columns (Refer to Exhibit 3)

Please see enclosed the following exhibits including drawings and Fire Engineer's Report
 References:
 Exhibit 1: Plan Diagram
 Exhibit 2: Details + 3D Diagrams
 Exhibit 3: Report from Fire Protection Engineer, David Gessert, P.E.

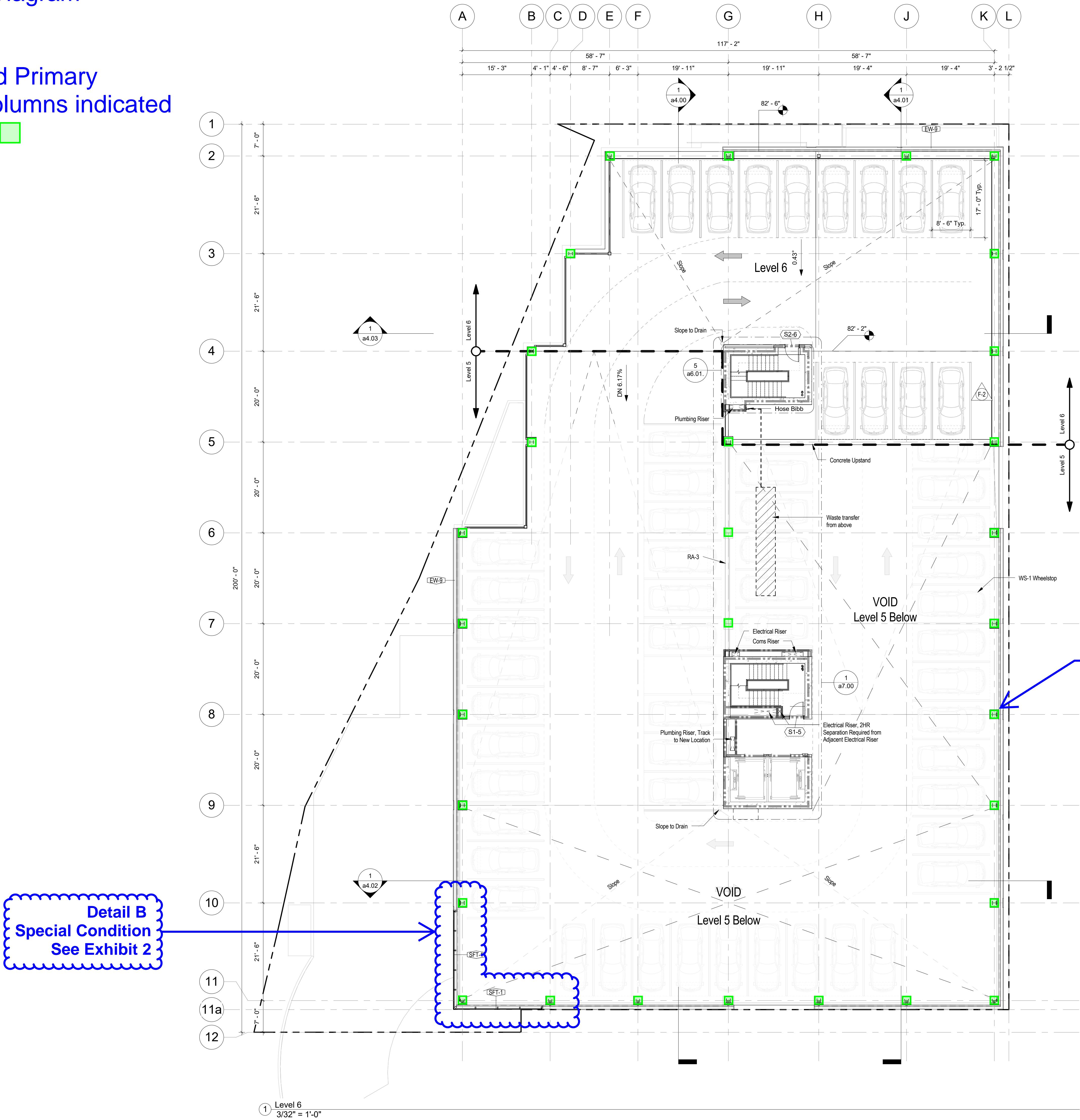
APPEAL DECISION

**Alternate 1 hour fire rated column assembly with engineering analysis: Denied. Proposal does not provide equivalent Life Safety protection.
 Appellant may contact John Butler (503 823-7339) with questions.**

