Development Services

From Concept to Construction

Phone: 503-823-7300 Email: bds@portlandoregon.gov 1900 SW 4th Ave, Portland, OR 97201
More Contact Info (http://www.portlandoregon.gov//bds/article/519984)

APPEAL SUMMARY

Status: Decision Rendered - Held over from ID 18853 (1/30/19) for additional information

Appeal ID: 18970	**Project Address:** 1844 SW Morrison St
Hearing Date: 2/6/19	**Appellant Name:** Vivian Calvin
Case No.: B-023	**Appellant Phone:** 5038672394
Appeal Type: Building	**Plans Examiner/Inspector:** Jim Zarr, Steven Mortensen
Project Type: commercial	**Stories:** 3 **Occupancy:** A-5 **Construction Type:** 1-B
Building/Business Name: Providence Park Stadium Expansion	**Fire Sprinklers:** Yes -
Appeal Involves: Erection of a new structure,Alteration of an existing structure,Addition to an existing structure,Reconsideration of appeal	**LUR or Permit Application No.:** 17-222908-CO
Plan Submitted Option: pdf [File 1]	**Proposed use:** Stadium

APPEAL INFORMATION SHEET

Appeal item 1

Code Section	703.2
Requires	OSSC Section 703.2 Fire Resistance Ratings - The fire-resistance rating of building elements, components or assemblies shall be determined in accordance with the test procedures set forth in ASTM E 119 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	The code requires that primary and secondary structural members have a fire resistance rating provided by individual encasement or alternative method. The Providence Park Stadium Expansion Project has HSS beams that are being fireproofed. The UL X827, the applicable approved UL design, is tested for columns only. According to Norkote, it is typical industry practice to propose to the authority having jurisdiction to utilize conservative thickness based on a UL column design (XSeries). It is also common industry practice to determine SFRM thickness based on calculated A/P and W/D ratios. The members listed fall outside of the respective UL designs to achieve fire rating.

Norkote determined the appropriate quantity of fire resistive material necessary to achieve the desired fire rating through industry standard tests. Those designs were then reviewed, approved and stamped by John D. Campbell P.E. of Fire Protection Consulting (see attached).

We request the fireproofing designs submitted be approved for construction

Reconsideration Text

John D Campbell has added additional information including 1-hr rating of the steel HSS members that are included in this appeal in addition to previously added 2-hr ratings. The 1 hour rated individual members have also been identified in the stamped letter and calculated thicknesses have been determined accordingly to this 2 hour requirement and shown in the evaluation.

The mislabeled thicknesses have also been corrected.

Reason for alternative This appeal and the attached engineering judgment report is being submitted to provide sufficient data the building official to demonstrate that the specified spray applied fire resistance rated material provides adequate protection of the horizontal HSS steel structural members in compliance with the building code.

The common practice of fireproofing at HSS beams is to use column design. This approach is overly conservative. The conservatism of column designs for beam use follows from the ASTM E119 test procedures and acceptance criteria that are more severe for columns than for beams.

APPEAL DECISION

Alternate 2 hour HSS beam detail with engineering analysis: Granted as proposed with information provided in this appeal and previous appeal #18853.

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.

GLOBAL
Fire Protection Group

17 January 2019

Luke Street
Estimator/Project Manager
Norkote
2330 106th Street SW
Everett, WA 98204
O: 425-212-3813/M: 206-571-6595

RE: Project: Providence Park Stadium Expansion
Location: Portland, OR
Contractor: Norkote
Isolatek Engineering Judgment: 02BC9014, dated 14 January 2019
Rating: 2-hours

Dear Mr. Street:

We have received and reviewed the Engineering Judgment documentation 02BC9014 prepared by Robert Casteel, Isolatek International dated 14 January 20198, regarding the use of CAFCO BLAZE-SHIELD HP Spray-Applied Fire Resistive Material (SFRM) on load bearing horizontal tube steel at the above referenced project, along with all pertinent data. It is desired that the required 2-hour fire-resistance rating of the steel members be maintained, in accordance with ASTM E119/UL 263, "Standard Test Methods for Fire Tests of Building Construction and Materials."

UL has not tested for this application. As a result, an Alternative Method per Section 703.3 of the 2014 Oregon Structural Specialty Code is required in the form of an Engineering Judgment to address the firestopping of this condition. Section 703.3 states, "The application of any of the alternative methods listed in this section shall be based on the fire exposure and acceptance criteria specified in ASTM E119 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 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 E119 or UL 263; 5. Alternative protection methods as allowed by Section 104.11." The referenced Engineering Judgment is an alternative method

of construction meeting subpart 4 of Section 703.3 and is based on actual listed systems and test data conducted in accordance with ASTM E119 (UL 263).

It is standard industry practice to determine SFRM thickness based on calculated A/P and W/D rations. These ratios are determined by dividing the weight, W, of the steel section in lbs./ft. (or the cross-sectional area, A, of the steel member) by the heated perimeter, D (or P), of protection at the interface of the protection material through which heat is be transferred to the steel, in inches. A/P ratio equation for steel columns is provided in the Underwriters Laboratories, Inc. (UL) Directory. The members listed fall outside of the respective UL Designs to achieve the fire rating.

It is also standard industry practice to utilize column designs, X or Y-Series Designs, as a basis for determining thickness as these are more conservative due to the four-sided exposure, as opposed to a three-sided exposure. In addition, column tests do not account for the heat sink properties of a concrete floor. Thickness in this case would be determined based on the derived A/P ratio of the tube steel and the corresponding column design thickness from UL Designs. In this case, the UL Design would be X827 for HSS tube steel members on which the thicknesses are to be determined. Based on this, the following thicknesses have been calculated for the indicated steel members based on the aforementioned criteria:

Steel Size	A/P	Thickness (in.)	Rating (hr.)	UL Design
HSS 4x4x1/14	0.23	2	2	X827
HSS 5x5x1/2	0.45	1-1/16	2	X827
HSS 6x4x1/4	0.24	1-5/16	2	X827
HSS 6x4x3/8	0.35	1-1/4	2	X827
HSS 6x4x1/2	0.46	1	2	X827
HSS 8x4x1/4	0.24	1-5/16	2	X827
HSS 8x4x5/8	0.56	11/16	2	X827
HSS 10x4x5/8	0.57	11/16	2	X827
HSS 12x4x1/4	0.24	1-5/16	2	X827
HSS 12x4x3/8	0.36	1-1/4	2	X827
HSS 12x4x5/8	0.58	11/16	2	X827

Pursuant to our review of the evaluation presented, we find the report provides substantial justification to support the conclusions drawn that the required 2-hour fire-resistance rating in accordance with ASTM E119 would be obtained, provided that the CAFCO SFRM is installed in accordance with manufacturer's written application installation instructions and methods.

GLOBAL
Fire Protection Group

This review is limited to those specific assemblies depicted and only for use as part of the above referenced project and cannot be extended to other assemblies or projects. The rating of the fireproofing system is dependent on the performance of the surrounding structure under fire exposure. The contractor is responsible for the compliant installation of the referenced engineering judgment.

Reviewed by: John D. Campbell, P.E.

REGISTERED PROFESSIONAL ENGINEER
74880PE
OREGON
MAY 11, 2004
JOHN D. CAMPBELL

John D. Campbell, P.E., Digitally signed by John D. Campbell, P.E., Date: 2019.01.17 18:38:22 -06'00'

EXPIRES: 12-31-2019

ISOLATEK INTERNATIONAL
Corporate Headquarters

Isolatek International
41 Furnace Street
Stanhope, NJ 07874
Telephone: 973.347.1200

January 14, 2019

Mr. Luke Street
Norkote, Inc.
2330 106th St. SW
Everett, WA 98204

Re: Providence Park Stadium

Dear Mr. Street:

This is in regards to the application of CAFCO® BLAZE-SHIELD® HP Spray-Applied Fire Resistive Material (SFRM) applied to structural steel to achieve the desired hourly fire resistive rating for the above referenced project.

Please be advised that it is standard industry practice to determine SFRM thicknesses based on calculated A/P ratios and W/D ratios. A/P and W/D Ratios are calculated by dividing the weight, W, of the steel section in lbs./ft. (or the cross section area, A, of the steel member) with the Perimeter, D (or P), of protection at the interface of the protection material through which heat is transferred to the steel in inches. The formulas to determine the required thickness based off the W/D and A/P are located within the UL directory designs.

It is our understanding that the listed steel dimensions require fire protection. Therefore, we propose the following thickness in accordance with the corresponding UL Designs basis listed. See table below.

Steel Size	W/D or A/P	Thickness	Rating	UL Design Basis
HSS 4x4x1/4	0.23	2"	2 hr	X827
HSS 5x5x1/2	0.45	1-1/16"	2 hr	X827
HSS 6x4x1/4	0.24	1-5/16"	2 hr	X827
HSS 6x4x3/8	0.35	1-1/4"	2 hr	X827
HSS 6x4x1/2	0.46	1"	2 hr	X827
HSS 8x4x1/4	0.24	1-5/16"	2 hr	X827
HSS 8x4x5/8	0.56	11/16"	2 hr	X827
HSS 10x4x5/8	0.57	11/16"	2 hr	X827
HSS 12x4x1/4	0.24	1-5/16"	2 hr	X827
HSS 12x4x3/8	0.36	1-1/4"	2 hr	X827
HSS 12x4x5/8	0.58	11/16"	2 hr	X827

It is our opinion that the fire resistive rating shall be achieved provided that the CAFCO SFRMs are applied in accordance with the written application and installation instructions, the method proposed, and UL Guidelines.

The proposed fire resistive thicknesses contained herein are being provided based upon the dimensions given by the Project Team to assist the architect, owner and authority having jurisdiction to determine a suitable protection method. This proposal must be reviewed with the Authority Having Jurisdiction for final acceptance.

We trust this information is of assistance. Should you have any questions, please feel free to contact the undersigned at 973-347-1200.

Sincerely,

Robert Casteel
Applications & Intumescent Technical Specialist
CAFCO® Fire Protection Products

BC
Cc: – T. Wildeboer - Isolatek International

ISOLATEK® INTERNATIONAL
Corporate Headquarters

Isolatek International
41 Furnace Street
Stanhope, NJ 07874
Telephone: 973.347.1200

February 1, 2019

Mr. Luke Street
Norkote, Inc.
2330 106th St. SW
Everett, WA 98204

Re: Providence Park Stadium

Dear Mr. Street:

This is in regards to the application of CAFCO® BLAZE-SHIELD® HP Spray-Applied Fire Resistive Material (SFRM) applied to structural steel to achieve the desired hourly fire resistive rating for the above referenced project.

Please be advised that it is standard industry practice to determine SFRM thicknesses based on calculated A/P ratios and W/D ratios. A/P and W/D Ratios are calculated by dividing the weight, W, of the steel section in lbs./ft. (or the cross section area, A, of the steel member) with the Perimeter, D (or P), of protection at the interface of the protection material through which heat is transferred to the steel in inches. The formulas to determine the required thickness based off the W/D and A/P are located within the UL directory designs.

It is our understanding that the listed steel dimensions require fire protection. Therefore, we propose the following thickness in accordance with the corresponding UL Designs basis listed. See table below.

