

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 - Held over from ID 20444 (5/29/19) for additional information

Appeal ID: 20547	Project Address: 2045 SW River Pkwy
Hearing Date: 6/19/19	Appellant Name: Matthew Poncelow
Case No.: B-018	Appellant Phone: 503-952-1527
Appeal Type: Building	Plans Examiner/Inspector: Brian McCall
Project Type: commercial	Stories: 14 Occupancy: Primarily R-2. A-3, B, S-2 Construction Type: Type I-A
Building/Business Name: Riverplace Parcel 3	Fire Sprinklers: Yes - Throughout project
Appeal Involves: Reconsideration of appeal	LUR or Permit Application No.: 17-156297-DFS-12-CO
Plan Submitted Option: pdf [File 1] [File 2]	Proposed use: Residential apartments

APPEAL INFORMATION SHEET

Appeal item 1

Code Section 703.2 and 703.3

Requires Code Section 703.2 The fire resistance rating of building elements, components or assemblies shall be determined in accordance with the test procedures set for in ASTM E119 or UL 263 or in accordance with Section 703.3. Where materials, systems or devices that have not been tested as part of a fire- resistance-rated assembly are incorporated into the building element, component, or assembly, sufficient data shall be made available to the building official to show that the required fire-resistance rating is not reduced. Materials and methods of construction used to protect joints and penetrations in fire-resistance-rated building elements, components or assemblies shall not reduce the required fire- resistance rating.

Proposed Design **Please note this is a reconsideration of Appeal #20444.

The code requires that primary and secondary structural members have a fire resistance rating provided by individual encasement or alternative method.

The 2045 SW River Parkway project has miscellaneous angles that are required to be fire protected. These angles are shown in the attached section details at the intersection of the fire rated concrete wall and the fire rated P.T. concrete slab above.

The proposed condition includes the angles as shown in the attached section details at the intersection of the fire rated concrete wall and the fire rated P.T. concrete slab above.

The W/D for the L 3x3x1/4 angle is 1.50, calculated off one side of one leg only being exposed as detailed in Fig 1 below.

The W/D for the L 5x5x3/8 angle is .84, calculated off one side of one leg only being exposed as detailed in Fig 2 and Fig. 4 below.

The fire protection of the proposed beam is based on a comparison to the UL tested assembly S751. The proposed beam used for evaluation is a W12x30 member with a W/D ratio of 0.607 and a flange thickness of 0.26 inch.

For evaluation, the L5x5x3/8 is the thinnest member but the protection thickness required for it will be applied to both members.

The proposed members have larger W/D ratios than the tested beam (0.84 vs 0.61). Based on the surface exposed to a potential fire, the W/D ratio is calculated for the sides exposed. The test utilizes a loaded beam in an unrestrained configuration, which is a conservative comparison to the proposed assemblies.

From the Isolatek table provided in fig 5 below, the thickness of 1" of spray-applied fire resistive material (SFRM) will provide 2 hours of protection for both members. For the L3x3x1/4 member concealed in the floor, overspray of at least 1" will be required on the adjacent wall and ceiling to ensure unprotected gaps will be protected.

See attached Engineering Judgement Report, dated 06/14/2019.

Reason for alternative We are requesting an appeal because it is standard industry practice to determine SFRM thicknesses based on calculated A/P ratios and W/D ratios. The protection requirements for these members have been compared to the requirements of UL assembly S751. As evaluated in the attached Engineering Judgement Report, the proposed beam assemblies will maintain 2 hour fire resistance as required per the OSSC when protected with 1" of SFRM as detailed above.

We request approval to use the approved UL design S751 for miscellaneous angles as the documentation required to satisfy Code Section 703.3.c for the project's miscellaneous angles where a UL test does not exist. It is common practice to use miscellaneous angles as detailed on this project and this is a common approach to fireproofing them when they exist.

APPEAL DECISION

Alternate 2 hour fire rated SFRM protected angle assemblies with engineering analysis: Granted as proposed.

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

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

Rating/UL/Member/Material/Thickness

2HR/ UL X790/ L5"x5"x0.375"/ C300HS/ 1-15/16"

2HR/ UL X790/ L3"x3"x0.25"/ C300HS/ 15/16"

FOUNDATION NOTES

- INDICATES PILE CAP TYPE WITH X NUMBER OF 12 3/4" DIAMETER DRIVEN CLOSED ENDED STEEL PILE CAPS EXTENDING TO THE UNDERLYING GRAVELS. REFERENCE S5.01 FOR TYPICAL PILE CAP DETAILS AND PILE INFORMATION. REFERENCE S5.03-S5.04 FOR PILE CAP DETAILS AT SHEAR WALL LOCATIONS. REFERENCE GEOTECHNICAL REPORT FOR ALL INFORMATION NOT INDICATED. UNLESS OTHERWISE NOTED, CENTER COLUMN AT PILE CAP PER DETAIL. LOCATE TOP OF PILE CAP 1'-0" BELOW SLAB (U.N.O.).
- INDICATES GROUT ENDED STEEL PILE AS NOTED ABOVE WITH MIN. 115 LB/DS GROUT. FULL FULL HEIGHT, PER S&D1 AND GEOTECH REPORT. REFERENCE 11/55.01 FOR ADDITIONAL REINFORCING AT CAP AND S5.15 FOR PILE CAP.
- TYPICAL ELEVATION OF STEEL PILE CAPS VARY BASED ON SITE CONDITIONS AND IS AS REQUIRED TO OBTAIN CAPACITY IN UNDERLYING GRAVELS. REF. GEOTECH REPORT AND S5.01 FOR ADDITIONAL INFORMATION.
- GB-X INDICATES REINFORCED CONCRETE GRADE BEAM TO BE LOCATED A MINIMUM OF 1'-0" BELOW GRADE. CONTINUE REINFORCING INTO PILE CAPS. REFERENCE 3 THRU 10/55.01 FOR SCHEDULE AND DETAILS.
- TGS-X INDICATES P/T REINFORCED CONC. TRANSFER GRADE BEAM. REF. ELEVATIONS ON S5.05.
- INDICATES TOP OF SLAB ELEVATION.
- EL=XXX'-XX" INDICATES POINT ELEVATION AT TOP OF CONCRETE.
- INDICATES STEP IN ELEVATION.
- INDICATES SLAB SLOPE.
- REFERENCE S5.01 - S5.09 FOR TYPICAL CONCRETE DETAILS.
- REFERENCE S4.01 - S4.10 FOR CONCRETE COLUMN SCHEDULE AND DETAILS.
- INDICATES 6" REIN. CMU WALL. REF. S7.01 FOR DETAILS.
- INDICATES 8" REIN. CMU WALL. REF. S7.01 FOR DETAILS.
- INDICATES CONCRETE WALL. REFERENCE ELEVATION FOR INFO.
- SLAB CONSTRUCTION JOINTS SHALL BE APPROVED BY THE ARCHITECT PRIOR TO CASTING S.O.G.
- REFERENCE ARCHITECTURAL AND MEP FOR SLEEVES, BLOCKOUTS AND OTHER ITEMS TO BE COORDINATED WITH THE FOUNDATIONS.
- INDICATES FLOOR DRAIN. COORDINATE WITH PLUMBING. FEATHER SLAB AS REQUIRED TO DRAIN.
- INDICATES BOLLARD.
- REFERENCE "AS201" DRAWINGS FOR DIMENSIONS.
- REFERENCE ARCHITECTURAL DRAWINGS FOR GRID DIMENSIONS.
- INDICATES REINFORCED CONCRETE SHEAR WALL, AND UNLESS NOTED OTHERWISE ON SHEAR WALL ELEVATIONS. ALL WALLS TO BE 12" THICK.
- ALL STAIRS AT WEST TOWER TO BE PRE-MANUFACTURED STEEL AND THOSE IN THE EAST TOWER TO BE WOOD FRAMED FOR THE FULL HEIGHT OF THE STRUCTURE.
- THICKENED S.O.G. AT MAN LIFT. COORDINATE SHORING DOWN FROM GROUND TO SUPPORT REACTIONS.
- ALL FOUNDATIONS SHALL BE REVIEWED, MONITORED AND APPROVED BY THE GEOTECHNICAL ENGINEER FOR FULL CONFORMANCE OF PERFORMANCE REQUIREMENTS AND LOADING DEMANDS.
- REF. 12/55.01 FOR TYP. CORNER GUARD DETAIL WHERE OCCURS PER ARCH.
- INDICATES PILES W/ 3000 PSI NORMAL WEIGHT CONCRETE FULL HEIGHT. CONCRETE SHALL BE READY TO UNDERLIE OF PILE TOP AND BE FULL CONTACT W/ PLATE. REF. 11/55.01 FOR ADDITIONAL INFO.

PARKING LEVEL PLAN - WB

1/8" = 1'-0"

CONSTRUCTION SEQUENCE 1

CONSTRUCTION SEQUENCE 2



078100 Applied Fireproofing

Thickness Plans

Riverplace Parcel 3

Portland, OR

Architect: Ankrom Moisan
General Contractor: HCC

Submitted Prepared by:
Performance Contracting Inc (PCI)
8015 SW Hunziker Rd
Tigard, OR 97223
Huda Alhamadah, Senior Project Engineer
huda.alhamadah@pci.com
503.754.7864 mobile

Per Plan Sheet G0.02:
Building Code: 2016 Portland Fire Code
Building Construction Type: Type I

Required Fire Resistivity of Structural
Elements:
Floor Assembly - 2hr

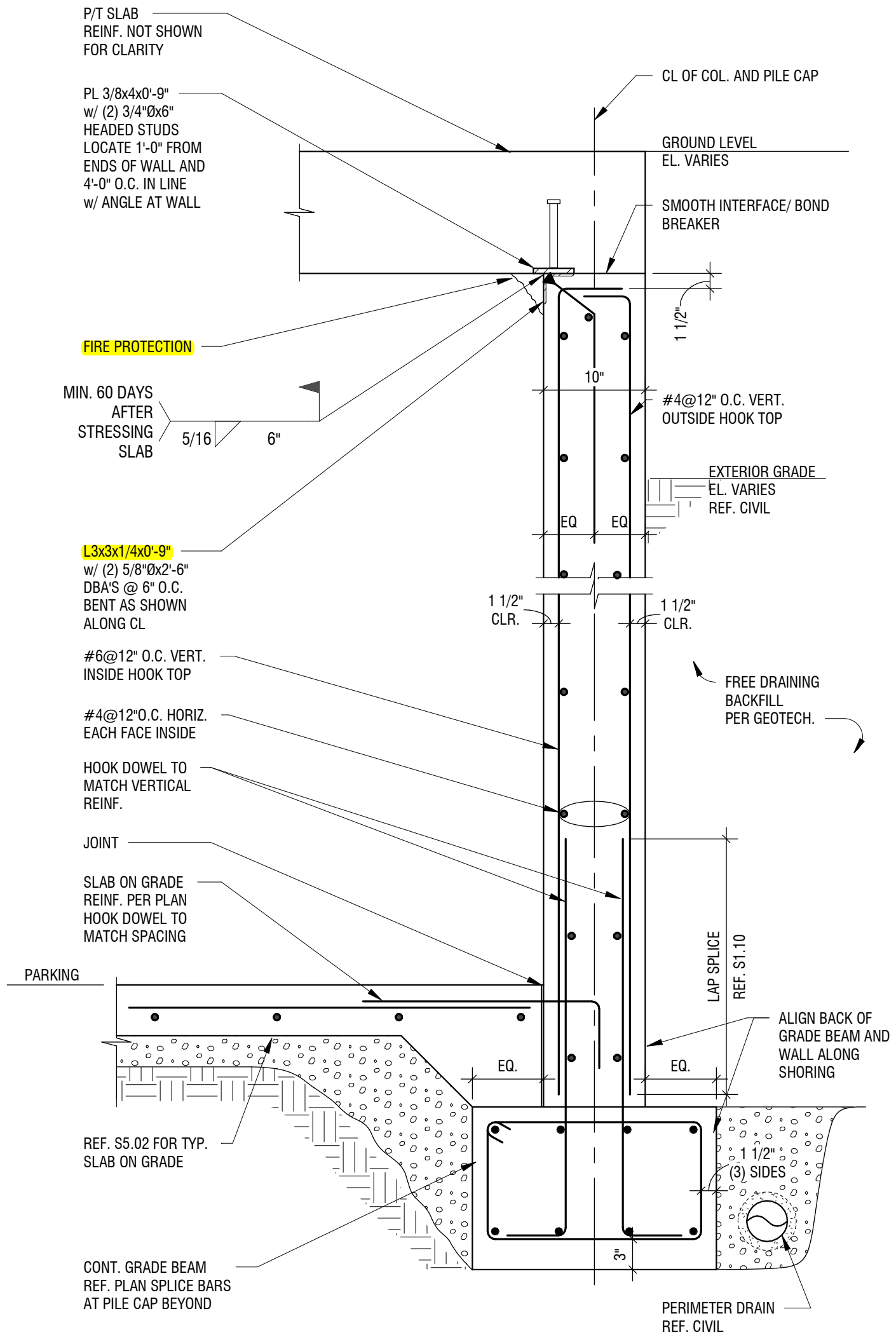
Fireproofing Materials Manufacturer:
Isolatek International Corp.
Contact: Terry Wildeboer
twildeboer@isolatek.com
206.817.9684 mobile