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

EXHIBIT 1: Plan Diagram
LEVEL 6

Locations of Rated Primary
Structure Steel Columns indicated
with **GREEN** Box



SHEET NOTES

- A. Reference Sheet g0.01 for Dimensioning Standards & Abbreviations
- B. Reference Sheet g0.01 for Accessibility Standards & Device Locations
- C. Reference Sheets a0.01 - a0.03 For Wall Types & Ceiling Types
- D. Reference Edge of Slab Plans for Opening & Additional Dimensions
- E. The Emergency Generator will Provide a Minimum Fuel Supply to Accommodate at least 2-hours at Full-Demand of all Required Emergency Equipment. At least 8-hrs for Fire Pump.
- F. Provide Dummage and/or Curbs for All Mechanical Equipment
- G. Shoring will be design build.
- H. Provide 6-inch housekeeping pads for fire pump in Fire Pump Room
- J. All Datum Levels Given are City Of Portland datum.
- K. Reference schedule a9.00 and acronym sheet a9.01 for specification references.
- M. Reference Sheet a0.16 for Roof Anchor Plans
- N. Per Appeal ID 15505 - Intake Louver has a Water Curtain-type Sprinkler Head. Signage States "Generator Exhaust, Do Not Block". Bollards to be placed in front of this area. No Parking Allowed within 10 feet.
- P. All Electrical Circuits and Junction Boxes to be located at or above the Flood Protection Elevation of 32.8ft City of Portland Datum, unless otherwise demonstrated to meet the req. of Section 7.2 of ASCE 7-05.

Legend

1 Hour Fire Barrier	---
2 Hour Fire Barrier	----
3 Hour Fire Barrier	-----

Accessible Parking Space Calculation (per OSSC Table 1106.1)

Total Parking in Lot	Minimum Number of Accessible Spaces	*Wheelchair User Only Spaces
201-300	7	2

Detail A
TYPICAL Condition
See Exhibit 2

Detail B
Special Condition
See Exhibit 2

7 SE Stark
Permit # 17-160571-CO
Appeal 5/20/2019



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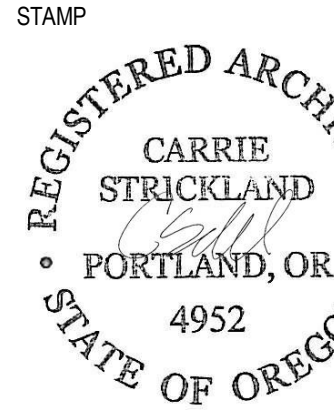
7 SE Stark
7 SE Stark Street
Portland OR, 97214
W.P.A. job number: 1196