Steel Size	W/D or A/P	Thickness	Rating	UL Design Basis
HSS 6x4x1/4	0.24	3/4”	1 hr	X827
HSS 6x4x3/8	0.35	1/2”	1 hr	X827
HSS 12x4x1/2	0.47	3/8”	1 hr	X827
HSS 12x4x3/8	0.36	1/2”	1 hr	X827
HSS 5x5x1/2	0.45	7/16”	1 hr	X827

It is our opinion that the fire resistive rating shall be achieved provided that the CAFCO SFRMs are applied in accordance with the written application and installation instructions, the method proposed, and UL Guidelines.

The proposed fire resistive thicknesses contained herein are being provided based upon the dimensions given by the Project Team to assist the architect, owner and authority having jurisdiction to determine a suitable protection method. This proposal must be reviewed with the Authority Having Jurisdiction for final acceptance.

We trust this information is of assistance. Should you have any questions, please feel free to contact the undersigned at 973-347-1200.

Sincerely,

Nicholas Federici
Applications Engineer
CAFCO® Fire Protection Products

NF
Cc: – T. Wildeboer - Isolatek International

GLOBAL
Fire Protection Group

1 February 2019

Luke Street
Estimator/Project Manager
Norkote
2330 106th Street SW
Everett, WA 98204
O: 425-212-3813/M: 206-571-6595

RE: Project: Providence Park Stadium Expansion
Location: Portland, OR
Contractor: Norkote
Isolatek Engineering Judgment: 04NF9032, dated 1 February 2019
Rating: 1-hour

Dear Mr. Street:

We have received and reviewed the Engineering Judgment documentation 04NF9032 prepared by Nicholas Federici, Isolatek International dated 1 February 2019, regarding the use of CAFCO BLAZE-SHIELD HP Spray-Applied Fire Resistive Material (SFRM) on load bearing horizontal tube steel at the above referenced project, along with all pertinent data. It is desired that the required 1-hour fire-resistance rating of the steel members be maintained, in accordance with ASTM E119/UL 263, "Standard Test Methods for Fire Tests of Building Construction and Materials."

UL has not tested for this application. As a result, an Alternative Method per Section 703.3 of the 2014 Oregon Structural Specialty Code is required in the form of an Engineering Judgment to address the firestopping of this condition. Section 703.3 states, "The application of any of the alternative methods listed in this section shall be based on the fire exposure and acceptance criteria specified in ASTM E119 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 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 E119 or UL 263; 5. Alternative protection methods as allowed by Section 104.11." The referenced Engineering Judgment is an alternative method of construction meeting subpart 4 of Section 703.3 and is based on actual listed systems and test data conducted in accordance with ASTM E119 (UL 263).

It is standard industry practice to determine SFRM thickness based on calculated A/P and W/D rations. These ratios are determined by dividing the weight, W, of the steel section in lbs./ft. (or the cross-

sectional area, A, of the steel member) by the heated perimeter, D (or P), of protection at the interface of the protection material through which heat is be transferred to the steel, in inches. A/P ratio equation for steel columns is provided in the Underwriters Laboratories, Inc. (UL) Directory. The members listed fall outside of the respective UL Designs to achieve the fire rating.

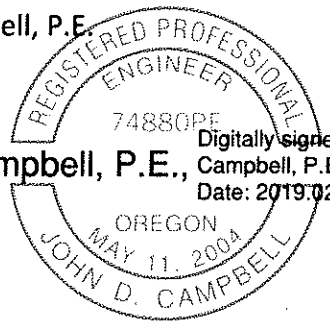
It is also standard industry practice to utilize column designs, X or Y-Series Designs, as a basis for determining thickness as these are more conservative due to the four-sided exposure, as opposed to a three-sided exposure. In addition, column tests do not account for the heat sink properties of a concrete floor. Thickness in this case would be determined based on the derived A/P ratio of the tube steel and the corresponding column design thickness from UL Designs. In this case, the UL Design would be X827 for HSS tube steel members on which the thicknesses are to be determined. Based on this, the following thicknesses have been calculated for the indicated steel members based on the aforementioned criteria:

Steel Size	A/P	Thickness (in.)	Rating (hr.)	UL Design
HSS 6 x 4 x ¼	0.24	¾	1	X827
HSS 6 x 4 x 3/8	0.35	½	1	X827
HSS 12 x 4 x ½	0.47	3/8	1	X827
HSS 12 x 4 x 3/8	0.36	½	1	X827
HSS 5 x 5 x ½	0.45	7/16	1	X827

Pursuant to our review of the evaluation presented, we find the report provides substantial justification to support the conclusions drawn that the required 1-hour fire-resistance rating in accordance with ASTM E119 would be obtained, provided that the CAFCO SFRM is installed in accordance with manufacturer's written application installation instructions and methods.

This review is limited to those specific assemblies depicted and only for use as part of the above referenced project and cannot be extended to other assemblies or projects. The rating of the fireproofing system is dependent on the performance of the surrounding structure under fire exposure. The contractor is responsible for the compliant installation of the referenced engineering judgment.

Reviewed by: John D. Campbell, P.E.



EXPIRES: 12-31-2019

John D. Campbell, P.E., Digitally signed by John D. Campbell, P.E., Date: 2019.02.01 16:47:51 -06'00'

SUMBITTAL 07 81 50-3.1 STARTS WITH THIS SHEET

REF: 01BC8276R1

ISOLATEK® INTERNATIONAL
Corporate Headquarters

Isolatek International
41 Furnace Street
Stanhope, NJ 07874
Telephone: 973.347.1200

October 5, 2018

Mr. Ron LaCroix
Norkote, Inc.
2330 106th St. SW
Everett, WA 98204

Re: Providence Park Stadium Expansion – Portland, OR

Dear Mr. LaCroix:

This is in regard to the proposed application of CAFCO® BLAZE-SHIELD® HP Spray-Applied Fire Resistive Materials (SFRMs) on the above referenced project.

It is our understanding that project conditions consist of horizontal beams that are exposed on all four sides. You have inquired as to the fire protection method that would achieve the required fire resistive rating for the wide flange steel in accordance with ANSI / UL 263, ASTM E119.

It is standard industry practice to treat horizontal members that have four sides exposed in accordance with an Underwriters Laboratories (UL) Column design. Using CAFCO BLAZE-SHIELD HP, the designs would be X829 for wide-flange members and X827 for HSS tube steel members. Please note that a column design is a worst case thickness; determined from a 4 side exposure rather than a 3 side exposure.

Provided that the application of the SFRM is in accordance with our written application / installation instructions, UL Design criteria, and the above proposal the fire resistive rating should be achieved. Please note that there are no UL Designs that conform to above described assembly.

Authorities having jurisdiction should be consulted in all cases where approval is to be obtained for all installations that fall outside the scope of UL or design guidelines.

We trust this information is of assistance. Should you have any questions, please feel free to contact the undersigned at 973-347-1200.

Sincerely,

Robert Casteel
Applications Analyst
CAFCO® Fire Protection Products

BC
Cc: – T. Wildeboer- Isolatek International

18 December 2018

Luke Street
Estimator/Project Manager
Norkote
2330 106th Street SW
Everett, WA 98204
O: 425-212-3813/M: 206-571-6595

RE: Project: Providence Park Stadium Expansion
Location: Portland, OR
Contractor: Norkote
Isolatek Engineering Judgment: 01BC8276R1, dated 5 October 2018

Dear Mr. Street:

We have received and reviewed the Engineering Judgment documentation 01BC8276R1 prepared by Robert Casteel, Isolatek International dated 5 October 2018, regarding the use of CAFCO BLAZE-SHIELD HP Spray-Applied Fire Resistive Material (SFRM) on load bearing horizontal tube steel at the above referenced project, along with all pertinent data. It is desired that the required hourly fire-resistance rating of the steel members be maintained, in accordance with ASTM E119/UL 263, "Standard Test Methods for Fire Tests of Building Construction and Materials."

UL has not tested for this application. As a result, an Alternative Method per Section 703.3 of the 2014 Oregon Structural Specialty Code is required in the form of an Engineering Judgment to address the firestopping of this condition. Section 703.3 states, "The application of any of the alternative methods listed in this section shall be based on the fire exposure and acceptance criteria specified in ASTM E119 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 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 E119 or UL 263; 5. Alternative protection methods as allowed by Section 104.11." The referenced Engineering Judgment is an alternative method of construction meeting subpart 4 of Section 703.3 and is based on actual listed systems and test data conducted in accordance with ASTM E119 (UL 263).

It is standard industry practice to determine SFRM thickness based on calculated A/P and W/D rations. These ratios are determined by dividing the weight, W, of the steel section in lbs./ft. (or the cross-sectional area, A, of the steel member) by the heated perimeter, D (or P), of protection at the interface of the protection material through which heat is be transferred to the steel, in inches. A/P ratio equation for steel columns is provided in the Underwriters Laboratories, Inc. (UL) Directory. The members listed fall outside of the respective UL Designs to achieve the fire rating.

It is also standard industry practice to utilize column designs, X or Y-Series Designs, as a basis for determining thickness as these are more conservative due to the four-sided exposure, as opposed to a three-sided exposure. In addition, column tests do not account for the heat sink properties of a concrete floor. Thickness in this case would be determined based on the derived A/P ratio of the tube steel and the corresponding column design thickness from UL Designs. In this case, the UL Design would be X827 for HSS tube steel members on which the thicknesses are to be based.

Pursuant to our review of the evaluation presented, we find the report provides substantial justification to support the conclusions drawn that the required fire-resistance rating in accordance with ASTM E119 would be obtained, provided that the CAFCO SFRM is installed in accordance with manufacturer's written application installation instructions and methods.

This review is limited to those specific assemblies depicted and only for use as part of the above referenced project and cannot be extended to other assemblies or projects. The rating of the fireproofing system is dependent on the performance of the surrounding structure under fire exposure. The contractor is responsible for the compliant installation of the referenced engineering judgment.