PARKING LEVEL
PLAN - SEQUENCE 1

CONSTRUCTION
SET

DATE 12/28/2017	REVISION 4
PROJECT NUMBER 15138	SHEET NUMBER
SCALE	S2.03

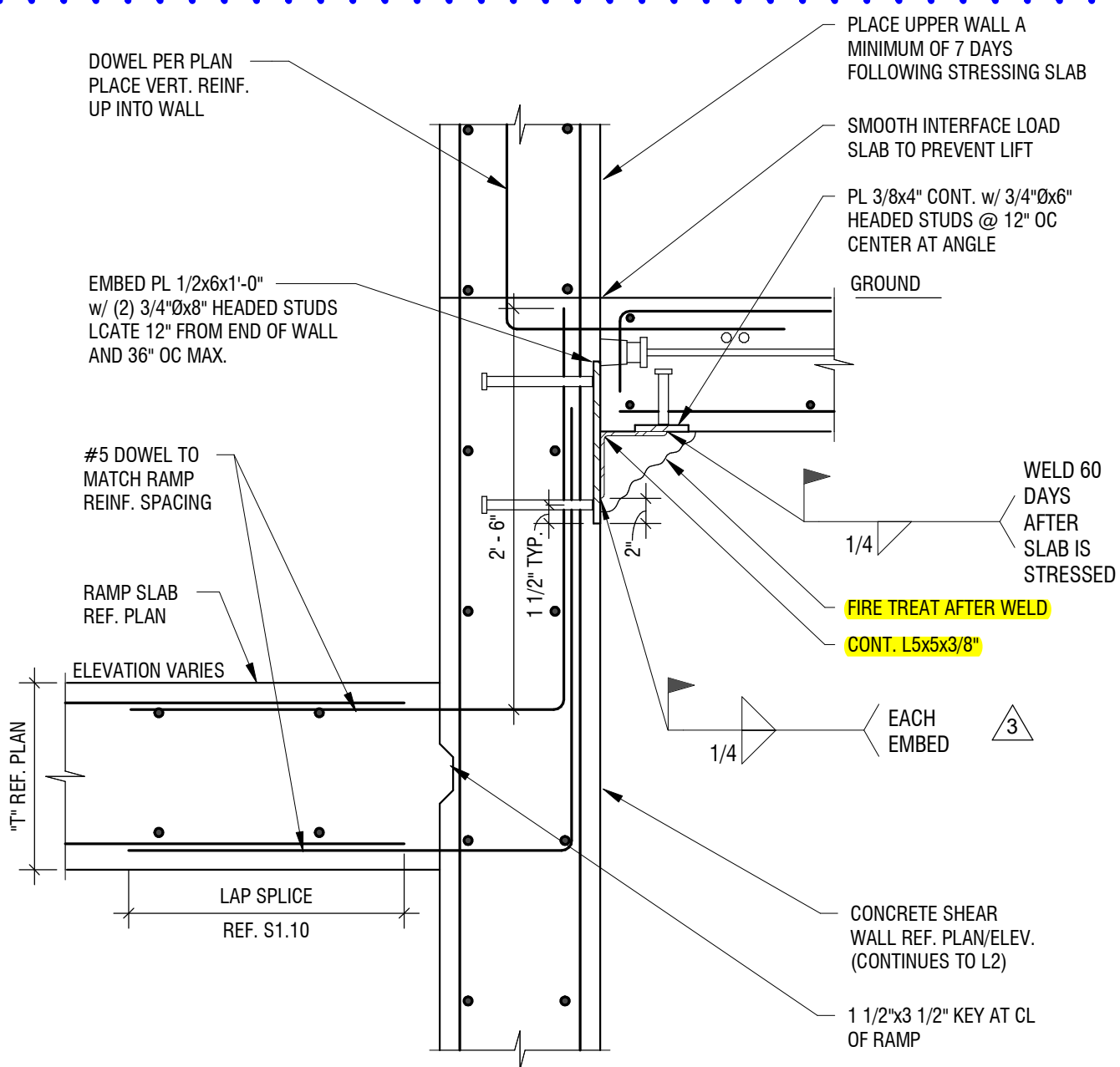
NOTE:
DO NOT BACKFILL WALL
UNTIL TOP CONNECTION
WELDED/COMPLETE



NOTE:
REF. DETAIL 9/S5.02 FOR TYP.
BLOCKOUT DETAILS
REF. 10/S5.02 FOR TIE BACK
BLOCKOUT DETAIL.
REF. 1/S5.08 FOR SOLDIER PILE CUT
OFF REQ'MTS. AT BACK OF WALL.

TYPICAL BASEMENT WALL - 10"

$$1'' = 1'-0''$$



11

RAMP SLAB TO WALL

1" = 1'-0"

Misc. Shapes (other) - X790

Full W/D Ratio Range (0.33 to 6.76)

CAFCO® 300 Series, CAFCO® 400 & ISOLATEK® Type 300 Series, ISOLATEK® Type 400

W/D	M/D	Hp/A	1-Hour	1-1/2 Hour	2-Hour	3-Hour	4-Hour
0.33	19.5	406.0	15/16	1-1/4	1-9/16	2-1/8	2-11/16
0.34	20.1	394.1	15/16	1-1/4	1-9/16	2-1/8	2-11/16
0.35	20.7	382.8	15/16	1-1/4	1-9/16	2-1/8	2-11/16
0.36	21.2	372.2	15/16	1-1/4	1-9/16	2-1/8	2-11/16
0.37	21.8	362.1	15/16	1-1/4	1-9/16	2-1/8	2-11/16
0.38	22.4	352.6	15/16	1-1/4	1-9/16	2-1/8	2-11/16
0.39	23.0	343.5	15/16	1-1/4	1-9/16	2-1/8	2-11/16
0.4	23.6	335.0	15/16	1-1/4	1-9/16	2-1/8	2-11/16
0.41	24.2	326.8	15/16	1-1/4	1-9/16	2-1/8	2-11/16
0.42	24.8	319.0	15/16	1-1/4	1-9/16	2-1/8	2-11/16
0.43	25.4	311.6	15/16	1-1/4	1-9/16	2-1/8	2-11/16
0.44	26.0	304.5	13/16	1-1/8	1-7/16	2	2-9/16
0.45	26.6	297.7	13/16	1-1/8	1-7/16	2	2-9/16
0.46	27.1	291.3	13/16	1-1/8	1-7/16	2	2-9/16
0.47	27.7	285.1	13/16	1-1/8	1-7/16	2	2-9/16
0.48	28.3	279.1	13/16	1-1/8	1-7/16	2	2-9/16
0.49	28.9	273.4	13/16	1-1/8	1-7/16	2	2-9/16
0.5	29.5	268.0	13/16	1-1/8	1-7/16	2	2-9/16
0.51	30.1	262.7	13/16	1-1/8	1-7/16	2	2-9/16
0.52	30.7	257.7	13/16	1-1/8	1-7/16	2	2-9/16
0.53	31.3	252.8	13/16	1-1/8	1-7/16	2	2-9/16
0.54	31.9	248.1	13/16	1-1/8	1-7/16	2	2-9/16
0.55	32.5	243.6	13/16	1-1/8	1-7/16	2	2-9/16
0.56	33.0	239.3	13/16	1-1/8	1-7/16	2	2-9/16
0.57	33.6	235.1	13/16	1-1/8	1-7/16	2	2-9/16
0.58	34.2	231.0	11/16	1	1-5/16	1-7/8	2-3/8
0.59	34.8	227.1	11/16	1	1-5/16	1-7/8	2-3/8
0.6	35.4	223.3	11/16	1	1-5/16	1-7/8	2-3/8
0.61	36.0	219.6	11/16	1	1-5/16	1-7/8	2-3/8
0.62	36.6	216.1	11/16	1	1-5/16	1-7/8	2-3/8
0.63	37.2	212.7	11/16	1	1-5/16	1-7/8	2-3/8
0.64	37.8	209.3	11/16	1	1-5/16	1-7/8	2-3/8
0.65	38.4	206.1	11/16	1	1-5/16	1-7/8	2-3/8
0.66	38.9	203.0	11/16	1	1-5/16	1-7/8	2-3/8
0.67	39.5	200.0	11/16	1	1-5/16	1-7/8	2-3/8
0.68	40.1	197.0	5/8	15/16	1-1/4	1-13/16	2-5/16
0.69	40.7	194.2	5/8	15/16	1-1/4	1-13/16	2-5/16
0.7	41.3	191.4	5/8	15/16	1-1/4	1-13/16	2-5/16
0.71	41.9	188.7	5/8	15/16	1-1/4	1-13/16	2-5/16
0.72	42.5	186.1	5/8	15/16	1-1/4	1-13/16	2-5/16
0.73	43.1	183.5	5/8	15/16	1-1/4	1-13/16	2-5/16
0.74	43.7	181.1	5/8	15/16	1-1/4	1-13/16	2-5/16
0.75	44.3	178.6	5/8	15/16	1-1/4	1-13/16	2-5/16
0.76	44.8	176.3	5/8	15/16	1-1/4	1-13/16	2-5/16
0.77	45.4	174.0	5/8	15/16	1-1/4	1-13/16	2-5/16
0.78	46.0	171.8	5/8	15/16	1-1/4	1-13/16	2-5/16
0.79	46.6	169.6	5/8	15/16	1-1/4	1-13/16	2-5/16
0.8	47.2	167.5	5/8	15/16	1-1/4	1-13/16	2-5/16
0.81	47.8	165.4	5/8	15/16	1-1/4	1-13/16	2-5/16
0.82	48.4	163.4	5/8	15/16	1-1/4	1-13/16	2-5/16
0.83	49.0	161.4	5/8	15/16	1-1/4	1-13/16	2-5/16
0.84	49.6	159.5	9/16	13/16	1-1/8	1-5/8	2-1/8
0.85	50.2	157.6	9/16	13/16	1-1/8	1-5/8	2-1/8
0.86	50.7	155.8	9/16	13/16	1-1/8	1-5/8	2-1/8
0.87	51.3	154.0	9/16	13/16	1-1/8	1-5/8	2-1/8
0.88	51.9	152.3	9/16	13/16	1-1/8	1-5/8	2-1/8
0.89	52.5	150.5	9/16	13/16	1-1/8	1-5/8	2-1/8
0.9	53.1	148.9	9/16	13/16	1-1/8	1-5/8	2-1/8

Note: Based on column design X790 Use for shapes where the W/D, M/D or Hp/A fall within the specified value.

Misc. Shapes (other) - X790

Full W/D Ratio Range (0.33 to 6.76)

CAFCO® 300 Series, CAFCO® 400 & ISOLATEK® Type 300 Series, ISOLATEK® Type 400

W/D	M/D	Hp/A	1-Hour	1-1/2 Hour	2-Hour	3-Hour	4-Hour	For 3x3xx1/4" Angle
1.49	87.9	89.9	3/8	9/16	13/16	1-1/4	1-11/16	
1.5	88.5	89.3	3/8	9/16	13/16	1-1/4	1-11/16	
1.51	89.1	89.7	3/8	9/16	13/16	1-1/4	1-11/16	
1.52	89.7	88.1	3/8	9/16	13/16	1-1/4	1-11/16	
1.53	90.3	87.6	3/8	9/16	13/16	1-1/4	1-11/16	
1.54	90.9	87.0	3/8	9/16	13/16	1-1/4	1-11/16	
1.55	91.5	86.4	3/8	9/16	13/16	1-1/4	1-5/8	
1.56	92.0	85.9	3/8	9/16	13/16	1-1/4	1-5/8	
1.57	92.6	85.3	3/8	9/16	13/16	1-1/4	1-5/8	
1.58	93.2	84.8	3/8	9/16	13/16	1-1/4	1-5/8	
1.59	93.8	84.3	3/8	9/16	13/16	1-1/4	1-5/8	
1.6	94.4	83.7	3/8	9/16	13/16	1-3/16	1-5/8	
1.61	95.0	83.2	3/8	9/16	13/16	1-3/16	1-5/8	
1.62	95.6	82.7	3/8	9/16	13/16	1-3/16	1-5/8	
1.63	96.2	82.2	3/8	9/16	13/16	1-3/16	1-9/16	
1.64	96.8	81.7	3/8	9/16	13/16	1-3/16	1-9/16	
1.65	97.4	81.2	3/8	9/16	13/16	1-3/16	1-9/16	
1.66	97.9	80.7	3/8	9/16	13/16	1-3/16	1-9/16	
1.67	98.5	80.2	3/8	9/16	13/16	1-3/16	1-9/16	
1.68	99.1	79.8	3/8	9/16	13/16	1-3/16	1-9/16	
1.69	99.7	79.3	3/8	9/16	13/16	1-3/16	1-9/16	
1.7	100.3	78.8	3/8	9/16	13/16	1-3/16	1-9/16	
1.71	100.9	78.4	3/8	9/16	3/4	1-1/8	1-1/2	
1.72	101.5	77.9	3/8	9/16	3/4	1-1/8	1-1/2	
1.73	102.1	77.4	3/8	9/16	3/4	1-1/8	1-1/2	
1.74	102.7	77.0	3/8	9/16	3/4	1-1/8	1-1/2	
1.75	103.3	76.6	3/8	9/16	3/4	1-1/8	1-1/2	
1.76	103.8	76.1	3/8	9/16	3/4	1-1/8	1-1/2	
1.77	104.4	75.7	3/8	9/16	3/4	1-1/8	1-1/2	
1.78	105.0	75.3	3/8	9/16	3/4	1-1/8	1-1/2	
1.79	105.6	74.9	3/8	9/16	3/4	1-1/8	1-1/2	
1.8	106.2	74.4	3/8	9/16	3/4	1-1/8	1-7/16	
1.81	106.8	74.0	3/8	9/16	3/4	1-1/8	1-7/16	
1.82	107.4	73.6	3/8	9/16	3/4	1-1/8	1-7/16	
1.83	108.0	73.2	3/8	9/16	3/4	1-1/8	1-7/16	
1.84	108.6	72.8	3/8	9/16	3/4	1-1/16	1-7/16	
1.85	109.2	72.4	3/8	9/16	3/4	1-1/16	1-7/16	
1.86	109.7	72.0	3/8	9/16	3/4	1-1/16	1-7/16	
1.87	110.3	71.6	3/8	9/16	3/4	1-1/16	1-7/16	
1.88	110.9	71.3	3/8	9/16	3/4	1-1/16	1-7/16	
1.89	111.5	70.9	3/8	9/16	3/4	1-1/16	1-7/16	
1.9	112.1	70.5	3/8	9/16	3/4	1-1/16	1-7/16	
1.91	112.7	70.1	3/8	9/16	11/16	1-1/16	1-3/8	
1.92	113.3	69.8	3/8	9/16	11/16	1-1/16	1-3/8	
1.93	113.9	69.4	3/8	9/16	11/16	1-1/16	1-3/8	
1.94	114.5	69.1	3/8	9/16	11/16	1-1/16	1-3/8	
1.95	115.1	68.7	3/8	9/16	11/16	1-1/16	1-3/8	
1.96	115.6	68.4	3/8	9/16	11/16	1-1/16	1-3/8	
1.97	116.2	68.0	3/8	9/16	11/16	1-1/16	1-3/8	
1.98	116.8	67.7	3/8	1/2	11/16	1	1-3/8	
1.99	117.4	67.3	3/8	1/2	11/16	1	1-3/8	
2	118.0	67.0	3/8	1/2	11/16	1	1-3/8	
2.01	118.6	66.7	3/8	1/2	11/16	1	1-3/8	
2.02	119.2	66.3	3/8	1/2	11/16	1	1-5/16	
2.03	119.8	66.0	3/8	1/2	11/16	1	1-5/16	
2.04	120.4	65.7	3/8	1/2	11/16	1	1-5/16	
2.05	121.0	65.4	3/8	1/2	11/16	1	1-5/16	
2.06	121.5	65.0	3/8	1/2	11/16	1	1-5/16	