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Revisions

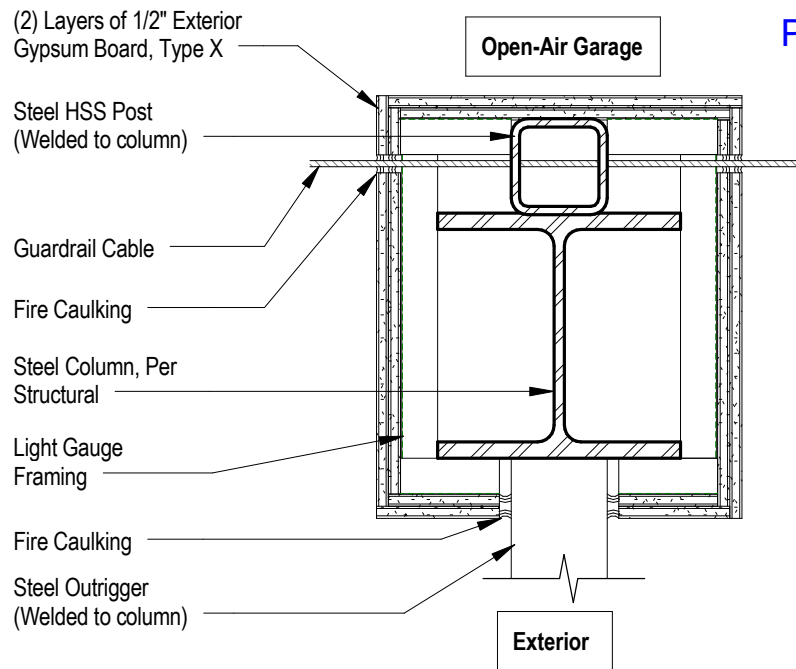
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Conformed Set A

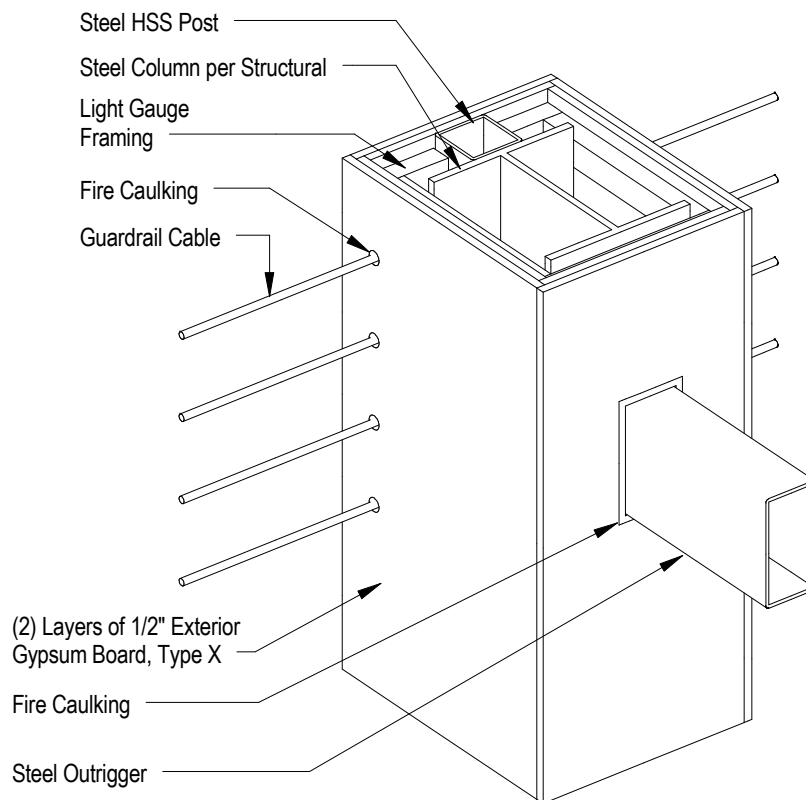


Sheet Title: Level 6
SCALE: As indicated
Sheet Number:

a2.06



1 Detail A Plan - 7 SE Stark Appeal
1 1/2" = 1'-0"



2 Detail A Axonometric Section - 7 SE Stark Appeal
1" = 1'-0"

W.P.A.