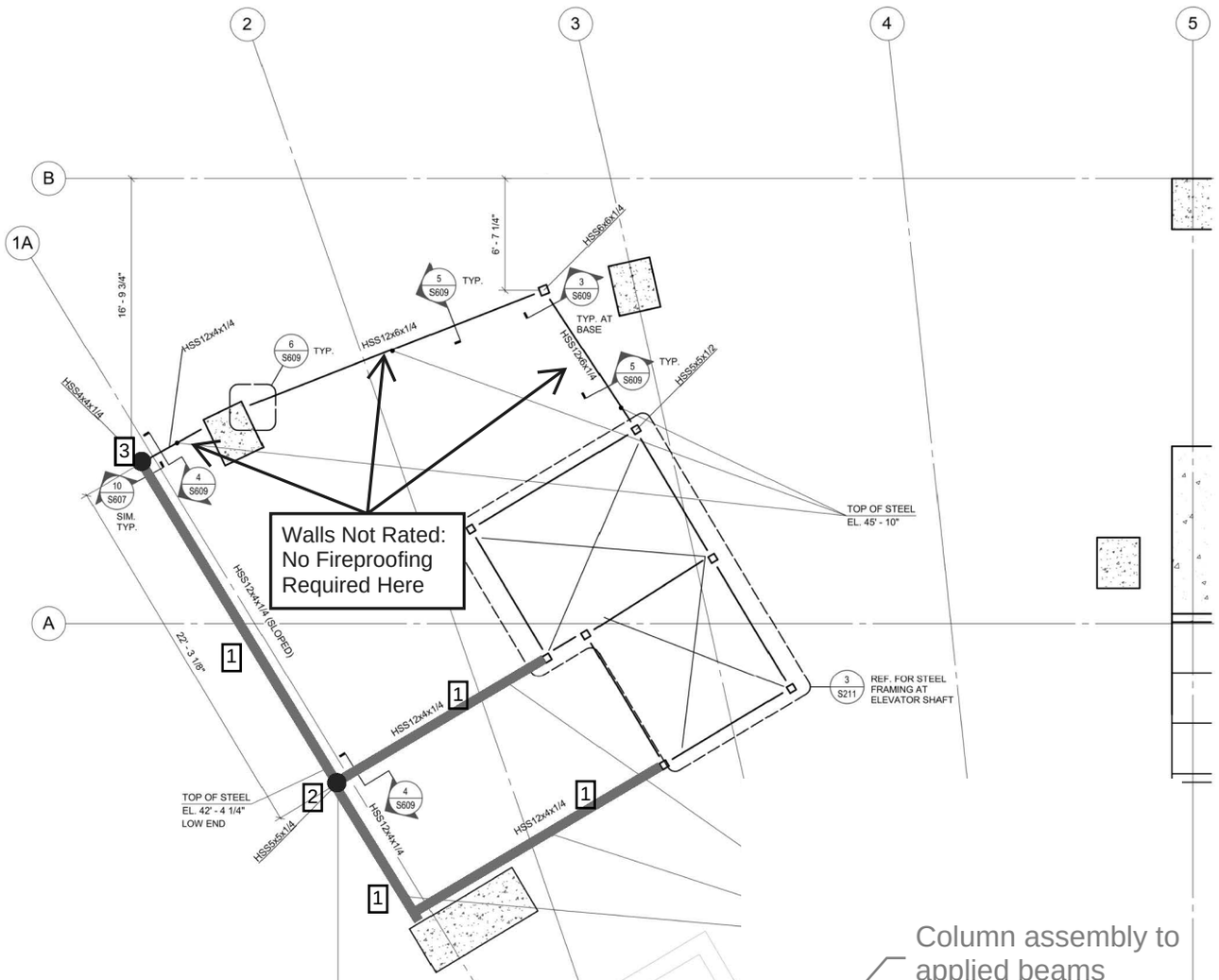
Reviewed by: John D. Campbell, P.E.

John D. Campbell, P.E., Digitally signed by John D. Campbell, P.E., Date: 2018.12.18 10:05:47 -06'00'

PHASE 2:
17-222908-DFS-01-CO REV. 01

NOTE: THIS DRAWING REPRESENTS THE STEEL & ASSOCIATED FIREPROOFING **BEARING** (ABOVE) ON THE CONCOURSE LEVEL DECK, PERFORMED IN PHASE 2 OF THIS PROJECT

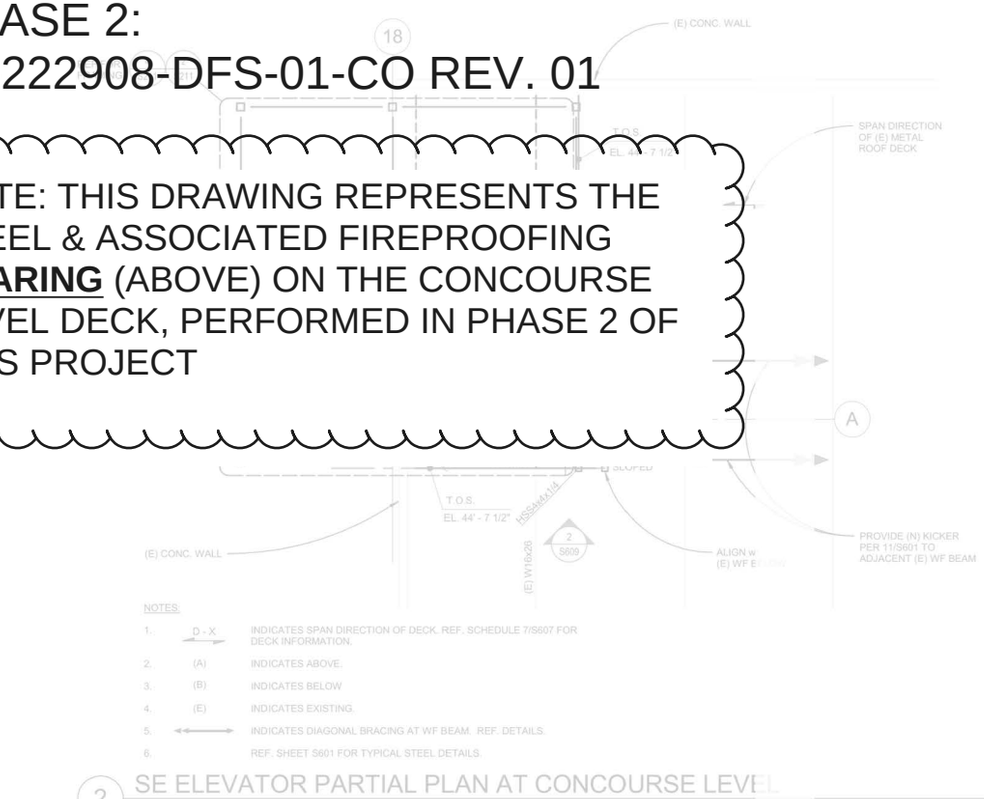
REVISED SHOP DRAWING **12/21/19**
NE ELEVATORS
APPLIED FIREPROOFING



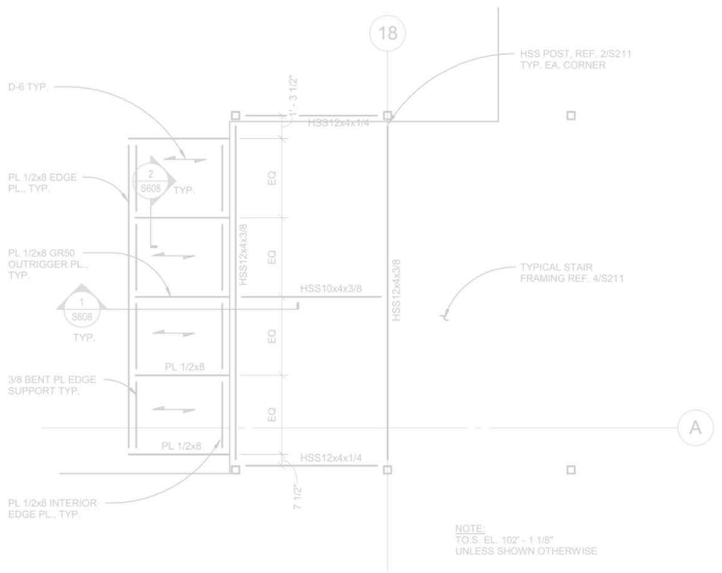
Isolatek CAFCO BlazeShield HP Thickness Minimums

	Legend	Description	Test	Hours	Thickness
1	▬	HSS 12 X 4 X 1/4 (A/P 0.24)	X827	2.00	1-15/16"
2	●	HSS 5 x 5 x 1/4 (A/P 0.24)	X827	2.00	1-15/16"
3	●	HSS 4 x 4 x 1/4 (A/P 0.23)	X827	2.00	~~1-15/16"~~ 2"

1 PARTIAL PLAN - CONCOURSE LEVEL
1/4" = 1'-0"



2 SE ELEVATOR PARTIAL PLAN AT CONCOURSE LEVEL
1/4" = 1'-0"



3 AWNING FRAMING PLAN AT ELEVATOR TOWER
1/4" = 1'-0"

FIREPROOFING THICKNESS DRAWINGS
PREPARED BY NORKOTE INC.
CONTACT: RON LACROIX
425-212-3813
MATERIAL: ISOLATEK BLAZE-SHIELD HP
CONTACT: TERRY WILDEBOER, CSI
206-546-8645

consultant
kpff
111 SW Fifth Ave., Suite 2500
Portland, OR 97204
O: 503.227.3251
F: 503.227.7980
10021600575

architect
allied works architecture, inc.
1532 sw morrison street | portland, oregon | 97205
v 503.227.1737 | f 503.227.6509

issue description	issue date	issue description	issue date
D ADDENDUM 4	04/25/18		

PROJECT SITE & MAILING ADDRESS:
PROVIDENCE PARK
1844 SW MORRISON STREET
PORTLAND, OR 97205

PPSE
Providence Park Stadium Expansion

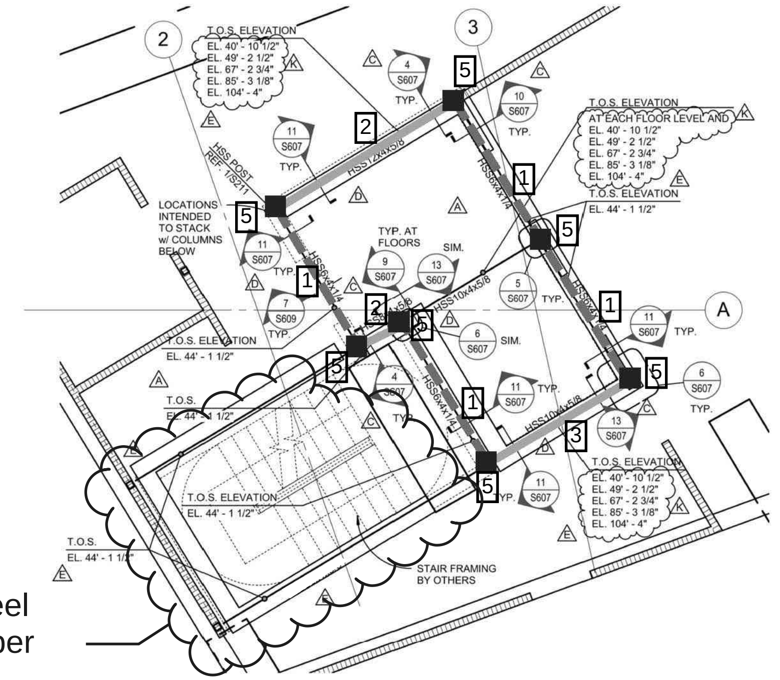
phase / date: PHASE 2 PERMIT SET FOR CONSTRUCTION — 2 FEBRUARY 2018
scale: SCALE: As indicated
sheet title: PARTIAL PLANS
sheet number: S212 D

north

4/17/2018 1:07:09 PM
C:\REVIT\Models\Detail\S_Aladdin1.rvt

REVISED SHOP DRAWING 12/21/19
NE ELEVATORS
APPLIED FIREPROOFING

NOTE: THIS DRAWING REPRESENTS THE STEEL & ASSOCIATED FIREPROOFING **BEARING** (ABOVE) ON THE CONCOURSE LEVEL DECK, PERFORMED IN PHASE 2 OF THIS PROJECT

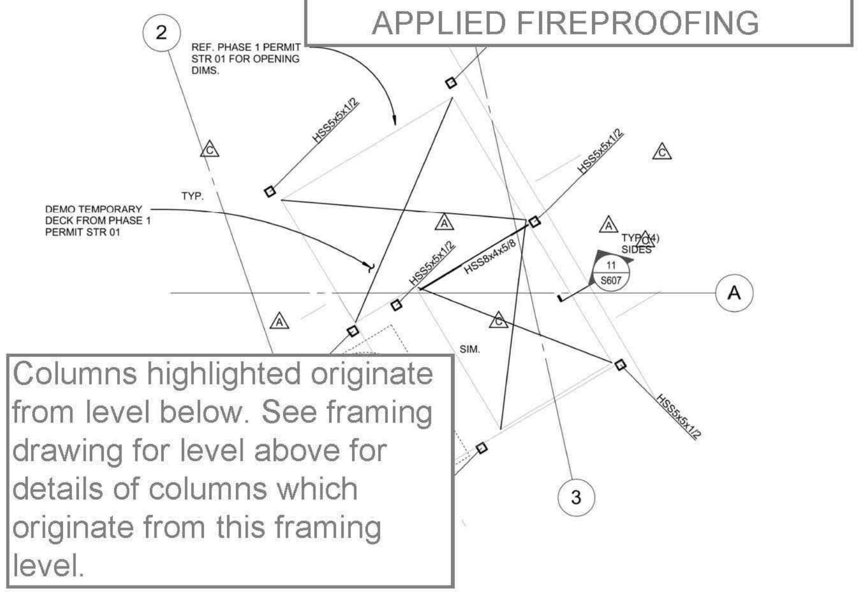


No Structural Steel For Stairs At Upper Club Levels

3 NE ELEVATOR PARTIAL PLAN AT CLUB LEVELS

1/4" = 1'-0"

Same for Levels 1, 2 and 3



Columns highlighted originate from level below. See framing drawing for level above for details of columns which originate from this framing level.