Note: Based on column design X790 Use for shapes where the W/D, M/D or Hp/A fall within the specified value.

FIRE-RESISTANCE DESIGN

Assembly Usage Disclaimer

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

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

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

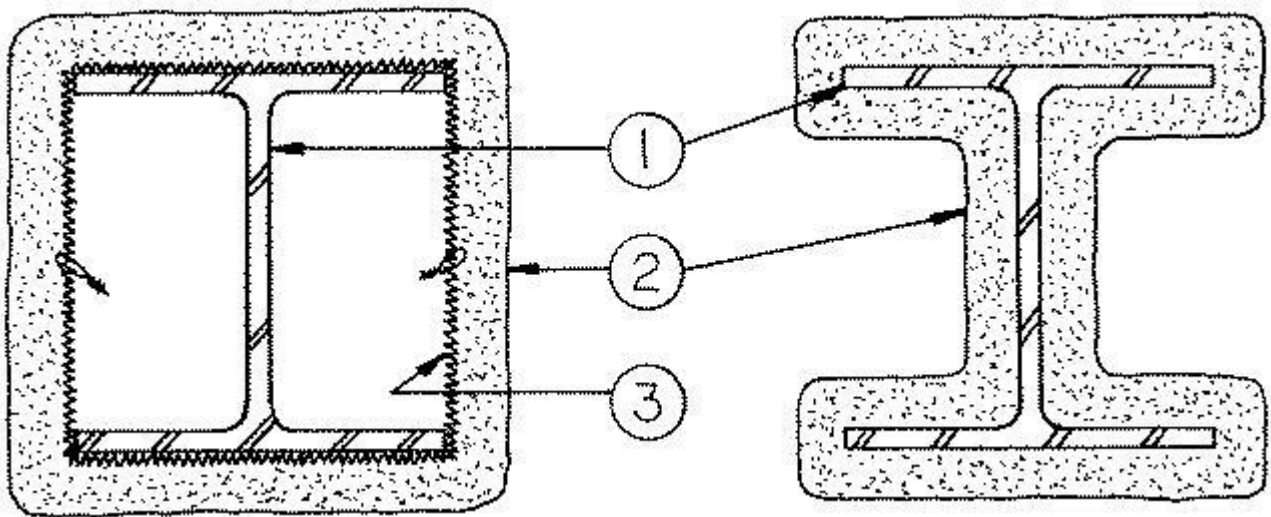
See General Information for Fire Resistance Ratings - CAN/ULC-S101 Certified for Canada
Design Criteria and Allowable Variances

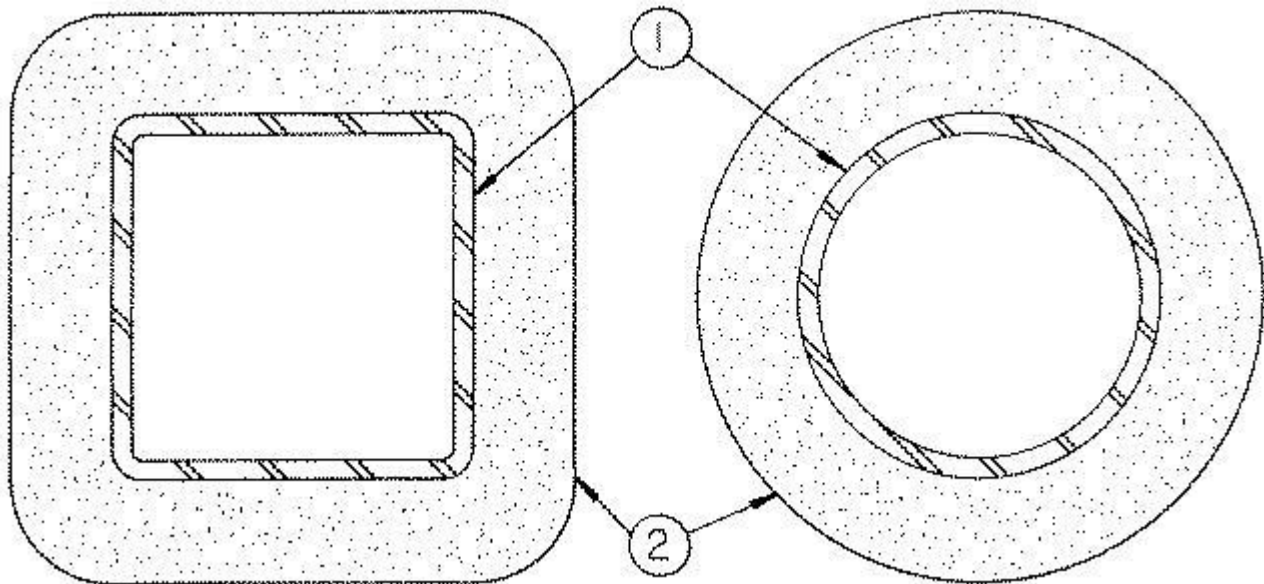
Design No. X790

November 17, 2014

Ratings — 1, 1-1/2, 2, 3 and 4 Hr.

* 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 Column, Steel Pipe or Steel Tube** — Wide flange steel column (W) or steel circular pipe (SP) or steel square or rectangular tube (ST), min sizes as shown in the tables below.

2. **Spray-Applied Fire Resistive Materials*** — Applied by mixing with water and spraying in one or more coats to the thicknesses shown below, to steel surfaces which are clean and free of dirt, loose scale, and oil. Min average and min individual density of 15 and 14 pcf, for Types 300, 300AC, 300ES, 300HS, 300N, 3000, 3000ES and SB. For Types 400AC and 400ES min average and min individual density of 22 and 19 pcf, respectively. For method of density determination, see Design Information Section, Sprayed Material.

The min thickness of Spray-Applied Fire Resistive Materials required for various fire resistance ratings of contour sprayed or boxed wide flange columns are shown in the table below:

Column Size	W/D	Min Thkns In.				
		1 Hr	1-1/2 Hr	2 Hr	3 Hr	4 Hr
W6x9	0.33	15/16	1-1/4	1-9/16	2-1/8	2-11/16
W6x12	0.43	13/16	1-1/8	1-7/16	2	2-9/16
W6x16	0.57	11/16	1	1-5/16	1-7/8	2-3/8
W8x28	0.68	5/8	15/16	1-1/4	1-13/16	2-5/16
W10x49	0.83	9/16	13/16	1-1/8	1-5/8	2-1/8
W12x106	1.46	3/8	9/16	13/16	1-1/4	1-11/16
W14x233	2.52	1/4	3/8	1/2	7/8	1-3/16
W14x730	6.68	1/4	1/4	1/4	3/8	1/2

As an alternate to the above table, the required thickness of Spray-Applied Fire Resistive Materials to be applied to all surfaces of the steel columns for all rating

periods may be determined from the following equations:

$$h = \frac{R}{75 (W/D) + 32}$$

(for column W/D range of 0.33 to 2.51)

$$h = \frac{R}{75 (W/D) + 15}$$

(for column W/D range of 2.51 to 6.68)

Where:

h = Spray-Applied Fire Resistive Materials thickness in the range of 1/4 to 4-1/2 in. (rounded up to the nearest 1/16 in.)

R = Fire resistance rating period in minutes (60-240 mins.)

D = Heated perimeter of the steel column in inches.

W = Weight of the steel column in lbs per foot.

The thicknesses contained in the table below are applicable when the Spray-Applied Fire Resistive Materials applied to the column's flange tips are reduced to one-half that shown in the table below (for contour application):

Column Size In.	Min Thkns In.				
	1 Hr	1-1/2 Hr	2 Hr	3 Hr	4 Hr
W6x9	1	1-3/8	1-3/4	2-7/16	3-1/8
W6x12	7/8	1-1/4	1-5/8	2-5/16	3-1/16
W6x16	3/4	1-1/8	1-7/16	2-1/16	2-11/16
W8x28	11/16	1	1-5/16	1-15/16	2-1/2
W10x49	5/8	15/16	1-3/16	1-3/4	2-3/8
W12x106	3/8	5/8	7/8	1-3/8	1-13/16
W14x233	5/16	3/8	9/16	15/16	1-5/16
W14x730	5/16	5/16	5/16	7/16	5/8

The min thickness of Spray-Applied Fire Resistive Materials required for various fire resistance ratings of contour sprayed steel pipes or tubes are shown on the table below:

Min Column Size In.	A/P	1 Hr	1-1/2 Hr	Min Thkns In. 2 Hr	3 Hr	4 Hr
SP 4x0.237	0.22	11/16	1	1-3/8	2-1/16	2-3/4
ST 4x4x0.1875	0.18	3/4	1-1/16	1-7/16	2-1/16	2-11/16
ST 4x4x0.3125	0.29	1/2	13/16	1-1/8	1-3/4	2-5/16
ST 4x4x0.375	0.34	7/16	3/4	1	1-9/16	2-1/8
ST 4x4x0.5	0.44	3/8	9/16	7/8	1-3/8	1-7/8
ST20x20x0.75 in.	0.72	5/16	1/2	11/16	1-1/16	1-7/16
ST20x20x1 in.	0.95	1/4	3/8	1/2	13/16	1-1/8
ST20x20x1.5 in.	1.39	1/4	1/4	3/8	5/8	13/16
ST20x20x1.75 in.	1.60	1/4	1/4	3/8	1/2	3/4
ST32x32x1.25 in.	1.20	1/4	5/16	7/16	11/16	15/16
ST 36x24x0.5	0.49	5/16	7/16	11/16	1-1/8	1-9/16

As an alternate to the table above, the required thickness of Spray-Applied Fire Resistive Materials to be applied to all surfaces of the steel pipes or tubes for all rating periods may be determined from the following equation:

$$h = \frac{R}{188 (A/P) + 45}$$

Where:

h = Spray-Applied Fire Resistive Materials thickness in the range of 5/16 to 4-1/4 in. (rounded up to the nearest 1/16 in.)

R = Fire resistance rating in minutes (60-240 mins.)

A = Cross-sectional area of pipe or tube.

P = Heated perimeter of steel pipe or tube.

A/P = 0.18 to 0.49.

The A/P ratio of a circular pipe is determined by:

$$A/P = \frac{t(d - t)}{d}$$

Where:

d = the outer diameter of the pipe (in.)

t = the wall thickness of the pipe (in.)

The A/P ratio of a rectangular tube is determined by:

$$A/P = \frac{t(a + b - 2t)}{a + b}$$

Where:

a = the outer width of the tube (in.)

b = the outer length of the tube (in.)

t = the wall thickness of the tube (in.)

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

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

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

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

2A. (As an alternate to Item 2) Spray-Applied Fire Resistive Materials* —

Applied by mixing with water and spraying in one or more coats to the thicknesses shown below, to steel surfaces which are clean and free of dirt, loose scale, and oil. Min average and min individual density of 17.5 and 16 pcf, respectively, for Type 300TW. Min average and min individual density of 22 and 19 pcf, respectively, for Type 400. For method of density determination, see Design Information Section, Sprayed Material.

The min thickness of Spray-Applied Fire Resistive Materials required for various fire resistance ratings is shown in Item 2.

BERLIN CO LTD — Type 400.

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

ISOLATEK INTERNATIONAL — Type 300TW or Type 400.

NEWKEM PRODUCTS CORP — Type 400.