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Sheet:

Issue: 7 SE Stark - 704.2 Appeal EXHIBIT 2

RE:

Date: 05/16/19

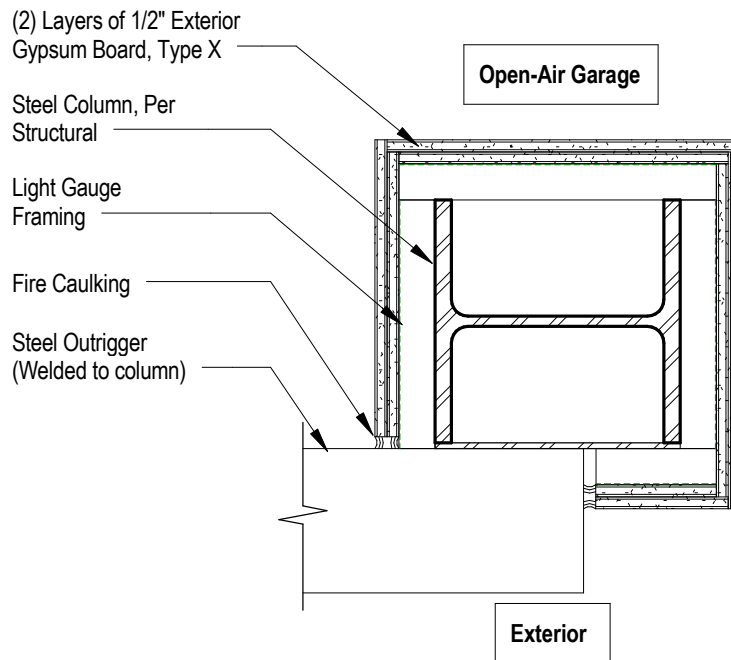
By: Author

7 SE Stark

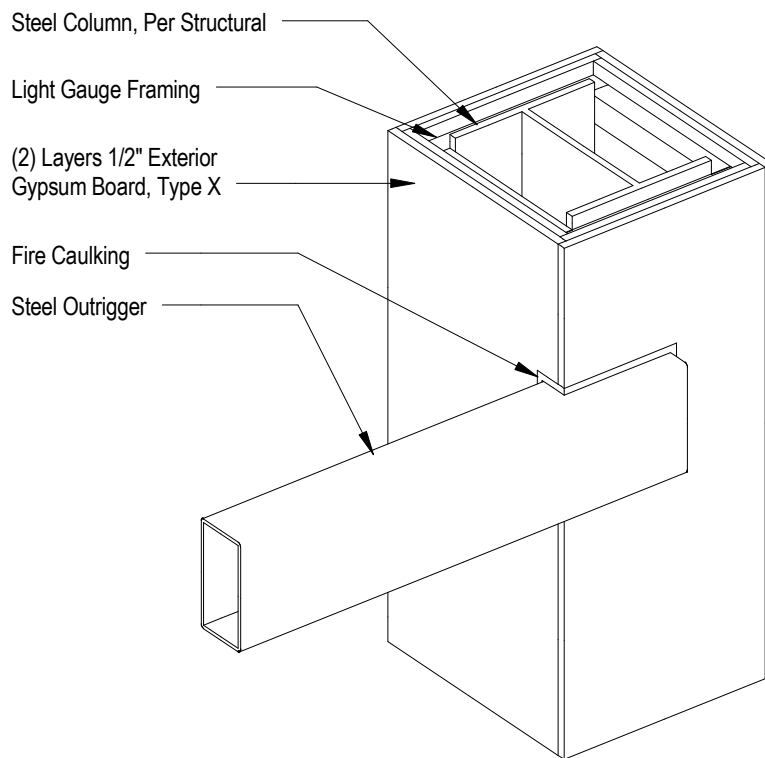
7 SE Stark
Portland, OR 97214
#1196

SK-39.0

7 SE Stark - 704.2
Appeal EXHIBIT 2



1 Detail B Plan - 7 SE Stark Appeal
1 1/2" = 1'-0"



2 Detail B Axonometric Section - 7 SE Stark Appeal
1" = 1'-0"

W.P.A.