1 NE ELEVATOR PARTIAL PLAN AT CONCOURSE LEVEL

1/4" = 1'-0"

5 BOTTOM OF ROOF PLAN

1/4" = 1'-0"

Isolatek CAFCO BlazeShield HP Thickness Minimums

	Legend	Description	Test	Hours	Thickness
1	▬ ▬	HSS 6 X 4 X 1/4 @ 3 levels (A/P 0.24)	X827	2.00	1-15/16"
2	▬	HSS 8 X 4 X 5/8 @ 3 levels (A/P 0.58)	X827	2.00	11/16"
3	▬	HSS 10 X 4 X 5/8 @ 3 levels (A/P 0.58)	X827	2.00	11/16"
4	▬	HSS 12 X 4 X 5/8 @ 3 levels (A/P 0.58)	X827	2.00	11/16"
5	■	HSS 5 X 5 X 1/2 columns full height of structure (A/P 0.45)	X827	2.00	1-1/16"

Column assembly to applied beams

TABLE WITH CORRESPONDING NUMBERS SHOWING STEEL MEMBER TYPES AND FIREPROOFING THICKNESSES SHOWN ON THIS PAGE FOR EASY REFERENCING. ALSO INCLUDED ON NEXT PAGE WITH NORCOTE/ISOLATEK CONTACTS

2 SE ELEVATOR PARTIAL PLAN AT CONCOURSE LEVEL

1/4" = 1'-0"

FIREPROOFING THICKNESS DRAWINGS
PREPARED BY NORKOTE INC.
CONTACT: RON LACROIX
425-212-3813
MATERIAL: ISOLATEK BLAZE-SHIELD HP
CONTACT: TERRY WILDEBOER, CSI
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	issue description	issue date
K	ASI-13	08/10/18
J	ASI-12	07/27/18
E	ADDENDUM 4.A	05/17/18
D	ADDENDUM 4	04/25/18
C	ADDENDUM 3	03/27/18
A	ADDENDUM 1	03/02/18

PROJECT SITE & MAILING ADDRESS:
PROVIDENCE PARK
1844 SW MORRISON STREET
PORTLAND, OR 97205

PPSE

Providence Park Stadium Expansion

PHASE 2 PERMIT CONFORMED SET FOR CONSTRUCTION — 22 JUNE 2018

SCALE: 1/4" = 1'-0"

PARTIAL PLANS

S211

Section: Entire Job
Page: S211 NE Elevator Club Levels - revised
Calcs: Cafco Blazeshield HP - Floor Calcs

REVISED SHOP DRAWING **12/21/19**
NE ELEVATORS
APPLIED FIREPROOFING

Isolatek CAFCO BlazeShield HP Thickness Minimums

	Legend	Description	Test	Hours	Thickness
1		HSS 6 X 4 X 1/4 @ 3 levels (A/P 0.24)	X827	2.00	1-15/16"
2		HSS 8 X 4 X 5/8 @ 3 levels (A/P 0.58)	X827	2.00	11/16"
3		HSS 10 X 4 X 5/8 @ 3 levels (A/P 0.58)	X827	2.00	11/16"
4		HSS 12 X 4 X 5/8 @ 3 levels (A/P 0.58)	X827	2.00	11/16"
5		HSS 5 X 5 X 1/2 columns full height of structure (A/P 0.45)	X827	2.00	1-1/16"
6		HSS 6 X 4 X 3/8 @ 3 levels (A/P 0.35)	X827	2.00	1 1/4"

Column assembly to applied beams

FIREPROOFING THICKNESS DRAWINGS
PREPARED BY NORKOTE INC.
CONTACT: RON LACROIX
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MATERIAL: ISOLATEK BLAZE-SHIELD HP
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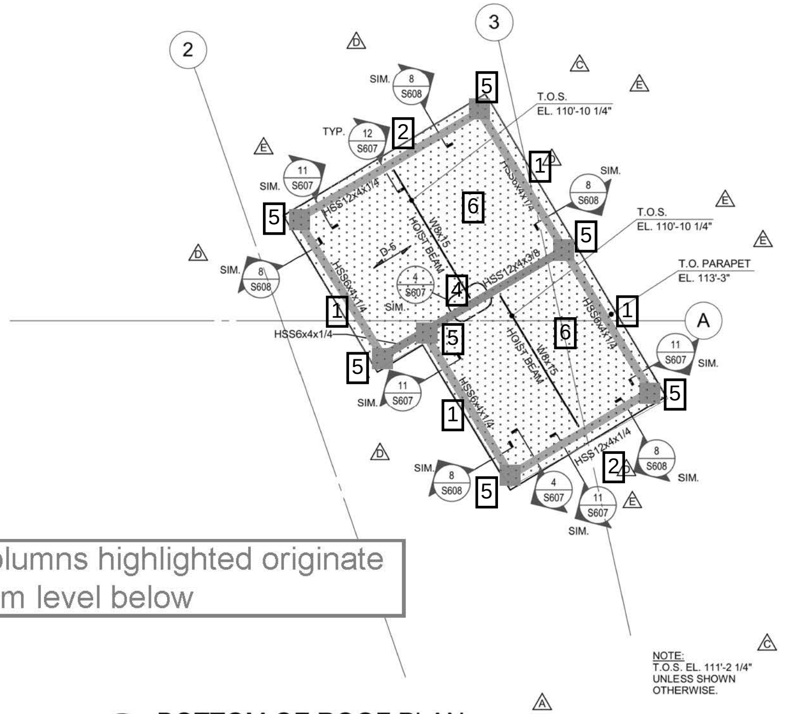
SHOP DRAWING - NE ELEVATORS
APPLIED FIREPROOFING



Columns highlighted originate from level below

5 BOTTOM OF ROOF PLAN
1/4" = 1'-0"

NOTE: THIS DRAWING REPRESENTS THE STEEL & ASSOCIATED FIREPROOFING **BEARING** (ABOVE) ON THE CONCOURSE LEVEL DECK, PERFORMED IN PHASE 2 OF THIS PROJECT

3 NE ELEVATOR PARTIAL PLAN AT CLUB LEVELS
1/4" = 1'-0"

1 NE ELEVATOR PARTIAL PLAN AT CONCOURSE LEVEL
1/4" = 1'-0"

Legend		Description	Test	Hours	Thickness
1		HSS 6 X 4 X 1/4 (A/P 0.24)	X827	1.00	3/4"
2		HSS 12 X 4 X 1/4 (A/P 0.24)	X827	1.00	3/4"
4		HSS 12 X 4 X 3/8 (A/P 0.35)	X827	1.00	1/2"
5		HSS 5 X 5 X 1/2 column (A/P 0.45)	X827	1.00	7/16"
6		1-1/2" roof deck	P819	1.00	13/16"

Column assembly to applied beams

TABLE WITH CORRESPONDING NUMBERS SHOWING STEEL MEMBER TYPES AND FIREPROOFING THICKNESSES SHOWN ON THIS PAGE FOR EASY REFERENCING. ALSO INCLUDED ON NEXT PAGE WITH NORCOTE/ISOLATEK CONTACTS

6 BOTTOM OF ROOF PLAN
1/4" = 1'-0"

4 SE ELEVATOR PARTIAL PLAN AT CLUB LEVELS
1/4" = 1'-0"

2 SE ELEVATOR PARTIAL PLAN AT CONCOURSE LEVEL
1/4" = 1'-0"

FIREPROOFING THICKNESS DRAWINGS
PREPARED BY NORKOTE INC.
CONTACT: RON LACROIX
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MATERIAL: ISOLATEK BLAZE-SHIELD HP
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	issue description	issue date
K	ASI-13	08/10/18
J	ASI-12	07/27/18
E	ADDENDUM 4.A	05/17/18
D	ADDENDUM 4	04/25/18
C	ADDENDUM 3	03/27/18
A	ADDENDUM 1	03/02/18

PROJECT SITE & MAILING ADDRESS:
PROVIDENCE PARK
1844 SW MORRISON STREET
PORTLAND, OR 97205

PPSE
Providence Park Stadium Expansion

PHASE 2 PERMIT CONFORMED SET FOR CONSTRUCTION
22 JUNE 2018
SCALE: 1/4" = 1'-0"
PARTIAL PLANS
S211

Section: Entire Job
Page: S211 NE Elevator Roof structure
Calcs: Cafco Blazeshield HP - Roof Calcs

SHOP DRAWING - NE ELEVATORS
APPLIED FIREPROOFING

Isolatek CAFCO BlazeShield HP Thickness Minimums

	Legend	Description	Test	Hours	Thickness
1		HSS 6 X 4 X 1/4 (A/P 0.24)	X827	1.00	3/4"
2		HSS 12 X 4 X 1/4 (A/P 0.24)	X827	1.00	3/4"
4		HSS 12 X 4 X 3/8 (A/P 0.35)	X827	1.00	1/2"
5		HSS 5 X 5 X 1/2 column (A/P 0.45)	X827	1.00	7/16"
6		1-1/2" roof deck	P819	1.00	13/16"

FIREPROOFING THICKNESS DRAWINGS
PREPARED BY NORKOTE INC.
CONTACT: RON LACROIX
425-212-3813
MATERIAL: ISOLATEK BLAZE-SHIELD HP
CONTACT: TERRY WILDEBOER, CSI
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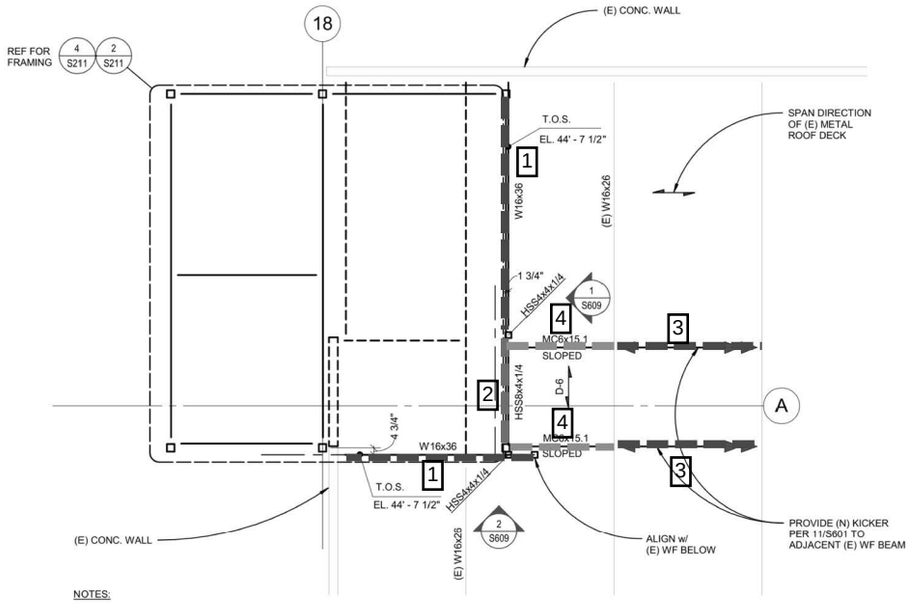
SHOP DRAWING - SE ELEVATORS
APPLIED FIREPROOFING