2B. (As an alternate to Item 2 and 2A) — Spray-Applied Fire Resistive

Materials* — Prepared by mixing with water according to instructions on each bag of mixture and spray- or trowel-applied to steel surfaces which are free of dirt, oil or scale. Min average density of 17.5 pcf with min individual value of 17.0 pcf. For method of density determination, see Design Information Section, Sprayed Material. The min thickness of Spray-Applied Fire Resistive Materials required for various fire resistance ratings is shown in Item 2.

ISOLATEK INTERNATIONAL — Type 280.

3. Metal Lath — (Optional for contour application) — 3.4 lb/sq yd galv or painted expanded steel lath. Lath shall be lapped 1 in. and tied together with No. 18 SWG galv steel wire spaced vertically 6 in. OC.

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

Last Updated on 2014-11-17

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.

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**Experienced.
Innovative.
Trusted.**

Riverplace Parcel 3

Engineering Judgement Report Roof Ceiling Joint Condition

Client Name: Hoffman Construction

Client Address: 805 SW Broadway, Suite 2100, Portland, OR 97223

Date: 6/14/2019

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1. PROJECT OVERVIEW

Hoffman Construction is currently installing the fireproofing for the new Riverplace Parcel 3 building. The building consists of 13 stories of Type I-A construction west structure and Type III-A construction east structure over the podium structure with a basement parking. The building includes Group A-3, B, S-1, S-2, R-2 occupancies. An NFPA 13 fire sprinkler system is provided throughout.

Code Unlimited has been asked to provide an engineering analysis for the fire protection requirement for the miscellaneous steel angles. Per 2014 OSSC Table 601, the primary structural frame is required to provide 2-hour fire resistance protection.

2. APPLICABLE CODES, STANDARDS, AND GUIDES

- 2014 Oregon Structural Specialty Code Appendix N, which refers to International Fire Code

3. DISCUSSION

3.1 Approach

- The proposed assembly has been analyzed in accordance with 2014 OSSC Section 703.3 **Alternative Methods for Determining Fire Resistance**.
- The proposed design has been evaluated by an Oregon Licensed Fire Protection Engineer.

4. PROPOSED DESIGN

The proposed condition includes the angles as shown in the attached section details at the intersection of the fire rated concrete wall and the fire rated P.T. concrete slab above.

The W/D for the L 3x3x1/4 angle is 1.50, calculated off one side of one leg only being exposed as detailed in Fig 1 below.

The W/D for the L 5x5x3/8 angle is .84, calculated off one side of one leg only being exposed as detailed in Fig 2 and Fig. 4 below.

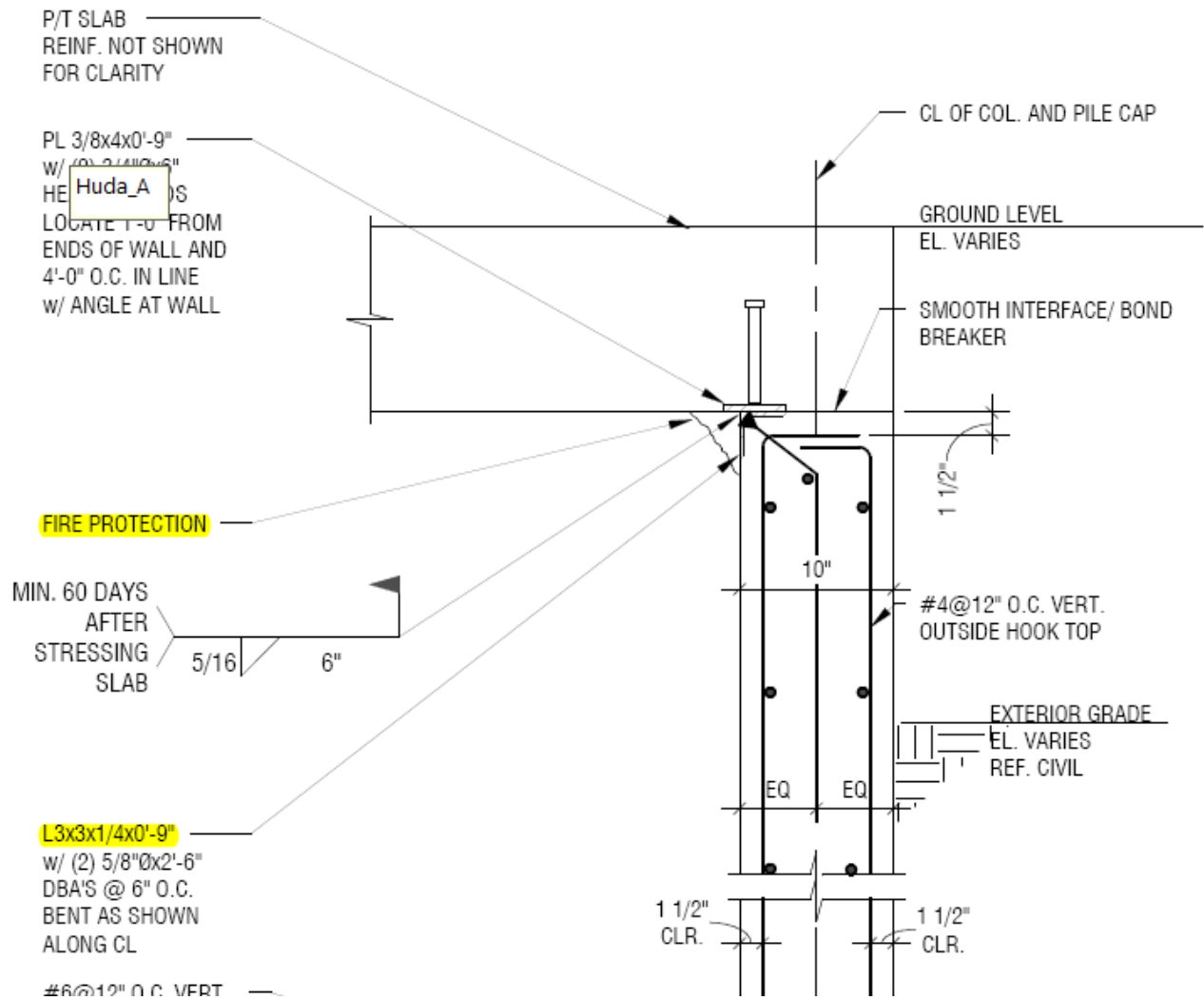


Figure 1: L3x3x1/4 (1 face exposed)

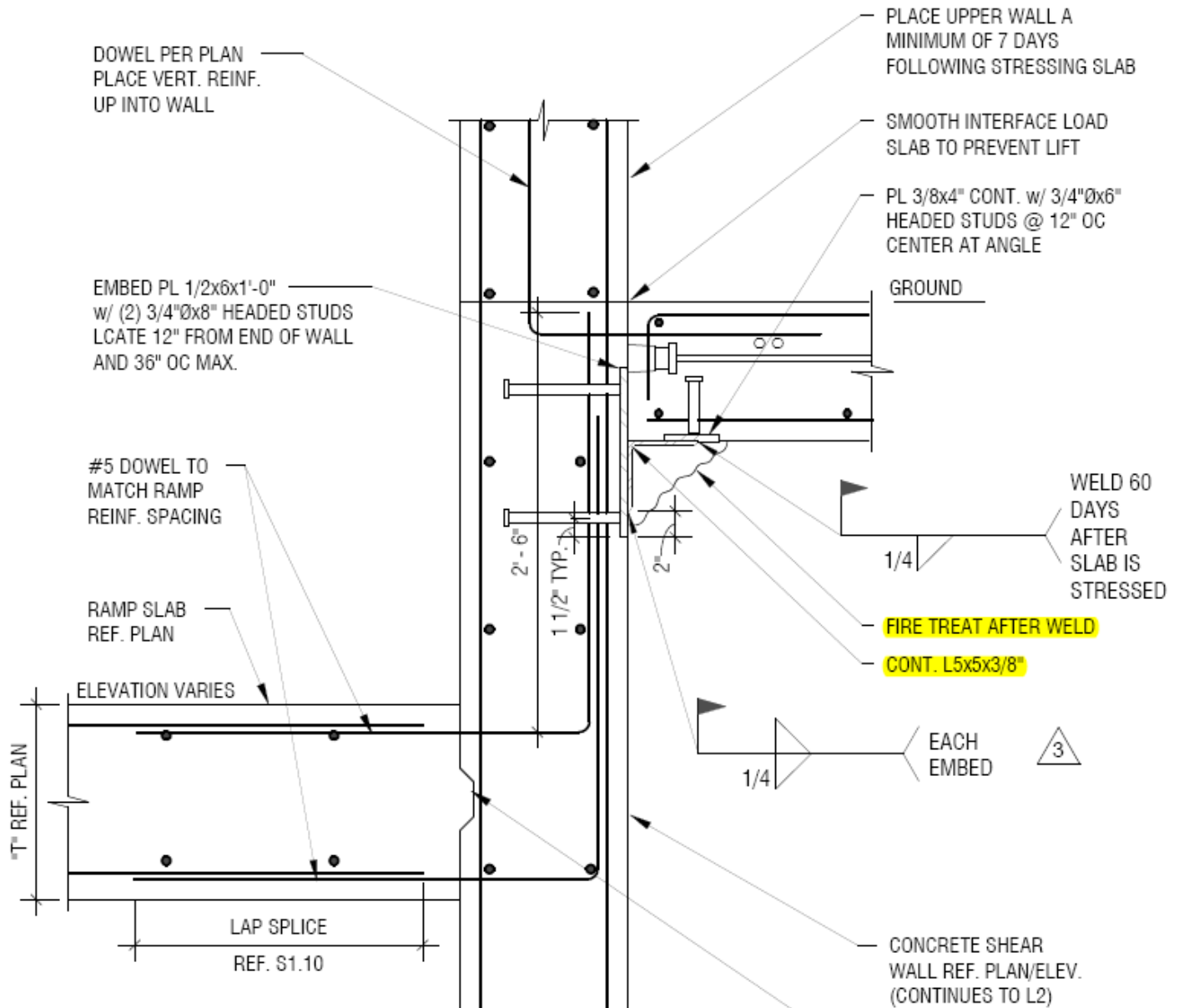


Figure 2: Angle L5x5x3/8 (2 sides exposed)

5. ASSEMBLY ANALYSIS

The assemblies are unique, as there is not a comparable UL listing for this condition, it is to be compared to a UL tested beam per UL S751.

5.1 UL Design No. S751 Comparison

The fire protection of the proposed beam is based on a comparison to the UL tested assembly S751. The proposed beam used for evaluation is a W12x30 member with a W/D ratio of 0.607 and a flange thickness of 0.26 inch.

For evaluation, the L5x5x3/8 is the thinnest member but the protection thickness required for it will be applied to both members.

The proposed members have larger W/D ratios than the tested beam (0.84 vs 0.61). Based on the surface exposed to a potential fire, the W/D ratio is calculated for the sides exposed. The test utilizes a loaded beam in an unrestrained configuration, which is a conservative comparison to the proposed assemblies.

From the Isolatek table provided in fig 5 below, the thickness of 1" of spray-applied fire resistive material (SFRM) will provide 2 hours of protection for both members. For the L3x3x1/4 member concealed in the floor, overspray of at least 1" will be required on the adjacent wall and ceiling to ensure unprotected gaps will be protected.

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. S751

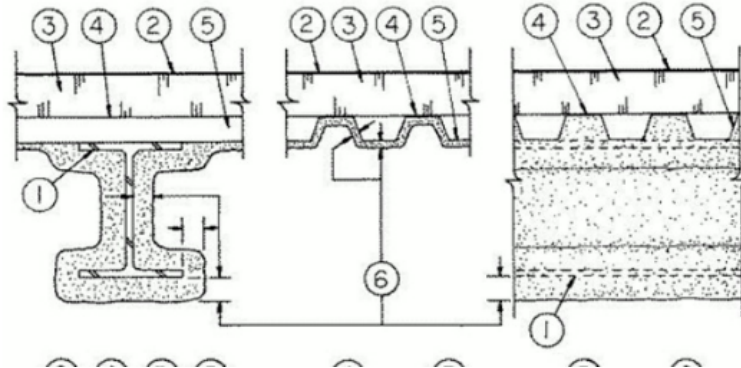
January 03, 2018

Restrained Beam Ratings — 1, 1-1/2, 2, 3 or 4 Hr (See Item 6)

Unrestrained Beam Ratings — 1, 1-1/2, 2, 3 or 4 Hr (See Item 6)

Loading determined by Allowable Stress Design Method or Load and Resistance Factor Design Method published by the American Institute of Steel Construction, or in accordance with the relevant Limit States Design provisions of Part 4 of the National Building Code of Canada — 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 Supports — W6x16 min size steel beam.

1A. As an alternate to Item 1 — Non-composite min 10K1 or min depth and weight shall be 10 in and 4.85 lb/ft respectively. May be uncoated or provided with a shop coat of paint. Designed per S.J.I. specifications for a max design yield stress of 50,000 psi (50 ksi). Top chords shall consist of two angles measuring minimum 1-1/4 by 1-1/4 by 0.129 in. thick. Bottom chords shall consist of two angles measuring minimum 1 by 1 by 0.109 in. thick. The first diagonal web member at each end shall consist of a minimum 0.625 in. dia. round bar. All remaining web members shall consist of minimum 0.50 in. dia. round bars. Bridging per S.J.I. specifications when non-composite joists are used.

2. Roof Covering* — Consisting of hot mopped, cold application or single-ply materials, compatible with insulation(s) described herein which provide Class A, B or C coverings. See Roofing Materials and Systems Directory-Roof Covering Materials (TEVT).