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Sheet:

Issue: 7 SE Stark - 704.2 Appeal EXHIBIT 2

RE:

Date: 05/17/19

By: Author

7 SE Stark

7 SE Stark
Portland, OR 97214


#1196

SK-39.1

7 SE Stark - 704.2
Appeal EXHIBIT 2

Letter

Date:	May 19, 2019
To:	Works Progress Architecture 811 SE Stark Street, S210 Portland, OR 97214
Attention:	Jared Diganci
From:	David Gessert, P. E. Fire Protection Engineer
Subject/Project:	7 SE Stark Fire Protection of Selected Columns Alternate Design
Job No.:	2019-22



Total Pages: 5

Introduction/Executive Summary

Oregon Structural Specialty Code (OSSC), (2014 Edition 704.2 requires the subject columns to be provided with individual encasement protection the full column length. More than the code required fire resistance gypsum wallboard wrap compensates for steel cable guardrail and Hollow Steel Section (HSS) outrigger penetrations of the encasement.

7 SE Stark Selected Column Protection – Alternate Design

Approximately 30 primary structure, wide-flange, steel columns will be wrapped with two layers of ½-inch Type X gypsum wallboard. This 1-inch thickness Type X gypsum wallboard provides more than 1-hour of fire resistance for the steel columns. See drawings SK-39.0 and SK-39.1

This greater than the code minimum fire resistance of the steel columns compensates for the following:

- Penetration of guardrail cable of the column protection. This is a reoccurring condition where guardrail cable is attached to the columns.
- Penetration of steel outriggers of the column protection. This condition occurs a maximum of one per column and only on selected columns.



Top 4 of 11 cables of the guardrail

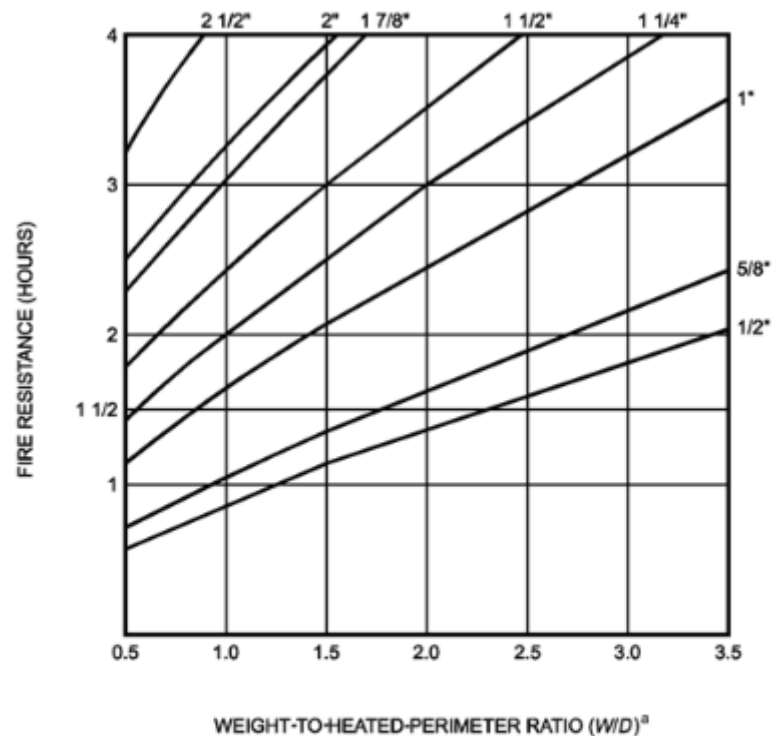


Outrigger to column attachment

Column Fire Resistance Analysis

For structural steel members the W/D ratio is the weight of steel section (lb/ft) divided by the heated perimeter of section in inches.

OSSC (2014) Figure 722.5.1(4) provides the fire resistance of the steel column protected with gypsum wallboard.



For SI: 1 inch = 25.4 mm, 1 pound per linear foot/inch = 0.059 kg/m/mm.