NOTE: THIS DRAWING REPRESENTS THE STEEL & ASSOCIATED FIREPROOFING **BEARING** (ABOVE) ON THE CONCOURSE LEVEL DECK, PERFORMED IN PHASE 2 OF THIS PROJECT. PLEASE SEE PHASE 1 DRAWING S200B FOR FIREPROOFING BELOW CONCOURSE LEVEL

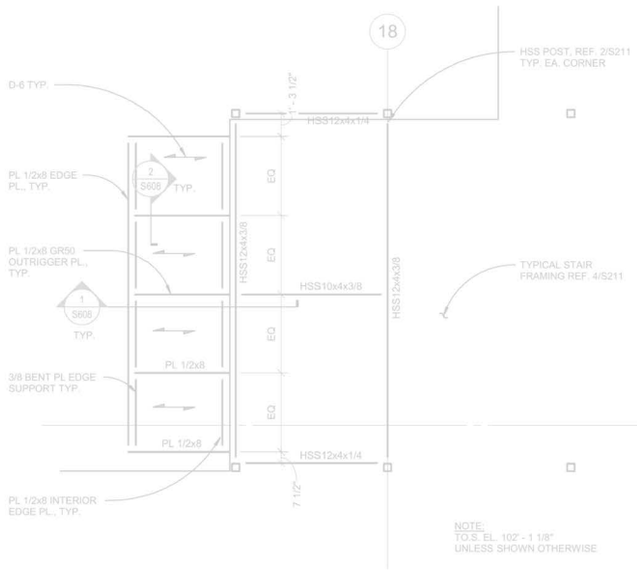


NOTES:

1. D - X — INDICATES SPAN DIRECTION OF DECK. REF. SCHEDULE 7/S607 FOR DECK INFORMATION.
2. (A) — INDICATES ABOVE.
3. (B) — INDICATES BELOW
4. (E) — INDICATES EXISTING.
5. ◄► — INDICATES DIAGONAL BRACING AT WF BEAM. REF. DETAILS.
6. REF. SHEET S601 FOR TYPICAL STEEL DETAILS.

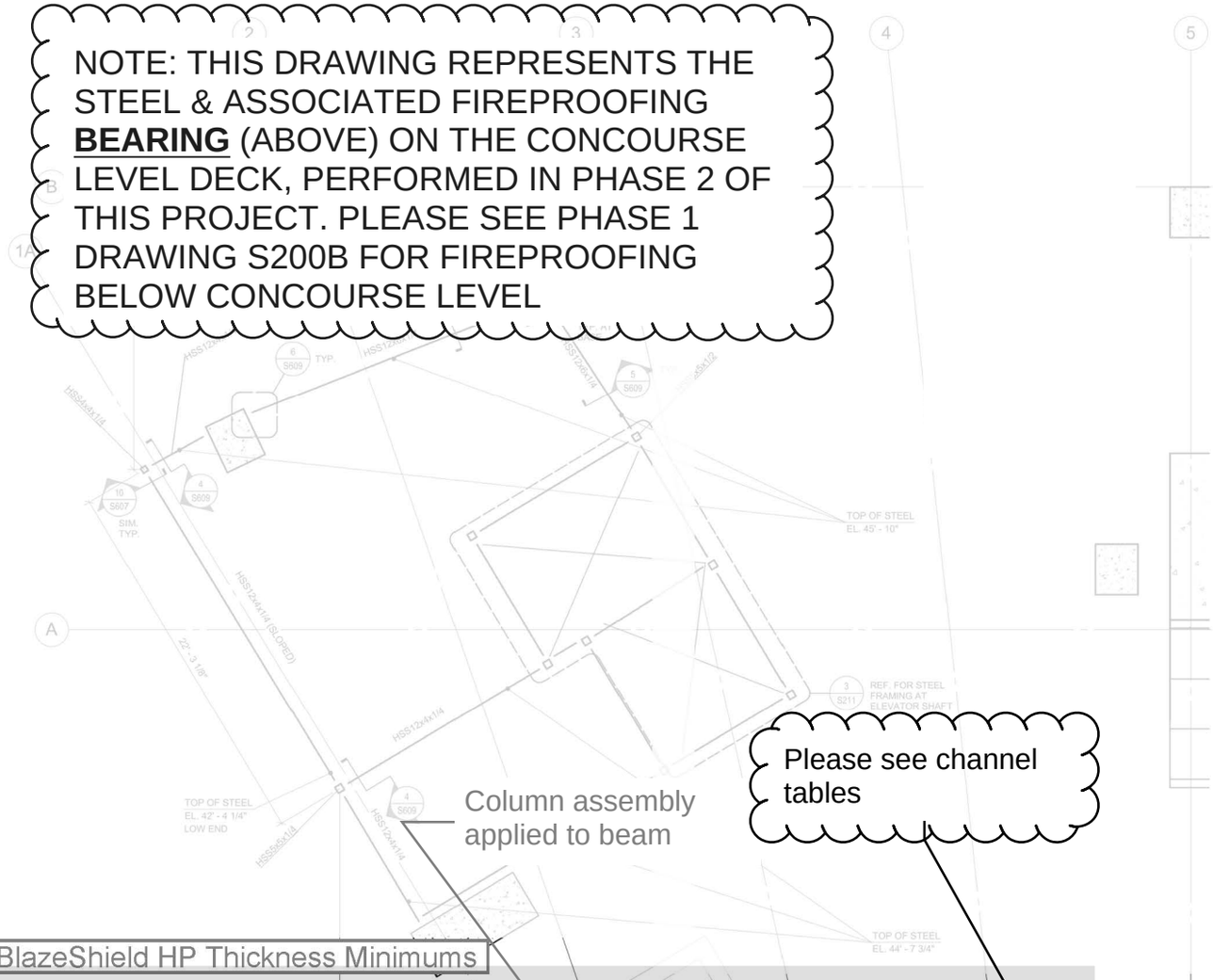
2 SE ELEVATOR PARTIAL PLAN AT CONCOURSE LEVEL

1/4" = 1'-0"



3 AWNING FRAMING PLAN AT ELEVATOR TOWER

1/4" = 1'-0"



1 PARTIAL PLAN - CONCOURSE LEVEL

1/4" = 1'-0"

Isolatek CAFCO BlazeShield HP Thickness Minimums

	Legend	Description	Test	Hours	Thickness
1	▬ ▬	W 16 X 36 Beam (W/D 0.61)	X829	2.00	~~1-9/16"~~ 1-13/16"
2	▬ ▬	HSS 8 X 4 X 1/4 (A/P 0.24)	X827	2.00	1-15/16"
3	▬ ▬	L 3 X 3 X 3/8 (W/D 0.60)	X829	2.00	~~1-5/8"~~ 1-9/16"
4	▬ ▬	MC 6 X 15.1 (W/D 0.61)	X829	2.00	~~1-1/2"~~ 1-9/16"

FIREPROOFING THICKNESS DRAWINGS
PREPARED BY NORKOTE INC.
CONTACT: RON LACROIX
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MATERIAL: ISOLATEK BLAZE-SHIELD HP
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issue description	issue date	issue description	issue date
D ADDENDUM 4	04/25/18		

PROJECT SITE & MAILING ADDRESS:
PROVIDENCE PARK
1844 SW MORRISON STREET
PORTLAND, OR 97205

PPSE
Providence Park Stadium Expansion

PHASE 2 PERMIT SET FOR CONSTRUCTION — 2 FEBRUARY 2018
SCALE: As indicated
PARTIAL PLANS
S212
D

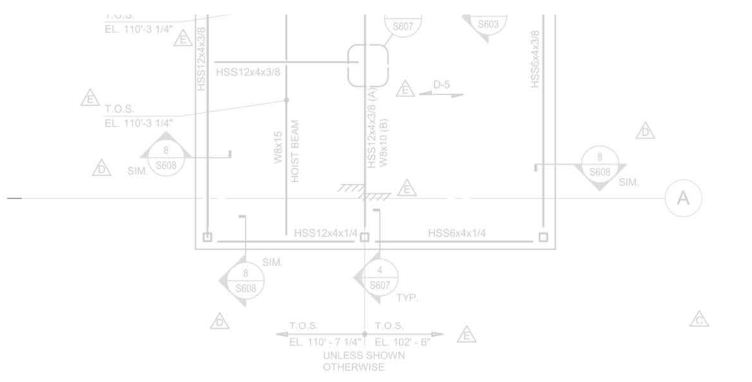
SHOP DRAWING - SE ELEVATORS
APPLIED FIREPROOFING

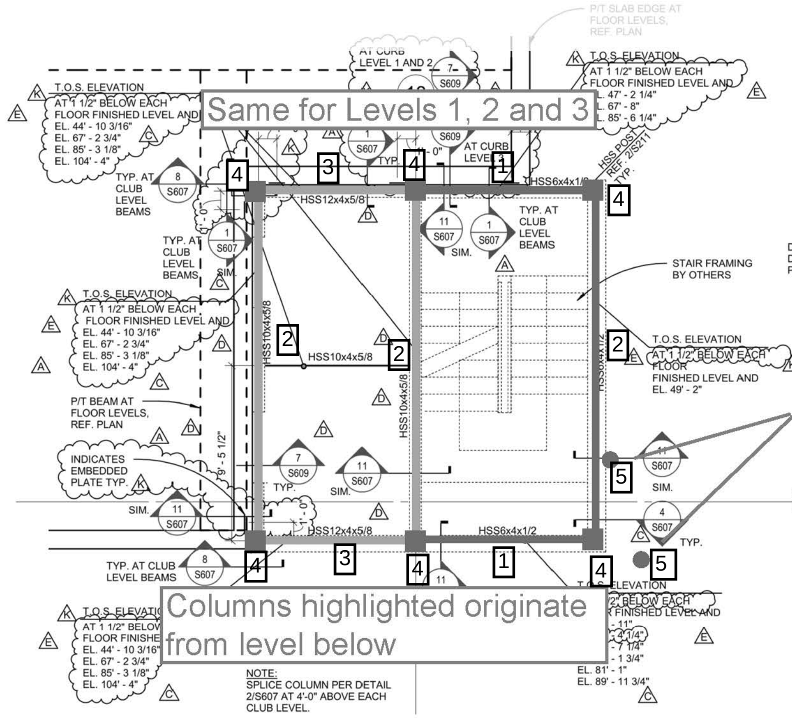
TABLE WITH CORRESPONDING NUMBERS SHOWING STEEL MEMBER TYPES AND FIREPROOFING THICKNESSES SHOWN ON THIS PAGE FOR EASY REFERENCING. ALSO INCLUDED ON NEXT PAGE WITH NORCOTE/ISOLATEK CONTACTS