3. Roof Insulation* — Consisting of building units, foamed plastic or mineral and fiber boards, applied in one or more layers. When multiple layers are used, end and side joints shall be offset a min of 12 in. in both directions in order to lap all joints. See category for names of companies providing Classified products — Building Units (BZXX), Foamed Plastic (CCVW) or Mineral and Fiber Boards (CERZ). Roof insulation shall be compatible with roof covering materials Class A, B or C system. See Roofing Materials and Systems Directory-Roof Covering Materials (TEVT).

4. Adhesive — (Optional) — May be applied to steel roof deck units or between insulation layers at a max application rate of 0.4 gal per 100 sq ft. See **Adhesives** (BYWR) category for names of manufacturers.

5. Steel Roof Deck — (Unclassified) — Fluted, No. 22 MSG min galv 1-1/2 in. deep with 3-1/2 in. wide flutes spaced 6 in. OC. Ends overlapped a min 1-1/2 in. and welded to supports, 12 in. OC max. Adjacent units button-punched, welded or fastened with No. 12 by 1/2 in. long self-drilling, self-tapping steel screws.

6. Spray-Applied Fire Resistive Materials* — Applied by mixing with water and spraying in one of more coats to the thicknesses shown below, to the beam, joist, and deck surfaces which are clean and free of dirt, loose scale, and oil. Min average and min individual density of 15 and 14 pcf, respectively, for Types 300, 300AC, 300ES, 300HS, 300N, 3000, 3000ES and SB. For Types 400, 400AC and 400ES min average and min individual density of 22 and 19 pcf, respectively. Min avg density of 44 pcf with min ind value of 40 pcf for Types M-II and TG. Min avg density of 47 pcf, with min individual value of 43 pcf for Type M-II/P. For method of density determination see Design Information Section, Sprayed Material. The thickness of the Spray-Applied Fire Resistive Material on the Structural Members shall be as follows:

Rating (hour)	Minimum Thickness (inches)						Steel Roof Deck
	Restrained Beam			Unrestrained Beam			
	Beam W6x16	Joists > 4' OC	Joists ≤ 4' OC	Beam W6x16	Joists > 4' OC	Joists ≤ 4' OC	
1	1/2	3/4	5/8	1/2	3/4	5/8	1/2
1-1/2	3/4	1-3/16	1-1/16	3/4	1-1/4	1-1/16	15/16
2	1	1-11/16	1-1/2	1	1-3/4	1-1/2	1-7/16
3	1-9/16	2-7/8	2-9/16	1-9/16	2-7/8	2-9/16	1-7/16
4	2-1/8	—	—	2-1/8	—	—	1-7/16

BERLIN CO LTD — Types 300, 300ES, 300N or SB, or 400; Types M-II, TG and M-II/P

ISOLATEK INTERNATIONAL — Types 300, 300AC, 300ES, 300HS, 300N, SB, 400, 400AC, 400ES, 3000 or 3000ES; Types M-II, TG and M-II/P

Figure 3: UL S751

ANGLES (3 sided minus long leg & 3 sided minus short leg continued...

METRIC					IMPERIAL				
SIZE (mm x mm x mm)	3 sided minus long leg		3 sided minus short leg		SIZE (in. x in. x in.)	3 sided minus long leg		3 sided minus short leg	
	M/D	Heated Perimeter (m)	M/D	Heated Perimeter (m)		W/D	Heated Perimeter (in.)	W/D	Heated Perimeter (in.)
L127 x 127 x 13	63.2	0.381	63.2	0.381	L5 x 5 x 1/2	1.10	14.8	1.10	14.8
x 11	55.6	0.381	55.6	0.381	x 7/16	0.973	14.8	0.973	14.8
L127 x 127 x 9.5	48.0	0.381	48.0	0.381	L5 x 5 x 3/8	0.838	14.8	0.838	14.8
x 7.9	40.1	0.381	40.1	0.381	x 5/16	0.703	14.8	0.703	14.8

*Figure 4: W/D ratio for Single Angle L5x5x3/8***W/D ratio for Single Angle L3x3x1/4 (1-leg exposed)**

L3x3x1/4 4.9 lbs/ft

Exposed surface (one side of one leg= 3.25")

Calculated W/D Ratio = 1.51

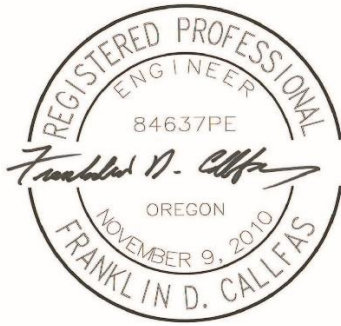
**S751****Protected Roof Deck****Unrestrained Beam****LRFD****CAFCO® 300 Series, CAFCO® 400 Series & ISOLATEK® Type 300 Series, ISOLATEK® Type 400 Series**

ASTM Desig.	W/D	Metric Desig.	M/D	Hp/A	1-Hour	1-1/2 Hour	2-Hour	3-Hour	4-Hour
W12 x 336	4.85	W310 x 500	286.2	27.6	3/8	3/8	3/8	3/8	1/2
305	4.49	454	264.9	29.8	3/8	3/8	3/8	7/16	9/16
279	4.19	415	247.2	32.0	3/8	3/8	3/8	7/16	5/8
252	3.84	375	226.6	34.9	3/8	3/8	3/8	7/16	5/8
230	3.55	342	209.5	37.7	3/8	3/8	3/8	1/2	11/16
210	3.27	313	192.9	41.0	3/8	3/8	3/8	1/2	3/4
190	3	283	177.0	44.7	3/8	3/8	3/8	9/16	13/16
170	2.72	253	160.5	49.3	3/8	3/8	7/16	5/8	7/8
152	2.45	225	144.6	54.7	3/8	3/8	7/16	11/16	15/16
136	2.23	202	131.6	60.1	3/8	3/8	1/2	11/16	1
120	1.99	179	117.4	67.3	3/8	3/8	1/2	3/4	1-1/16
106	1.77	158	104.4	75.7	3/8	7/16	9/16	13/16	1-3/16
96	1.61	143	95.0	83.2	3/8	7/16	5/8	7/8	1-1/4
87	1.47	129	86.7	91.1	3/8	1/2	5/8	15/16	1-3/8
79	1.34	117	79.1	100.0	3/8	1/2	11/16	1	1-7/16
72	1.23	107	72.6	108.9	3/8	9/16	3/4	1-1/16	1-1/2
65	1.11	97	65.5	120.7	3/8	9/16	3/4	1-1/8	1-5/8
58	1.1	86	64.9	121.8	7/16	5/8	13/16	1-3/16	1-5/8
53	1.02	79	60.2	131.4	7/16	5/8	13/16	1-3/16	1-11/16
50	1.06	74	62.5	126.4	7/16	5/8	13/16	1-3/16	1-11/16
45	0.97	67	57.2	138.1	7/16	5/8	7/8	1-1/4	1-3/4
40	0.86	60	50.7	155.8	1/2	11/16	15/16	1-3/8	1-7/8
35	0.81	52	47.8	165.4	1/2	11/16	15/16	1-3/8	1-15/16
30	0.69	45	40.7	194.2	1/2	3/4	1	1-1/2	2-1/8

Figure 5: Cafco 300 thickness tables for S751.

6. CONCLUSION

The protection requirements for these members have been compared to the requirements of UL assembly S751. As evaluated in this EJ, the proposed beam assemblies will maintain 2 hour fire resistance as required per the OSSC when protected with 1" of SFRM as detailed above.



EXPIRES 12-31-19

Franklin Callfas
Principal/Fire Protection Engineer
Code Unlimited

Rating/UL/Member/Material/Thickness

2HR/ UL X790/ L5"x5"x0.375"/ C300HS/ 1"

2HR/ UL X790/ L3"x3"x0.25"/ C300HS/ 1"

FOUNDATION NOTES

- INDICATES PILE CAP TYPE WITH X NUMBER OF 12 3/4" DIAMETER DRIVEN CLOSED ENDED STEEL PILE CAPS EXTENDING TO THE UNDERLYING GRAVELS. REFERENCE S5.01 FOR TYPICAL PILE CAP DETAILS AND PILE INFORMATION. REFERENCE S5.03-S5.04 FOR PILE CAP DETAILS AT SHEAR WALL LOCATIONS. REFERENCE GEOTECHNICAL REPORT FOR ALL INFORMATION NOT INDICATED. UNLESS OTHERWISE NOTED, CENTER COLUMN AT PILE CAP PER DETAIL. LOCATE TOP OF PILE CAP 1'-0" BELOW SLAB (U.N.O.).
- INDICATES GROUT ENDED STEEL PILE AS NOTED ABOVE WITH MIN. 115 LB/DS GROUT. FULL FULL HEIGHT, PER S&T AND GEOTECH REPORT. REFERENCE 11/55.01 FOR ADDITIONAL REINFORCING AT CAP AND S5.15 FOR PILE CAP.
- TYPICAL ELEVATION OF STEEL PILE WALL VARY BASED ON SITE CONDITIONS AND IS AS REQUIRED TO OBTAIN CAPACITY IN UNDERLYING GRAVELS. REF. GEOTECH REPORT AND S5.01 FOR ADDITIONAL INFORMATION.
- GB-X INDICATES REINFORCED CONCRETE GRADE BEAM TO BE LOCATED A MINIMUM OF 1'-0" BELOW GRADE. CONTINUE REINFORCING INTO PILE CAPS. REFERENCE 3 THRU 10/55.01 FOR SCHEDULE AND DETAILS.
- TGS-X INDICATES P/T REINFORCED CONC. TRANSFER GRADE BEAM. REF. ELEVATIONS ON S5.05.
- INDICATES TOP OF SLAB ELEVATION.
- EL=XXX'-XX" INDICATES POINT ELEVATION AT TOP OF CONCRETE.
- INDICATES STEP IN ELEVATION.
- INDICATES SLAB SLOPE.
- REFERENCE S5.01 - S5.09 FOR TYPICAL CONCRETE DETAILS.
- REFERENCE S4.01 - S4.10 FOR CONCRETE COLUMN SCHEDULE AND DETAILS.
- INDICATES 6" REIN. CMU WALL. REF. S7.01 FOR DETAILS.
- INDICATES 8" REIN. CMU WALL. REF. S7.01 FOR DETAILS.
- INDICATES CONCRETE WALL. REFERENCE ELEVATION FOR INFO.
- SLAB CONSTRUCTION JOINTS SHALL BE APPROVED BY THE ARCHITECT PRIOR TO CASTING S.O.G.
- REFERENCE ARCHITECTURAL AND MEP FOR SLEEVES, BLOCKOUTS AND OTHER ITEMS TO BE COORDINATED WITH THE FOUNDATIONS.
- INDICATES FLOOR DRAIN. COORDINATE WITH PLUMBING. FEATHER SLAB AS REQUIRED TO DRAIN.
- INDICATES BOLLARD.
- REFERENCE "AS201" DRAWINGS FOR DIMENSIONS.
- REFERENCE ARCHITECTURAL DRAWINGS FOR GRID DIMENSIONS.
- INDICATES REINFORCED CONCRETE SHEAR WALL, AND UNLESS NOTED OTHERWISE ON SHEAR WALL ELEVATIONS. ALL WALLS TO BE 12" THICK.
- ALL STAIRS AT WEST TOWER TO BE PRE-MANUFACTURED STEEL AND THOSE IN THE EAST TOWER TO BE WOOD FRAMED FOR THE FULL HEIGHT OF THE STRUCTURE.
- THICKENED S.O.G. AT MAN LIFT. COORDINATE SHORING DOWN FROM GROUND TO SUPPORT REACTIONS.
- ALL FOUNDATIONS SHALL BE REVIEWED, MONITORED AND APPROVED BY THE GEOTECHNICAL ENGINEER FOR FULL CONFORMANCE OF PERFORMANCE REQUIREMENTS AND LOADING DEMANDS.
- REF. 12/55.01 FOR TYP. CORNER GUARD DETAIL WHERE OCCURS PER ARCH.
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PARKING LEVEL PLAN - WB

1/8" = 1'-0"

CONSTRUCTION SEQUENCE 1

CONSTRUCTION SEQUENCE 2



078100 Applied Fireproofing

Thickness Plans

Riverplace Parcel 3

Portland, OR

Architect: Ankrom Moisan
General Contractor: HCC

Submitted Prepared by:
Performance Contracting Inc (PCI)
8015 SW Hunziker Rd
Tigard, OR 97223
Huda Alhamadah, Senior Project Engineer
huda.alhamadah@pci.com
503.754.7864 mobile

Per Plan Sheet G0.02:
Building Code: 2016 Portland Fire Code
Building Construction Type: Type I