FIGURE 722.5.1(4)
FIRE RESISTANCE OF STRUCTURAL STEEL
COLUMNS PROTECTED WITH VARIOUS
THICKNESSES OF TYPE X GYPSUM WALLBOARD

The following table shows the wide-flange steel column shapes that are included in the alternate design and their corresponding fire resistance provide by 1-inch of Type X gypsum wallboard. Fire resistance values are read from Figure 722.5.1(4) above.

7 SE Stark Fire Resistance of Selected Columns

Steel Column Shape	W/D Ratio ¹	Fire Resistance Hours ²
W10x33	0.661	1:15
W10x39	0.780	1:25
W10x45	0.888	1:30
W10x49	0.840	1:25
W10x54	0.922	1:35
W10x60	1.01	1:40
W10x68	1.15	1:45
W10x77	1.28	1:50
W10x88	1.45	2:00
W12x65	0.925	1:35
W12x136	1.86	2:20

Table Notes:

1. Weight of steel section (lb/ft) divided by the heated perimeter of section in inches. Values are from Carboline publication, see References.
2. Fire resistance rounded to 5 minutes.

Both the cable guardrail and HSS outrigger penetrations of the gypsum wallboard fire wrap provide conduction paths for heating of the steel columns. This is a negative attribute of the design. However the overdesign of the fire wrap slows heat transfer to the columns. This is a positive attribute. From a surface area standpoint the overdesigned fire wrap is more than an order of magnitude greater than the area of the non-compliant penetrations. The area of the penetrations of the column encasement is substantially smaller than the area of the gypsum wallboard encasement which provides greater fire resistance than required by OSSC (2014). The better than code column encasement compensates for the penetrations.

Additional Considerations

Vehicle Fires – The primary if not sole fire hazard in the space of the subject columns are vehicles. Vehicles are specifically designed to minimize the probability of a fire and if a fire were to occur to minimize the size and severity of the fire. The most common cause of a vehicle fire is a collision with another moving vehicle or stationary object. The probability of a post-collision vehicle fire increases as the severity of the crash increases.

Since this is a parking garage the vehicles speeds are moderate and severity of crashes is less than on the open road. Hence the rate incidence and severity of fires will be less.

Fire incidents of parked vehicles are low and propagation to adjacent vehicles is rare. In a space with code compliant fire protection sprinklers further reduces the severity of fires.

Open-Air Fires – The ASTM E119 fire test that the gypsum wallboard wrap of the columns is required to pass takes place in an enclosed furnace. All of the subject columns are in a space that is partially open to atmosphere. In actual fire conditions much of the heat from a fire will be lost to the outside. Additionally since part of the space does not have walls, there is no mass to heat up and radiate heat back to intensify the fire.

Location of Steel Outrigger – Secondary Structural Member – These HSS steel shapes are attached to the outside face of the columns. At this location it will be less likely that the column will be exposed to a fire with the intensity of the ASTM E 119 test.

Conclusion

For all the primary structure, wide-flange, steel columns two layers of ½-inch (1-inch total thickness) Type X gypsum wallboard provides more than one-hour of fire resistance. This fire resistance above 1-hour compensates for cable guardrail and HSS penetrations of the column protection required by OSSC (2014) 704.2.

References

Drawing s2.06, Structural Mild Reinforcing Plan – Level 6, Revision 6, 10.14.17, DCI Engineers, Portland, Oregon

Oregon Structural Specialty Code, 2014 Edition, International Code Council, Country Club Hills, Illinois

W/D, M/D, A/P Tables, Carbolite Fireproofing Division, Issued: June 7, 2007, Carbolite, St. Louis, Missouri

White Paper – *Evaluation of Motor Vehicle Fire Initiation and Propagation, Vehicle Crash and Fire Propagation* Test Program, 98-S4-0-04, Jack Jensen and Jeffery Santock, General Motors Corporation, USA

End of Report