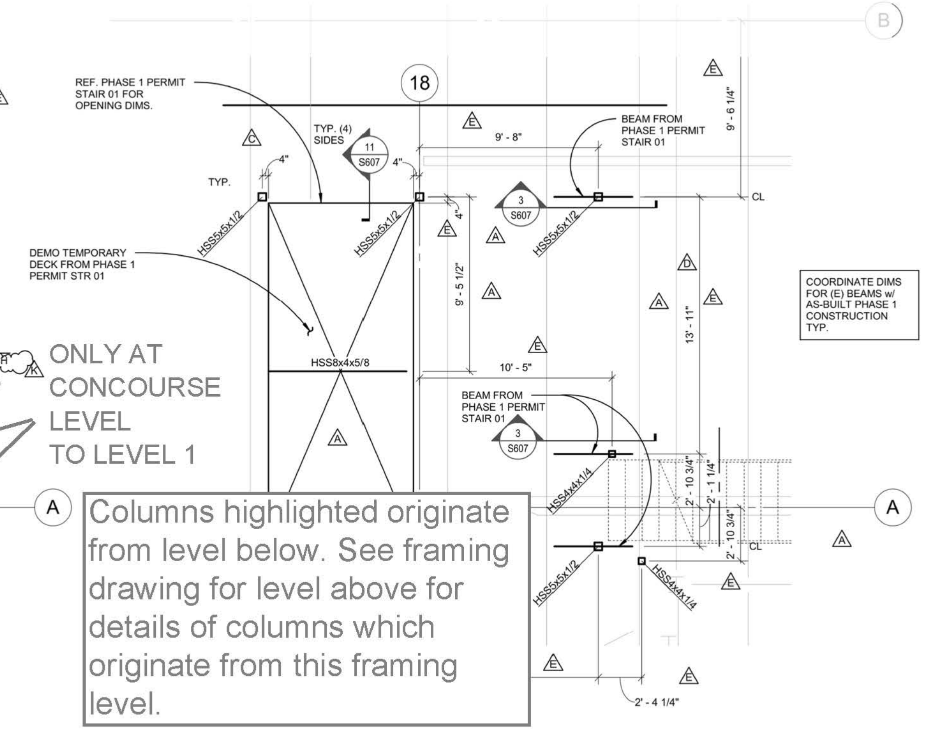
Column assembly to applied beams

Legend	Description	Test	Hours	Thickness
1 (thick dark line)	HSS 6 X 4 X 1/2 @ 3 levels (A/P 0.46)	X827	2.00	1"
2 (grey line)	HSS 10 X 4 X 5/8 @ 3 levels (A/P 0.58)	X827	2.00	11/16"
3 (grey line)	HSS 12 X 4 X 5/8 @ 3 levels (A/P 0.58)	X827	2.00	11/16"
4 (square)	HSS 5 X 5 X 1/2 columns full height of structure (A/P 0.45)	X827	2.00	~~1"~~ 1-1/16"
5 (circle)	HSS 4 X 4 X 1/4 columns (A/P 0.24)	X827	2.00	~~1-15/16"~~ 2"

NOTE: THIS DRAWING REPRESENTS THE STEEL & ASSOCIATED FIREPROOFING **BEARING** (ABOVE) ON THE CONCOURSE LEVEL DECK, PERFORMED IN PHASE 2 OF THIS PROJECT







6 BOTTOM OF ROOF PLAN
1/4" = 1'-0"

4 SE ELEVATOR PARTIAL PLAN AT CLUB LEVELS
1/4" = 1'-0"

2 SE ELEVATOR PARTIAL PLAN AT CONCOURSE LEVEL
1/4" = 1'-0"

FIREPROOFING THICKNESS DRAWINGS
PREPARED BY NORKOTE INC.
CONTACT: RON LACROIX
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MATERIAL: ISOLATEK BLAZE-SHIELD HP
CONTACT: TERRY WILDEBOER, CSI
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	issue description	issue date
K	ASI-13	08/10/18
J	ASI-12	07/27/18
E	ADDENDUM 4.A	05/17/18
D	ADDENDUM 4	04/25/18
C	ADDENDUM 3	03/27/18
A	ADDENDUM 1	03/02/18

PROJECT SITE & MAILING ADDRESS:
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PORTLAND, OR 97205

PPSE
Providence Park Stadium Expansion

PHASE 2 PERMIT CONFORMED SET FOR CONSTRUCTION
22 JUNE 2018
SCALE: 1/4" = 1'-0"
PARTIAL PLANS
S211

SHOP DRAWING - SE ELEVATORS
APPLIED FIREPROOFING

Isolatek CAFCO BlazeShield HP Thickness Minimums

	Legend	Description	Test	Hours	Thickness
1		HSS 6 X 4 X 1/2 @ 3 levels (A/P 0.46)	X827	2.00	1"
2		HSS 10 X 4 X 5/8 @ 3 levels (A/P 0.58)	X827	2.00	11/16"
3		HSS 12 X 4 X 5/8 @ 3 levels (A/P 0.58)	X827	2.00	11/16"
4		HSS 5 X 5 X 1/2 columns full height of structure (A/P 0.45)	X827	2.00	~~1"~~ 1-1/16"
5		HSS 4 X 4 X 1/4 columns (A/P 0.24)	X827	2.00	~~1-15/16"~~ 2"

FIREPROOFING THICKNESS DRAWINGS
PREPARED BY NORKOTE INC.
CONTACT: RON LACROIX
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MATERIAL: ISOLATEK BLAZE-SHIELD HP
CONTACT: TERRY WILDEBOER, CSI
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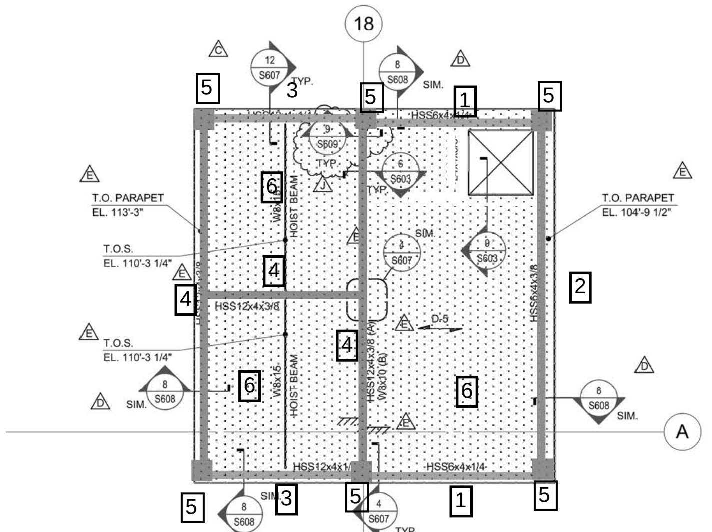
REVISED SHOP DRAWING 12/21/19
NE ELEVATORS
APPLIED FIREPROOFING

NOTE: THIS DRAWING REPRESENTS THE STEEL & ASSOCIATED FIREPROOFING **BEARING** (ABOVE) ON THE CONCOURSE LEVEL DECK, PERFORMED IN PHASE 2 OF THIS PROJECT

5 BOTTOM OF ROOF PLAN
1/4" = 1'-0"

1 NE ELEVATOR PARTIAL PLAN AT CONCOURSE LEVEL
1/4" = 1'-0"



Columns highlighted originate from level below

TABLE WITH CORRESPONDING NUMBERS SHOWING STEEL MEMBER TYPES AND FIREPROOFING THICKNESSES SHOWN ON THIS PAGE FOR EASY REFERENCING. ALSO INCLUDED ON NEXT PAGE WITH NORCOTE/ISOLATEK CONTACTS

Column assembly to applied beams

Legend	Description	Test	Hours	Thickness
1	HSS 6 X 4 X 1/4 (A/P 0.24)	X827	1.00	3/4"
2	HSS 6 X 4 X 3/8 (A/P 0.35)	X827	1.00	1/2"
3	HSS 12 X 4 X 1/4 (A/P 0.24)	X827	1.00	3/4"
4	HSS 12 X 4 X 3/8 (A/P 0.35)	X827	1.00	1/2"
5	HSS 5 X 5 X 1/2 column (A/P 0.45)	X827	1.00	7/16"
6	1-1/2" roof deck	P819	1.00	13/16"

6 BOTTOM OF ROOF PLAN
1/4" = 1'-0"

4 SE ELEVATOR PARTIAL PLAN AT CLUB LEVELS
1/4" = 1'-0"

2 SE ELEVATOR PARTIAL PLAN AT CONCOURSE LEVEL
1/4" = 1'-0"

FIREPROOFING THICKNESS DRAWINGS
PREPARED BY NORKOTE INC.
CONTACT: RON LACROIX
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MATERIAL: ISOLATEK BLAZE-SHIELD HP
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	issue description	issue date
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PROJECT SITE & MAILING ADDRESS:
PROVIDENCE PARK
1844 SW MORRISON STREET
PORTLAND, OR 97205

PPSE
Providence Park Stadium Expansion

PHASE 2 PERMIT CONFORMED SET FOR CONSTRUCTION — 22 JUNE 2018
SCALE: 1/4" = 1'-0"
PARTIAL PLANS
S211

Section: Entire Job
Page: S211 SE Elevator Roof structure - revised
Calcs: Cafco Blazeshield HP - Roof Calcs

REVISED SHOP DRAWING **12/21/19**
NE ELEVATORS
APPLIED FIREPROOFING

Isolatek CAFCO BlazeShield HP Thickness Minimums

	Legend	Description	Test	Hours	Thickness
1		HSS 6 X 4 X 1/4 (A/P 0.24)	X827	1.00	3/4"
2		HSS 6 X 4 X 3/8 (A/P 0.35)	X827	1.00	1/2"
3		HSS 12 X 4 X 1/4 (A/P 0.24)	X827	1.00	3/4"
4		HSS 12 X 4 X 3/8 (A/P 0.35)	X827	1.00	1/2"
5		HSS 5 X 5 X 1/2 column (A/P 0.45)	X827	1.00	7/16"
6		1-1/2" roof deck	P819	1.00	13/16"

FIREPROOFING THICKNESS DRAWINGS
PREPARED BY NORKOTE INC.
CONTACT: RON LACROIX
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MATERIAL: ISOLATEK BLAZE-SHIELD HP
CONTACT: TERRY WILDEBOER, CSI
206-546-8645