Required Fire Resistivity of Structural
Elements:
Floor Assembly - 2hr

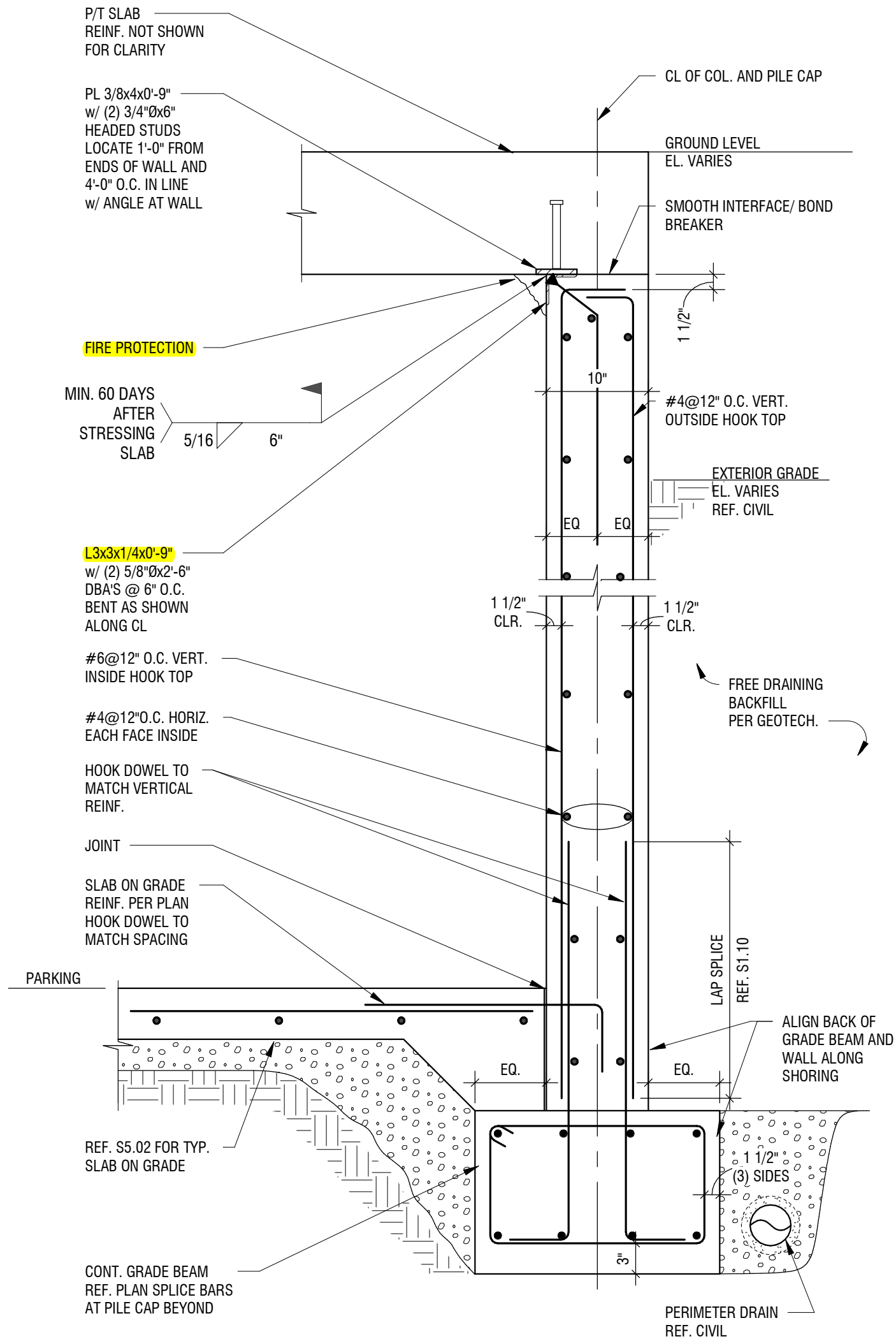
Fireproofing Materials Manufacturer:
Isolatek International Corp.
Contact: Terry Wildeboer
twildeboer@isolatek.com
206.817.9684 mobile

PARKING LEVEL
PLAN - SEQUENCE 1

CONSTRUCTION
SET

DATE 12/28/2017	REVISION 4
PROJECT NUMBER 15138	SHEET NUMBER
SCALE	S2.03

NOTE:
DO NOT BACKFILL WALL
UNTIL TOP CONNECTION
WELDED/COMPLETE

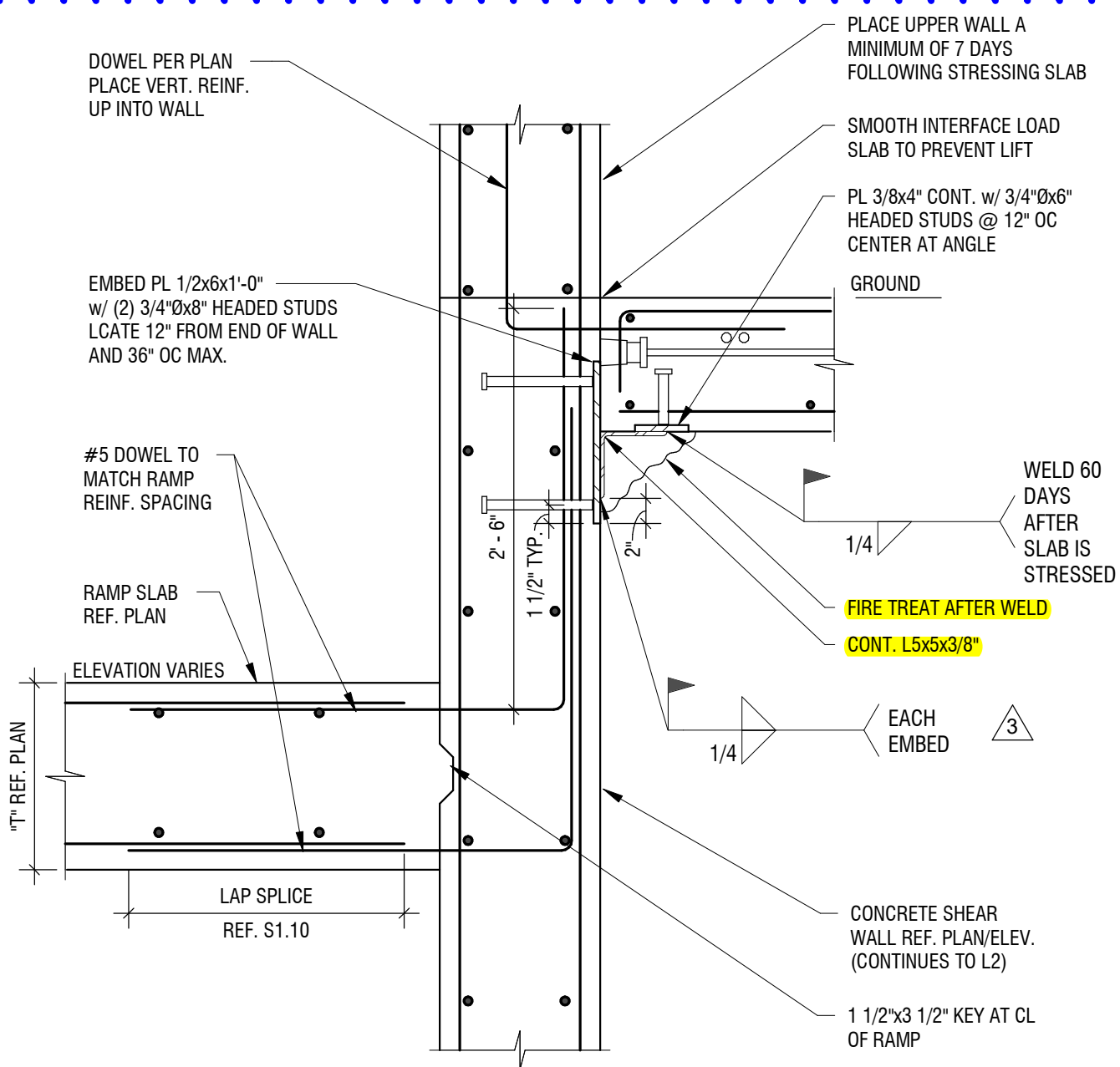


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REF. 10/S5.02 FOR TIE BACK
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OFF REQ'MTS. AT BACK OF WALL.

2

TYPICAL BASEMENT WALL - 10"

1" = 1'-0"



11

RAMP SLAB TO WALL

1" = 1'-0"



Riverplace Parcel 3

Engineering Judgement Report Roof Ceiling Joint Condition

Client Name: Hoffman Construction

Client Address: 805 SW Broadway, Suite 2100, Portland, OR 97223

Date: 6/14/2019

Table of Contents

1. Project Overview	3
2. Applicable Codes, Standards, and Guides	3
3. Discussion.....	3
3.1 Approach.....	3
4. Proposed design	3
5. Assembly Analysis.....	5
5.1 UL Design No. S751 Comparison.....	6
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1. PROJECT OVERVIEW

Hoffman Construction is currently installing the fireproofing for the new Riverplace Parcel 3 building. The building consists of 13 stories of Type I-A construction west structure and Type III-A construction east structure over the podium structure with a basement parking. The building includes Group A-3, B, S-1, S-2, R-2 occupancies. An NFPA 13 fire sprinkler system is provided throughout.

Code Unlimited has been asked to provide an engineering analysis for the fire protection requirement for the miscellaneous steel angles. Per 2014 OSSC Table 601, the primary structural frame is required to provide 2-hour fire resistance protection.

2. APPLICABLE CODES, STANDARDS, AND GUIDES

- 2014 Oregon Structural Specialty Code Appendix N, which refers to International Fire Code

3. DISCUSSION

3.1 Approach

- The proposed assembly has been analyzed in accordance with 2014 OSSC Section 703.3 **Alternative Methods for Determining Fire Resistance**.
- The proposed design has been evaluated by an Oregon Licensed Fire Protection Engineer.

4. PROPOSED DESIGN

The proposed condition includes the angles as shown in the attached section details at the intersection of the fire rated concrete wall and the fire rated P.T. concrete slab above.

The W/D for the L 3x3x1/4 angle is 1.50, calculated off one side of one leg only being exposed as detailed in Fig 1 below.

The W/D for the L 5x5x3/8 angle is .84, calculated off one side of one leg only being exposed as detailed in Fig 2 and Fig. 4 below.

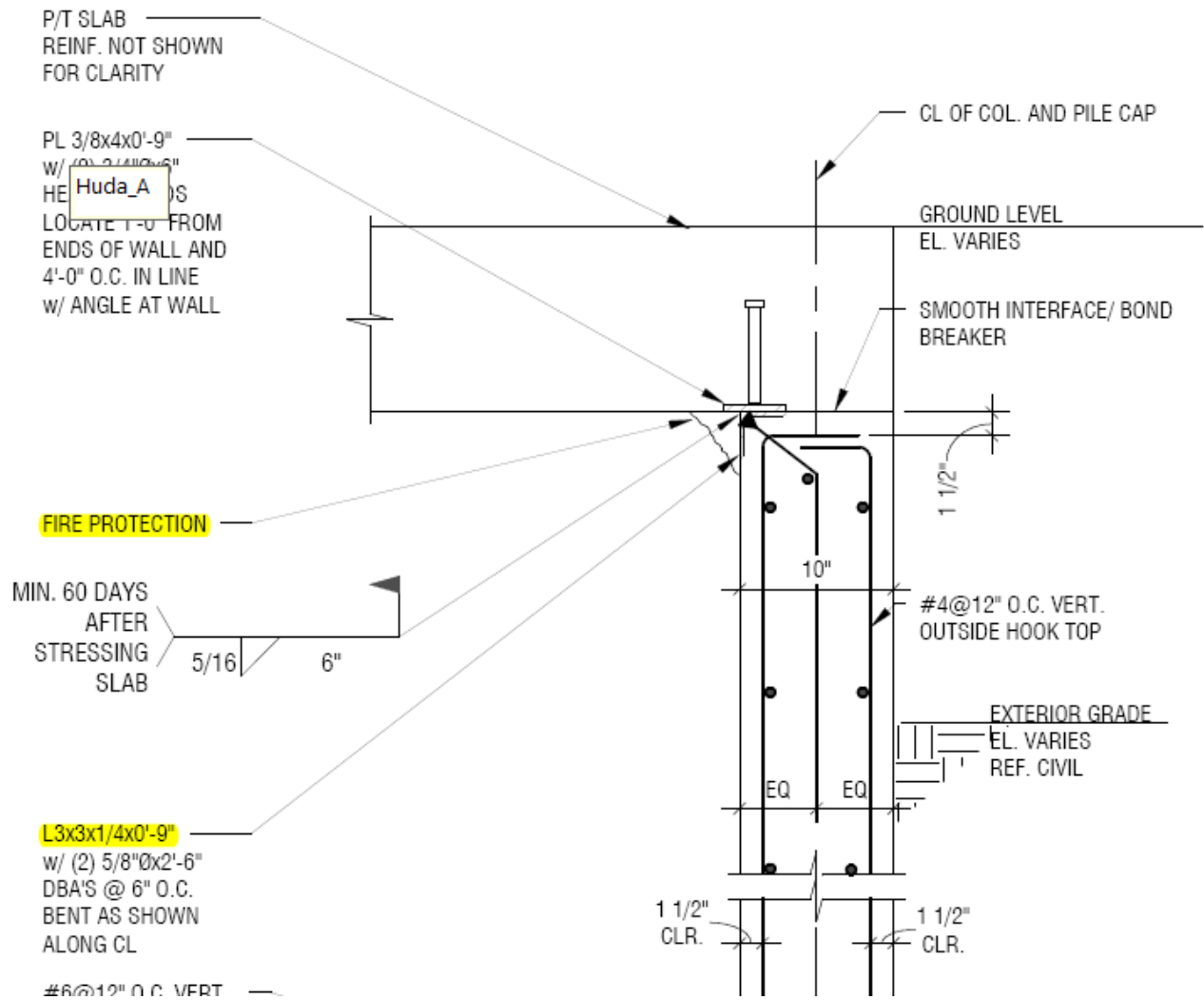


Figure 1: L3x3x1/4 (1 face exposed)