ASTM Desig.	Wall Thk	A/P	Metric Desig.	M/D	Hp/A	1-Hour	1-1/2 Hour	2-Hour	3-Hour	4-Hour
14 x 10	5/8	0.59	356 x 254 x 15.9	112.1	70.5	3/8	7/16	11/16	1-1/8	1-5/8
	1/2	0.48	x 12.7	93.2	84.8	3/8	11/16	1	1-9/16	2-1/8
	3/8	0.36	x 9.5	71.4	110.7	1/2	13/16	1-1/4	2-1/16	2-13/16
	5/16	0.30	x 7.9	60.2	131.3	5/8	1-1/16	1-9/16	2-1/2	3-3/8
14 x 6	1/2	0.48	356 x 152 x 12.7	92	85.9	3/8	11/16	1	1-9/16	2-1/8
	3/8	0.36	x 9.5	70.8	111.7	1/2	13/16	1-1/4	2-1/16	2-13/16
	5/16	0.30	x 7.9	59.6	132.6	5/8	1-1/16	1-9/16	2-1/2	3-3/8
	1/4	0.24	x 6.4	48.4	163.3	3/4	1-5/16	1-15/16	3	4-13/16
14 x 4	1/2	0.47	356 x 102 x 12.7	91.5	86.4	3/8	11/16	1	1-9/16	2-3/16
	3/8	0.36	x 9.5	70.2	112.6	1/2	13/16	1-1/4	2-1/16	2-13/16
	5/16	0.30	x 7.9	59	134.0	5/8	1-1/16	1-9/16	2-1/2	3-3/8
	1/4	0.24	x 6.4	47.8	165.4	3/4	1-5/16	1-15/16	3	4-13/16
12 x 8	5/8	0.59	305 x 203 x 15.9	112.7	70.1	3/8	7/16	11/16	1-1/8	1-5/8
	1/2	0.48	x 12.7	92	85.9	3/8	11/16	1	1-9/16	2-1/8
	3/8	0.36	x 9.5	71	111.3	1/2	13/16	1-1/4	2-1/16	2-13/16
	5/16	0.30	x 7.9	59.6	132.6	5/8	1-1/16	1-9/16	2-1/2	3-3/8
	1/4	0.24	x 6.4	48.4	163.3	3/4	1-5/16	1-15/16	3	4-13/16
	3/16	0.18	x 4.8	36.6	216.0	15/16	1-9/16	2-3/16	3-1/2	4-13/16
12 x 6	5/8	0.58	305 x 152 x 15.9	111	71.2	3/8	7/16	11/16	1-1/8	1-5/8
	1/2	0.47	x 12.7	91.5	86.4	3/8	11/16	1	1-9/16	2-3/16
	3/8	0.36	x 9.5	70.2	112.6	1/2	13/16	1-1/4	2-1/16	2-13/16
	5/16	0.30	x 7.9	59	134.0	5/8	1-1/16	1-9/16	2-1/2	3-3/8
	1/4	0.24	x 6.4	48.8	162.0	3/4	1-5/16	1-15/16	3	4-13/16
	3/16	0.18	x 4.8	36.6	216.0	15/16	1-9/16	2-3/16	3-1/2	4-13/16
12 x 4	5/8	0.58	305 x 102 x 15.9	109.2	72.4	3/8	7/16	11/16	1-1/8	1-5/8
	1/2	0.47	x 12.7	90.3	87.5	3/8	11/16	1	1-9/16	2-3/16
	3/8	0.36	x 9.5	69.6	113.6	1/2	13/16	1-1/4	2-1/16	2-13/16
	5/16	0.30	x 7.9	59	134.0	5/8	1-1/16	1-9/16	2-1/2	3-3/8
	1/4	0.24	x 6.4	47.8	165.4	3/4	1-5/16	1-15/16	3	4-13/16
	3/16	0.18	x 4.8	36	219.6	15/16	1-9/16	2-3/16	3-1/2	4-13/16
10 x 8	5/8	0.58	254 x 203 x 15.9	110.2	71.7	3/8	7/16	11/16	1-1/8	1-5/8
	1/2	0.47	x 12.7	91.5	86.4	3/8	11/16	1	1-9/16	2-3/16
	3/8	0.36	x 9.5	70.2	112.6	1/2	13/16	1-1/4	2-1/16	2-13/16
	5/16	0.30	x 7.9	59	134.0	5/8	1-1/16	1-9/16	2-1/2	3-3/8
	1/4	0.24	x 6.4	47.8	165.4	3/4	1-5/16	1-15/16	3	4-13/16
	3/16	0.18	x 4.8	36	219.6	15/16	1-9/16	2-3/16	3-1/2	4-13/16
10 x 6	5/8	0.58	254 x 152 x 15.9	110.2	71.7	3/8	7/16	11/16	1-1/8	1-5/8
	1/2	0.47	x 12.7	90.3	87.5	3/8	11/16	1	1-9/16	2-3/16
	3/8	0.36	x 9.5	69.6	113.6	1/2	13/16	1-1/4	2-1/16	2-13/16
	5/16	0.30	x 7.9	59	134.0	5/8	1-1/16	1-9/16	2-1/2	3-3/8
	1/4	0.24	x 6.4	47.8	165.4	3/4	1-5/16	1-15/16	3	4-13/16
	3/16	0.18	x 4.8	36	219.6	15/16	1-9/16	2-3/16	3-1/2	4-13/16
10 x 4	1/2	0.46	254 x 102 x 12.7	88.5	89.3	7/16	11/16	1	1-5/8	2-1/4
	3/8	0.35	x 9.5	68.4	115.6	1/2	13/16	1-1/4	2-1/8	2-15/16
	5/16	0.30	x 7.9	58.4	135.4	5/8	1-1/16	1-9/16	2-1/2	3-3/8
	1/4	0.24	x 6.4	47.2	167.5	3/4	1-5/16	1-15/16	3	4-13/16
	3/16	0.18	x 4.8	36	219.6	15/16	1-9/16	2-3/16	3-1/2	4-13/16
8 x 6	1/2	0.46	203 x 152 x 12.7	88.5	89.3	7/16	11/16	1	1-5/8	2-1/4
	3/8	0.35	x 9.5	68.4	115.6	1/2	13/16	1-1/4	2-1/8	2-15/16
	5/16	0.30	x 7.9	57	138.7	5/8	1-1/16	1-9/16	2-1/2	3-3/8
	1/4	0.24	x 6.4	47.2	167.5	3/4	1-5/16	1-15/16	3	4-13/16
	3/16	0.18	x 4.8	36	219.6	15/16	1-9/16	2-3/16	3-1/2	4-13/16

Note: A/P Ratio based on Design Formula

X827

Structural Steel Rectangular Tube Columns

CAFCO® BLAZE-SHIELD® II, HP & ISOLATEK® Type II, HP

ASTM Desig.	Wall Thk	A/P	Metric Desig.	M/D	Hp/A	1-Hour	1-1/2 Hour	2-Hour	3-Hour	4-Hour
8 x 4	1/2	0.46	203 x 102 x 12.7	86.7	91.2	7/16	11/16	1	1-5/8	2-1/4
	3/8	0.35	x 9.5	67.9	116.4	1/2	13/16	1-1/4	2-1/8	2-15/16
	5/16	0.30	x 7.9	57.2	138.2	5/8	1-1/16	1-9/16	2-1/2	3-3/8
	1/4	0.24	x 6.4	46.6	169.6	3/4	1-5/16	1-15/16	3	4-13/16
	3/16	0.18	x 4.8	36	219.6	15/16	1-9/16	2-3/16	3-1/2	4-13/16
7 x 5	1/2	0.46	178 x 127 x 12.7	86.7	91.2	7/16	11/16	1	1-5/8	2-1/4
	3/8	0.35	x 9.5	67.9	116.4	1/2	13/16	1-1/4	2-1/8	2-15/16
	5/16	0.30	x 7.9	57.2	138.2	5/8	1-1/16	1-9/16	2-1/2	3-3/8
	1/4	0.24	x 6.4	46.6	169.6	3/4	1-5/16	1-15/16	3	4-13/16
	3/16	0.18	x 4.8	36	219.6	15/16	1-9/16	2-3/16	3-1/2	4-13/16
7 x 4	1/2	0.46	178 x 102 x 12.7	87.4	90.4	7/16	11/16	1	1-5/8	2-1/4
	3/8	0.35	x 9.5	66.7	118.5	1/2	13/16	1-1/4	2-1/8	2-15/16
	5/16	0.29	x 7.9	56.6	139.7	5/8	1-1/8	1-9/16	2-9/16	3-1/2
	1/4	0.24	x 6.4	46.6	169.6	3/4	1-5/16	1-15/16	3	4-13/16
	3/16	0.18	x 4.8	35.4	223.3	15/16	1-9/16	2-3/16	3-1/2	4-13/16
6 x 4	1/2	0.46	152 x 102 x 12.7	83.8	94.3	7/16	11/16	1	1-5/8	2-1/4
	3/8	0.35	x 9.5	66.1	119.6	1/2	13/16	1-1/4	2-1/8	2-15/16
	5/16	0.29	x 7.9	56.1	140.9	5/8	1-1/8	1-9/16	2-9/16	3-1/2
	1/4	0.24	x 6.4	46	171.8	3/4	1-5/16	1-15/16	3	4-13/16
	3/16	0.18	x 4.8	35.4	223.3	15/16	1-9/16	2-3/16	3-1/2	4-13/16
5 x 4	3/8	0.34	127 x 102 x 9.5	65	121.6	9/16	13/16	1-1/4	2-3/16	3
	5/16	0.29	x 7.9	55.5	142.4	5/8	1-1/8	1-9/16	2-9/16	3-1/2
	1/4	0.24	x 6.4	45.4	174.1	3/4	1-5/16	1-15/16	3	4-13/16
	3/16	0.18	x 4.8	34.8	227.2	15/16	1-9/16	2-3/16	3-1/2	4-13/16