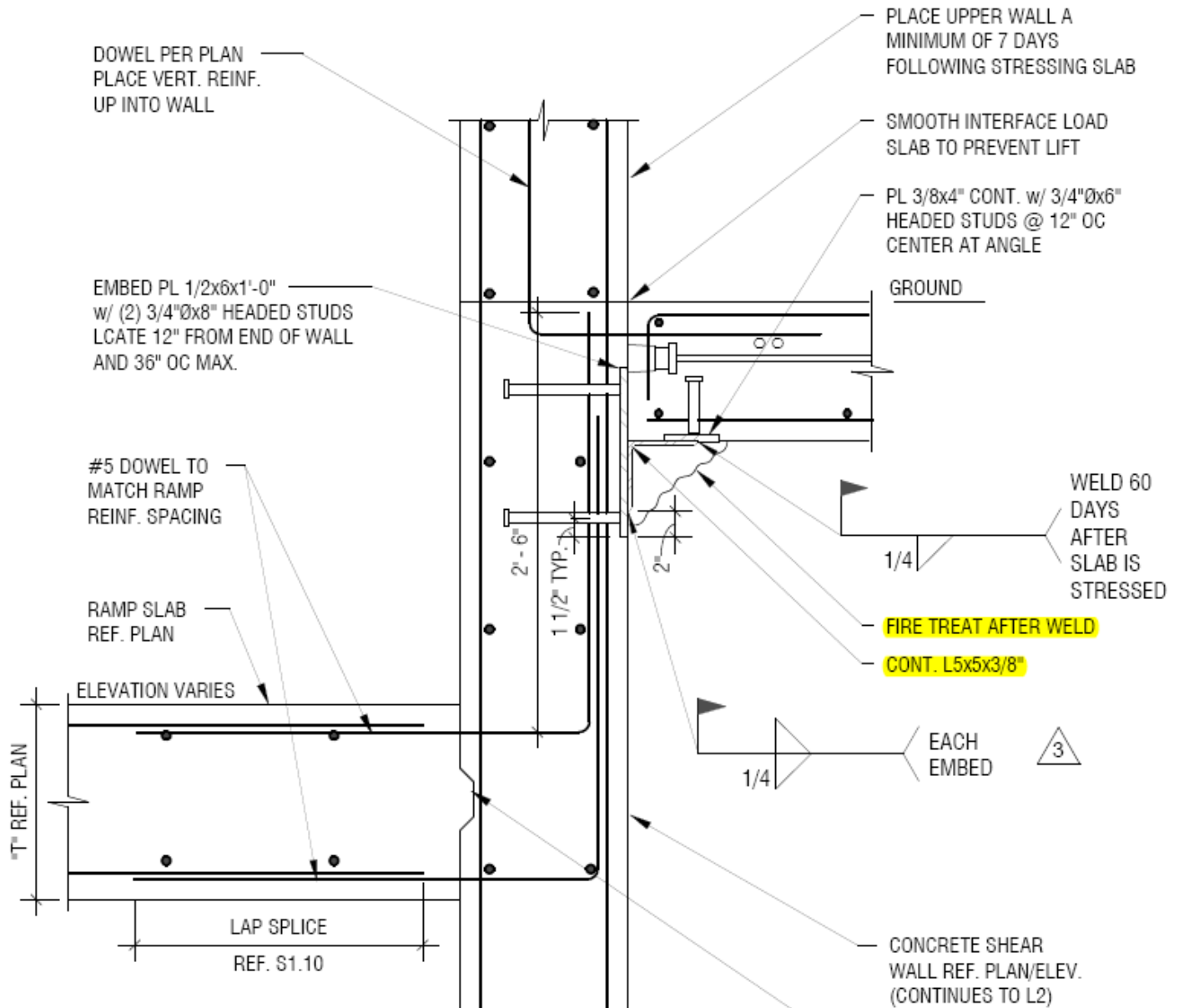


Figure 2: Angle L5x5x3/8 (2 sides exposed)

5. ASSEMBLY ANALYSIS

The assemblies are unique, as there is not a comparable UL listing for this condition, it is to be compared to a UL tested beam per UL S751.

5.1 UL Design No. S751 Comparison

The fire protection of the proposed beam is based on a comparison to the UL tested assembly S751. The proposed beam used for evaluation is a W12x30 member with a W/D ratio of 0.607 and a flange thickness of 0.26 inch.

For evaluation, the L5x5x3/8 is the thinnest member but the protection thickness required for it will be applied to both members.

The proposed members have larger W/D ratios than the tested beam (0.84 vs 0.61). Based on the surface exposed to a potential fire, the W/D ratio is calculated for the sides exposed. The test utilizes a loaded beam in an unrestrained configuration, which is a conservative comparison to the proposed assemblies.

From the Isolatek table provided in fig 5 below, the thickness of 1" of spray-applied fire resistive material (SFRM) will provide 2 hours of protection for both members. For the L3x3x1/4 member concealed in the floor, overspray of at least 1" will be required on the adjacent wall and ceiling to ensure unprotected gaps will be protected.

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. S751

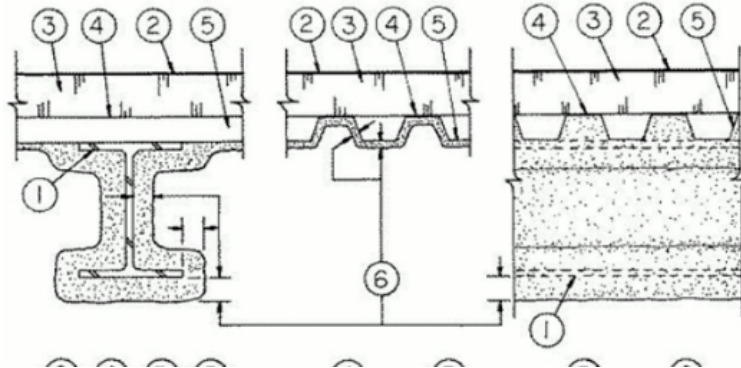
January 03, 2018

Restrained Beam Ratings — 1, 1-1/2, 2, 3 or 4 Hr (See Item 6)

Unrestrained Beam Ratings — 1, 1-1/2, 2, 3 or 4 Hr (See Item 6)

Loading determined by Allowable Stress Design Method or Load and Resistance Factor Design Method published by the American Institute of Steel Construction, or in accordance with the relevant Limit States Design provisions of Part 4 of the National Building Code of Canada — 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 Supports — W6x16 min size steel beam.

1A. As an alternate to Item 1 — Non-composite min 10K1 or min depth and weight shall be 10 in and 4.85 lb/ft respectively. May be uncoated or provided with a shop coat of paint. Designed per S.J.I. specifications for a max design yield stress of 50,000 psi (50 ksi). Top chords shall consist of two angles measuring minimum 1-1/4 by 1-1/4 by 0.129 in. thick. Bottom chords shall consist of two angles measuring minimum 1 by 1 by 0.109 in. thick. The first diagonal web member at each end shall consist of a minimum 0.625 in. dia. round bar. All remaining web members shall consist of minimum 0.50 in. dia. round bars. Bridging per S.J.I. specifications when non-composite joists are used.

2. Roof Covering* — Consisting of hot mopped, cold application or single-ply materials, compatible with insulation(s) described herein which provide Class A, B or C coverings. See Roofing Materials and Systems Directory-Roof Covering Materials (TEVT).

3. Roof Insulation* — Consisting of building units, foamed plastic or mineral and fiber boards, applied in one or more layers. When multiple layers are used, end and side joints shall be offset a min of 12 in. in both directions in order to lap all joints. See category for names of companies providing Classified products — Building Units (BZXX), Foamed Plastic (CCVW) or Mineral and Fiber Boards (CERZ). Roof insulation shall be compatible with roof covering materials Class A, B or C system. See Roofing Materials and Systems Directory-Roof Covering Materials (TEVT).

4. Adhesive — (Optional) — May be applied to steel roof deck units or between insulation layers at a max application rate of 0.4 gal per 100 sq ft. See **Adhesives** (BYWR) category for names of manufacturers.

5. Steel Roof Deck — (Unclassified) — Fluted, No. 22 MSG min galv 1-1/2 in. deep with 3-1/2 in. wide flutes spaced 6 in. OC. Ends overlapped a min 1-1/2 in. and welded to supports, 12 in. OC max. Adjacent units button-punched, welded or fastened with No. 12 by 1/2 in. long self-drilling, self-tapping steel screws.

6. Spray-Applied Fire Resistive Materials* — Applied by mixing with water and spraying in one of more coats to the thicknesses shown below, to the beam, joist, and deck surfaces which are clean and free of dirt, loose scale, and oil. Min average and min individual density of 15 and 14 pcf, respectively, for Types 300, 300AC, 300ES, 300HS, 300N, 3000, 3000ES and SB. For Types 400, 400AC and 400ES min average and min individual density of 22 and 19 pcf, respectively. Min avg density of 44 pcf with min ind value of 40 pcf for Types M-II and TG. Min avg density of 47 pcf, with min individual value of 43 pcf for Type M-II/P. For method of density determination see Design Information Section, Sprayed Material. The thickness of the Spray-Applied Fire Resistive Material on the Structural Members shall be as follows:

Rating (hour)	Minimum Thickness (inches)						Steel Roof Deck
	Restrained Beam			Unrestrained Beam			
	Beam W6x16	Joists > 4' OC	Joists ≤ 4' OC	Beam W6x16	Joists > 4' OC	Joists ≤ 4' OC	
1	1/2	3/4	5/8	1/2	3/4	5/8	1/2
1-1/2	3/4	1-3/16	1-1/16	3/4	1-1/4	1-1/16	15/16
2	1	1-11/16	1-1/2	1	1-3/4	1-1/2	1-7/16
3	1-9/16	2-7/8	2-9/16	1-9/16	2-7/8	2-9/16	1-7/16
4	2-1/8	—	—	2-1/8	—	—	1-7/16

BERLIN CO LTD — Types 300, 300ES, 300N or SB, or 400; Types M-II, TG and M-II/P

ISOLATEK INTERNATIONAL — Types 300, 300AC, 300ES, **300HS**, 300N, SB, 400, 400AC, 400ES, 3000 or 3000ES; Types M-II, TG and M-II/P

Figure 3: UL S751

ANGLES (3 sided minus long leg & 3 sided minus short leg continued...

METRIC					IMPERIAL				
SIZE (mm x mm x mm)	3 sided minus long leg		3 sided minus short leg		SIZE (in. x in. x in.)	3 sided minus long leg		3 sided minus short leg	
	M/D	Heated Perimeter (m)	M/D	Heated Perimeter (m)		W/D	Heated Perimeter (in.)	W/D	Heated Perimeter (in.)
L127 x 127 x 13	63.2	0.381	63.2	0.381	L5 x 5 x 1/2	1.10	14.8	1.10	14.8
x 11	55.6	0.381	55.6	0.381	x 7/16	0.973	14.8	0.973	14.8
L127 x 127 x 9.5	48.0	0.381	48.0	0.381	L5 x 5 x 3/8	0.838	14.8	0.838	14.8
x 7.9	40.1	0.381	40.1	0.381	x 5/16	0.703	14.8	0.703	14.8

*Figure 4: W/D ratio for Single Angle L5x5x3/8***W/D ratio for Single Angle L3x3x1/4 (1-leg exposed)**

L3x3x1/4 4.9 lbs/ft

Exposed surface (one side of one leg= 3.25")

Calculated W/D Ratio = 1.51

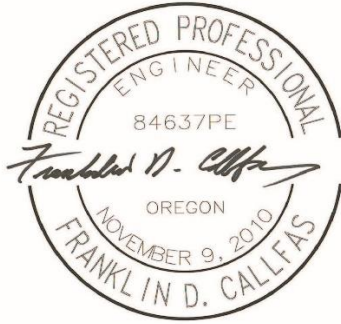
**S751****Protected Roof Deck****Unrestrained Beam****LRFD****CAFCO® 300 Series, CAFCO® 400 Series & ISOLATEK® Type 300 Series, ISOLATEK® Type 400 Series**

ASTM Desig.	W/D	Metric Desig.	M/D	Hp/A	1-Hour	1-1/2 Hour	2-Hour	3-Hour	4-Hour
W12 x 336	4.85	W310 x 500	286.2	27.6	3/8	3/8	3/8	3/8	1/2
305	4.49	454	264.9	29.8	3/8	3/8	3/8	7/16	9/16
279	4.19	415	247.2	32.0	3/8	3/8	3/8	7/16	5/8
252	3.84	375	226.6	34.9	3/8	3/8	3/8	7/16	5/8
230	3.55	342	209.5	37.7	3/8	3/8	3/8	1/2	11/16
210	3.27	313	192.9	41.0	3/8	3/8	3/8	1/2	3/4
190	3	283	177.0	44.7	3/8	3/8	3/8	9/16	13/16
170	2.72	253	160.5	49.3	3/8	3/8	7/16	5/8	7/8
152	2.45	225	144.6	54.7	3/8	3/8	7/16	11/16	15/16
136	2.23	202	131.6	60.1	3/8	3/8	1/2	11/16	1
120	1.99	179	117.4	67.3	3/8	3/8	1/2	3/4	1-1/16
106	1.77	158	104.4	75.7	3/8	7/16	9/16	13/16	1-3/16
96	1.61	143	95.0	83.2	3/8	7/16	5/8	7/8	1-1/4
87	1.47	129	86.7	91.1	3/8	1/2	5/8	15/16	1-3/8
79	1.34	117	79.1	100.0	3/8	1/2	11/16	1	1-7/16
72	1.23	107	72.6	108.9	3/8	9/16	3/4	1-1/16	1-1/2
65	1.11	97	65.5	120.7	3/8	9/16	3/4	1-1/8	1-5/8
58	1.1	86	64.9	121.8	7/16	5/8	13/16	1-3/16	1-5/8
53	1.02	79	60.2	131.4	7/16	5/8	13/16	1-3/16	1-11/16
50	1.06	74	62.5	126.4	7/16	5/8	13/16	1-3/16	1-11/16
45	0.97	67	57.2	138.1	7/16	5/8	7/8	1-1/4	1-3/4
40	0.86	60	50.7	155.8	1/2	11/16	15/16	1-3/8	1-7/8
35	0.81	52	47.8	165.4	1/2	11/16	15/16	1-3/8	1-15/16
30	0.69	45	40.7	194.2	1/2	3/4	1	1-1/2	2-1/8

Figure 5: Cafco 300 thickness tables for S751.

6. CONCLUSION

The protection requirements for these members have been compared to the requirements of UL assembly S751. As evaluated in this EJ, the proposed beam assemblies will maintain 2 hour fire resistance as required per the OSSC when protected with 1" of SFRM as detailed above.



EXPIRES 12-31-19

Franklin Callfas
Principal/Fire Protection Engineer
Code Unlimited

Rating/UL/Member/Material/Thickness

2HR/ UL X790/ L5"x5"x0.375"/ C300HS/ 1"

2HR/ UL X790/ L3"x3"x0.25"/ C300HS/ 1"

FOUNDATION NOTES

- INDICATES PILE CAP TYPE WITH X NUMBER OF 12 3/4" DIAMETER DRIVEN CLOSED ENDED STEEL PILE CAPS EXTENDING TO THE UNDERLYING GRAVELS. REFERENCE S5.01 FOR TYPICAL PILE CAP DETAILS AND PILE INFORMATION. REFERENCE S5.03-S5.04 FOR PILE CAP DETAILS AT SHEAR WALL LOCATIONS. REFERENCE GEOTECHNICAL REPORT FOR ALL INFORMATION NOT INDICATED. UNLESS OTHERWISE NOTED, CENTER COLUMN AT PILE CAP PER DETAIL. LOCATE TOP OF PILE CAP 1'-0" BELOW SLAB (U.N.O.).
- INDICATES GROUT ENDED STEEL PILE AS NOTED ABOVE WITH MIN. 115 LB/DS GROUT. FULL FULL HEIGHT, PER S&D1 AND GEOTECH REPORT. REFERENCE 11/55.01 FOR ADDITIONAL REINFORCING AT CAP AND S5.15 FOR PILE CAP.
- TYPICAL ELEVATION OF STEEL PILE WALL VARY BASED ON SITE CONDITIONS AND IS AS REQUIRED TO OBTAIN CAPACITY IN UNDERLYING GRAVELS. REF. GEOTECH REPORT AND S5.01 FOR ADDITIONAL INFORMATION.
- GB-X INDICATES REINFORCED CONCRETE GRADE BEAM TO BE LOCATED A MINIMUM OF 1'-0" BELOW GRADE. CONTINUE REINFORCING INTO PILE CAPS. REFERENCE 3 THRU 10/55.01 FOR SCHEDULE AND DETAILS.
- TGB-X INDICATES P/T REINFORCED CONC. TRANSFER GRADE BEAM. REF. ELEVATIONS ON S5.05.
- INDICATES TOP OF SLAB ELEVATION.
- EL=XXX'-XX" INDICATES POINT ELEVATION AT TOP OF CONCRETE.
- INDICATES STEP IN ELEVATION.
- INDICATES SLAB SLOPE.
- REFERENCE S5.01 - S5.09 FOR TYPICAL CONCRETE DETAILS.
- REFERENCE S4.01 - S4.10 FOR CONCRETE COLUMN SCHEDULE AND DETAILS.
- INDICATES 6" REIN. CMU WALL. REF. S7.01 FOR DETAILS.
- INDICATES 8" REIN. CMU WALL. REF. S7.01 FOR DETAILS.
- INDICATES CONCRETE WALL. REFERENCE ELEVATION FOR INFO.
- SLAB CONSTRUCTION JOINTS SHALL BE APPROVED BY THE ARCHITECT PRIOR TO CASTING S.O.G.
- REFERENCE ARCHITECTURAL AND MEP FOR SLEEVES, BLOCKOUTS AND OTHER ITEMS TO BE COORDINATED WITH THE FOUNDATIONS.
- INDICATES FLOOR DRAIN. COORDINATE WITH PLUMBING. FEATHER SLAB AS REQUIRED TO DRAIN.
- INDICATES BOLLARD.
- REFERENCE "AS201" DRAWINGS FOR DIMENSIONS.
- REFERENCE ARCHITECTURAL DRAWINGS FOR GRID DIMENSIONS.
- INDICATES REINFORCED CONCRETE SHEAR WALL, AND UNLESS NOTED OTHERWISE ON SHEAR WALL ELEVATIONS. ALL WALLS TO BE 12" THICK.
- ALL STAIRS AT WEST TOWER TO BE PRE-MANUFACTURED STEEL AND THOSE IN THE EAST TOWER TO BE WOOD FRAMED FOR THE FULL HEIGHT OF THE STRUCTURE.
- THICKENED S.O.G. AT MAN LIFT. COORDINATE SHORING DOWN FROM GROUND TO SUPPORT REACTIONS.
- ALL FOUNDATIONS SHALL BE REVIEWED, MONITORED AND APPROVED BY THE GEOTECHNICAL ENGINEER FOR FULL CONFORMANCE OF PERFORMANCE REQUIREMENTS AND LOADING DEMANDS.
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Architect: Ankrom Moisan
General Contractor: HCC

Submitted Prepared by:
Performance Contracting Inc (PCI)
8015 SW Hunziker Rd
Tigard, OR 97223
Huda Alhamadah, Senior Project Engineer
huda.alhamadah@pci.com
503.754.7864 mobile

Per Plan Sheet G0.02:
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Elements:
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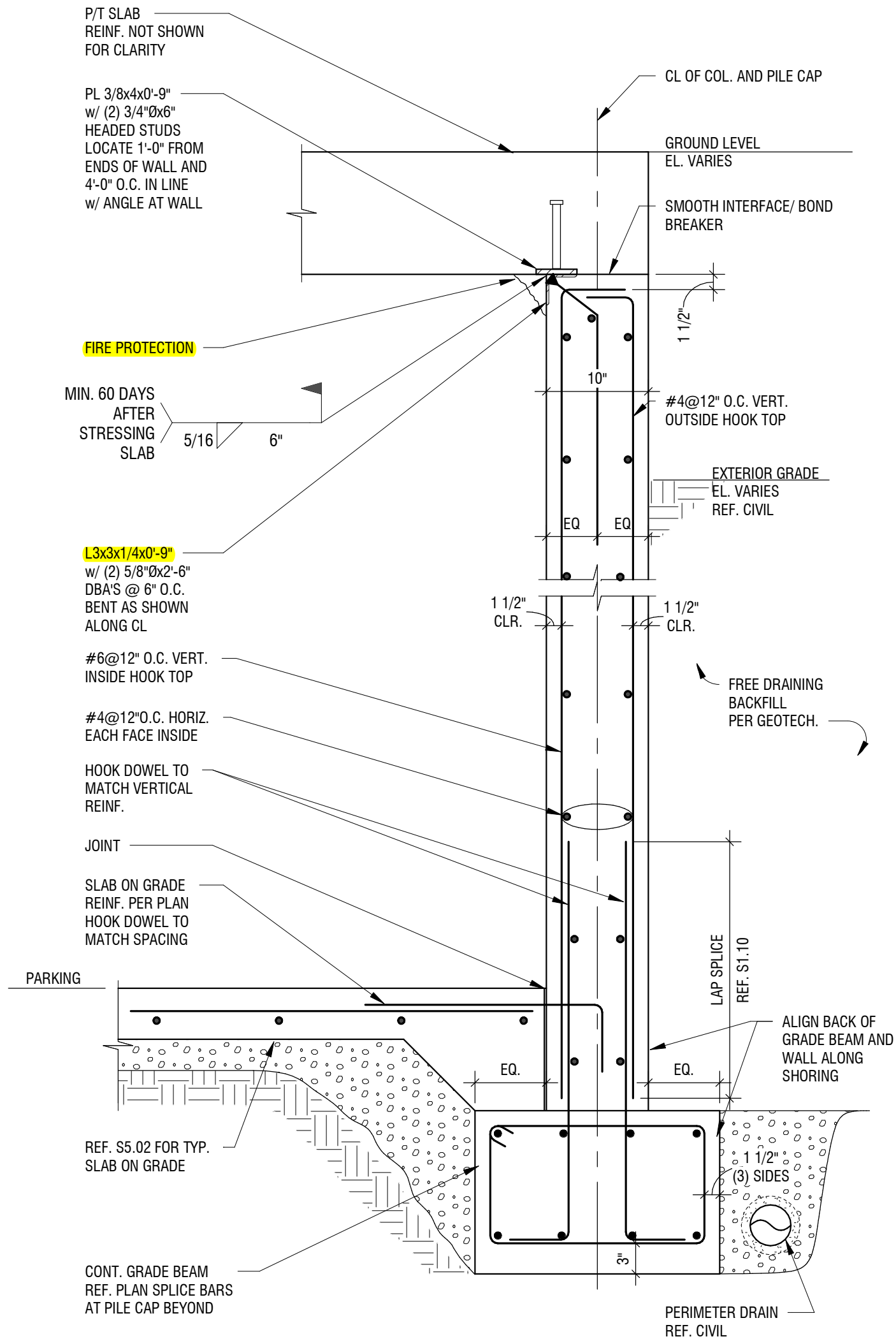
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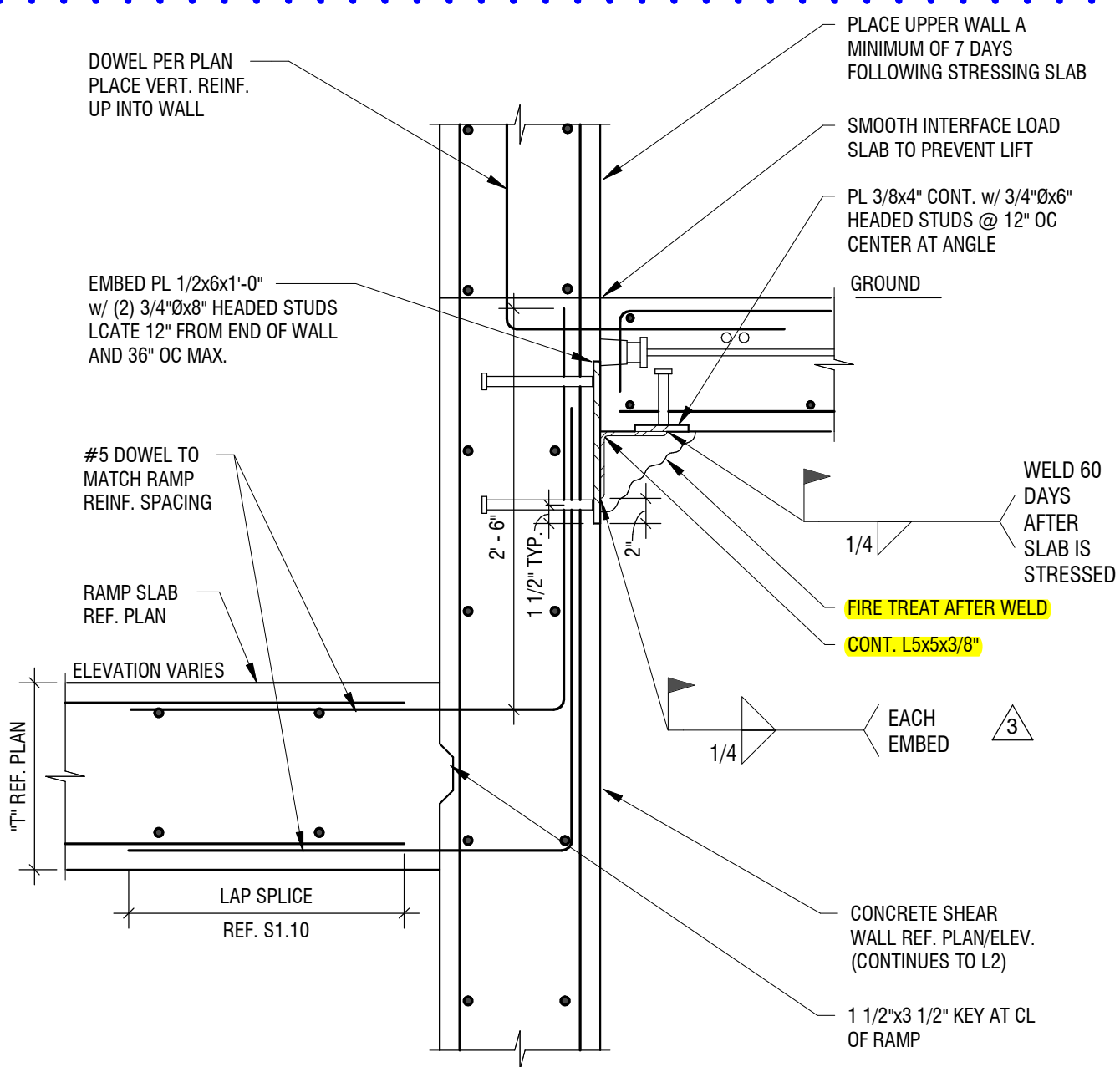


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