Note: A/P Ratio based on Design Formula

X827

Structural Steel Square Tube Columns

CAFCO® BLAZE-SHIELD® II, HP & ISOLATEK® Type II, HP

ASTM Desig.	Wall Thk	A/P	Metric Desig.	M/D	Hp/A	1-Hour	1-1/2 Hour	2-Hour	3-Hour	4-Hour
30 x 30	5/8	0.61	762 x 762 x 15.9	121.2	65.2	3/8	7/16	11/16	1-1/8	1-5/8
28 x 28	5/8	0.61	711 x 711 x 15.9	120.9	65.4	3/8	7/16	11/16	1-1/8	1-5/8
26 x 26	5/8	0.61	660 x 660 x 15.9	120.5	65.6	3/8	7/16	11/16	1-1/8	1-5/8
24 x 24	5/8	0.61	610 x 610 x 15.9	120.1	65.8	3/8	7/16	11/16	1-1/8	1-5/8
	1/2	0.49	x 12.7	96.9	81.6	3/8	7/16	11/16	1-1/8	1-5/8
	3/8	0.37	x 9.5	73.4	107.7	1/2	13/16	1-1/4	2	2-3/4
22 x 22	5/8	0.61	559 x 559 x 15.9	119.6	66.1	3/8	7/16	11/16	1-1/8	1-5/8
	1/2	0.49	x 12.7	96.6	81.8	3/8	7/16	11/16	1-1/8	1-5/8
	3/8	0.37	x 9.5	73.2	108.0	1/2	13/16	1-1/4	2	2-3/4
20 x 20	5/8	0.61	508 x 508 x 15.9	119	66.4	3/8	7/16	11/16	1-1/8	1-5/8
	1/2	0.49	x 12.7	96.3	82.1	3/8	7/16	11/16	1-1/8	1-5/8
	3/8	0.37	x 9.5	73	108.3	1/2	13/16	1-1/4	2	2-3/4
18 x 18	5/8	0.60	457 x 457x 15.9	118.3	66.8	3/8	7/16	11/16	1-1/8	1-5/8
	1/2	0.49	x 12.7	95.8	82.5	3/8	7/16	11/16	1-1/8	1-5/8
	3/8	0.37	x 9.5	72.7	108.7	1/2	13/16	1-1/4	2	2-3/4
16 x 16	5/8	0.60	406 x 406 x 15.9	117.4	67.3	3/8	7/16	11/16	1-1/8	1-5/8
	1/2	0.49	x 12.7	95.2	83.0	3/8	7/16	11/16	1-1/8	1-5/8
	3/8	0.37	x 9.5	72.4	109.2	1/2	13/16	1-1/4	2	2-3/4
	5/16	0.31	x 7.9	60.7	130.2	9/16	1-1/16	1-1/2	2-3/8	3-5/16
14 x 14	5/8	0.60	356 x 356 x 15.9	116.3	68.0	3/8	7/16	11/16	1-1/8	1-5/8
	1/2	0.48	x 12.7	94.5	83.7	3/8	11/16	1	1-9/16	2-1/8
	3/8	0.36	x 9.5	72	109.8	1/2	13/16	1-1/4	2-1/16	2-13/16
	5/16	0.31	x 7.9	60.4	130.9	9/16	1-1/16	1-1/2	2-3/8	3-5/16
12 x 12	5/8	0.59	305 x 305 x 15.9	114.7	68.9	3/8	7/16	11/16	1-1/8	1-5/8
	1/2	0.48	x 12.7	93	85.0	3/8	11/16	1	1-9/16	2-1/8
	3/8	0.36	x 9.5	71.4	110.7	1/2	13/16	1-1/4	2-1/16	2-13/16
	5/16	0.30	x 7.9	60.1	131.5	5/8	1-1/16	1-9/16	2-1/2	3-3/8
	1/4	0.24	x 6.4	48.8	162.0	3/4	1-5/16	1-15/16	3	4-13/16
10 x 10	5/8	0.59	254 x 254 x 15.9	112.6	70.2	3/8	7/16	11/16	1-1/8	1-5/8
	1/2	0.48	x 12.7	92.1	85.8	3/8	11/16	1	1-9/16	2-1/8
	3/8	0.36	x 9.5	70	112.9	1/2	13/16	1-1/4	2-1/16	2-13/16
	5/16	0.30	x 7.9	59.5	132.9	5/8	1-1/16	1-9/16	2-1/2	3-3/8
	1/4	0.24	x 6.4	48.1	164.3	3/4	1-5/16	1-15/16	3	4-13/16
	3/16	0.18	x 4.8	36.5	216.6	15/16	1-9/16	2-3/16	3-1/2	4-13/16
8 x 8	5/8	0.58	203 x 203 x 15.9	108	73.2	3/8	7/16	11/16	1-1/8	1-5/8
	1/2	0.47	x 12.7	89	88.8	3/8	11/16	1	1-9/16	2-3/16
	3/8	0.36	x 9.5	69.5	113.7	1/2	13/16	1-1/4	2-1/16	2-13/16
	5/16	0.30	x 7.9	58.7	134.7	5/8	1-1/16	1-9/16	2-1/2	3-3/8
	1/4	0.24	x 6.4	47	168.2	3/4	1-5/16	1-15/16	3	4-13/16
	3/16	0.18	x 4.8	36.2	218.4	15/16	1-9/16	2-3/16	3-1/2	4-13/16
7 x 7	1/2	0.46	178 x 178 x 12.7	88.6	89.2	7/16	11/16	1	1-5/8	2-1/4
	3/8	0.35	x 9.5	68.7	115.1	1/2	13/16	1-1/4	2-1/8	2-15/16
	5/16	0.30	x 7.9	58.1	136.1	5/8	1-1/16	1-9/16	2-1/2	3-3/8
	1/4	0.24	x 6.4	47.2	167.5	3/4	1-5/16	1-15/16	3	4-13/16
	3/16	0.18	x 4.8	36	219.6	15/16	1-9/16	2-3/16	3-1/2	4-13/16

Note: A/P Ratio based on Design Formula

X827

Structural Steel Square Tube Columns

CAFCO® BLAZE-SHIELD® II, HP & ISOLATEK® Type II, HP

ASTM Desig.	Wall Thk	A/P	Metric Desig.	M/D	Hp/A	1-Hour	1-1/2 Hour	2-Hour	3-Hour	4-Hour
6 x 6	1/2	0.46	152 x 152 x 12.7	86.6	91.3	7/16	11/16	1	1-5/8	2-1/4
	3/8	0.35	x 9.5	67.6	116.9	1/2	13/16	1-1/4	2-1/8	2-15/16
	5/16	0.30	x 7.9	57.4	137.7	5/8	1-1/16	1-9/16	2-1/2	3-3/8
	1/4	0.24	x 6.4	46	171.8	3/4	1-5/16	1-15/16	3	4-13/16
	3/16	0.18	x 4.8	35.7	221.4	15/16	1-9/16	2-3/16	3-1/2	4-13/16
5 x 5	1/2	0.45	127 x 127 x 12.7	83.9	94.2	7/16	3/4	1-1/16	1-11/16	2-1/4
	3/8	0.35	x 9.5	66	119.8	1/2	13/16	1-1/4	2-1/8	2-15/16
	5/16	0.29	x 7.9	56.3	140.4	5/8	1-1/8	1-9/16	2-9/16	3-1/2
	1/4	0.24	x 6.4	46.1	171.5	3/4	1-5/16	1-15/16	3	4-13/16
	3/16	0.18	x 4.8	35.3	223.9	15/16	1-9/16	2-3/16	3-1/2	4-13/16
4 x 4	1/2	0.44	102 x 102 x 12.7	79.8	99.1	7/16	3/4	1-1/16	1-11/16	2-5/16
	3/8	0.34	x 9.5	63.7	124.1	9/16	13/16	1-1/4	2-3/16	3
	5/16	0.29	x 7.9	54.7	144.5	5/8	1-1/8	1-9/16	2-9/16	3-1/2
	1/4	0.23	x 6.4	45	175.7	13/16	1-3/8	2	3-3/16	4-13/16
	3/16	0.18	x 4.8	35	225.9	15/16	1-9/16	2-3/16	3-1/2	4-13/16

Note: A/P Ratio based on Design Formula

X829

Wide Flange Structural Steel Columns

CAFCO® BLAZE-SHIELD® II, HP & ISOLATEK® Type II, HP

ASTM Desig.	W/D	Metric Desig.	M/D	Hp/A	1-Hour	1-1/2 Hour	2-Hour	3-Hour	4-Hour
W18 x 143	1.77	W460 x 213	104.4	75.7	7/16	5/8	7/8	1-1/4	1-11/16
130	1.61	193	95.0	83.2	7/16	11/16	7/8	1-5/16	1-3/4
119	1.48	177	87.3	90.5	7/16	3/4	15/16	1-7/16	1-7/8
106	1.33	158	78.5	100.7	1/2	3/4	1	1-1/2	2
97	1.22	144	72.0	109.8	9/16	13/16	1-1/16	1-5/8	2-1/8
86	1.09	128	64.3	122.9	5/8	7/8	1-3/16	1-11/16	2-1/8
76	0.97	113	57.2	138.1	5/8	15/16	1-1/4	1-11/16	2-1/8
71	1.08	106	63.7	124.1	5/8	7/8	1-3/16	1-11/16	2-1/8
65	0.99	97	58.4	135.3	5/8	15/16	1-1/4	1-11/16	2-1/8
60	0.92	89	54.3	145.6	11/16	1	1-1/4	1-11/16	2-1/8
55	0.85	82	50.2	157.6	11/16	1	1-1/4	1-11/16	2-1/8
50	0.77	74	45.4	174.0	11/16	1-1/16	1-7/16	1-7/8	2-5/16
46	0.78	68	46.0	171.8	11/16	1-1/16	1-7/16	1-7/8	2-5/16
40	0.68	60	40.1	197.0	11/16	1-1/8	1-7/16	1-7/8	2-5/16
35	0.6	52	35.4	223.3	11/16	1-1/8	1-9/16	2-3/8	3-3/16
W16 x 100	1.37	W410 x 149	80.8	97.8	1/2	3/4	1	1-1/2	2
89	1.22	132	72.0	109.8	9/16	13/16	1-1/16	1-5/8	2-1/8
77	1.07	114	63.1	125.2	5/8	7/8	1-3/16	1-11/16	2-1/8
67	0.93	100	54.9	144.1	11/16	1	1-1/4	1-11/16	2-1/8
57	0.96	85	56.6	139.6	5/8	15/16	1-1/4	1-11/16	2-1/8
50	0.84	74	49.6	159.5	11/16	1	1-1/4	1-11/16	2-1/8
45	0.76	67	44.8	176.3	11/16	1-1/16	1-7/16	1-7/8	2-5/16
40	0.68	60	40.1	197.0	11/16	1-1/8	1-7/16	1-7/8	2-5/16
36	0.61	53	36.0	219.6	11/16	1-1/8	1-9/16	2-3/8	3-3/16
31	0.59	46	34.8	227.1	11/16	1-1/8	1-9/16	2-7/16	3-3/16
26	0.49	39	28.9	273.4	1-1/8	1-11/16	2-3/16	3-5/16	NR
W14 x 808	7.28	W360 x 1202	429.5	18.4	3/8	3/8	3/8	3/8	1/2
730	6.76	1086	398.8	19.8	3/8	3/8	3/8	7/16	9/16
665	6.21	990	366.4	21.6	3/8	3/8	3/8	7/16	5/8
605	5.82	900	343.4	23.0	3/8	3/8	3/8	1/2	5/8
550	5.34	818	315.1	25.1	3/8	3/8	3/8	1/2	11/16
500	4.95	744	292.1	27.1	3/8	3/8	3/8	9/16	3/4
455	4.59	677	270.8	29.2	3/8	3/8	7/16	5/8	13/16
426	4.32	634	254.9	31.0	3/8	3/8	7/16	5/8	13/16
398	4.09	592	241.3	32.8	3/8	3/8	7/16	11/16	7/8
370	3.84	551	226.6	34.9	3/8	3/8	1/2	11/16	15/16
342	3.58	509	211.2	37.4	3/8	3/8	1/2	3/4	15/16
311	3.3	463	194.7	40.6	3/8	7/16	1/2	13/16	1-1/16
283	3.03	421	178.8	44.2	3/8	7/16	1/2	13/16	1-1/8
257	2.78	382	164.0	48.2	3/8	7/16	1/2	7/8	1-3/16
233	2.55	347	150.5	52.5	3/8	1/2	1/2	15/16	1-1/4
211	2.32	314	136.9	57.8	3/8	1/2	11/16	1	1-3/8
193	2.14	287	126.3	62.6	3/8	9/16	3/4	1-1/8	1-7/16
176	1.96	262	115.6	68.4	7/16	5/8	13/16	1-3/16	1-9/16
159	1.78	237	105.0	75.3	7/16	5/8	7/8	1-1/4	1-11/16
145	1.64	216	96.8	81.7	7/16	11/16	7/8	1-5/16	1-3/4
132	1.56	196	92.0	85.9	7/16	11/16	15/16	1-3/8	1-13/16

Note: Increased thicknesses may be applied when thickness applied to lower flange tips is reduced by one-half. Refer to alternate thickness tables.

X829

Wide Flange Structural Steel Columns

CAFCO® BLAZE-SHIELD® II, HP & ISOLATEK® Type II, HP

ASTM Desig.	W/D	Metric Desig.	M/D	Hp/A	1-Hour	1-1/2 Hour	2-Hour	3-Hour	4-Hour
W14 x 120	1.42	W360 x 179	83.8	94.4	1/2	3/4	1	1-7/16	1-15/16
109	1.29	162	76.1	103.9	9/16	13/16	1-1/16	1-9/16	2-1/16
99	1.18	147	69.6	113.5	9/16	13/16	1-1/8	1-5/8	2-1/8
90	1.08	134	63.7	124.1	5/8	7/8	1-3/16	1-11/16	2-1/8
82	1.23	122	72.6	108.9	9/16	13/16	1-1/16	1-5/8	2-1/8
74	1.12	110	66.1	119.6	9/16	7/8	1-1/8	1-11/16	2-1/8
68	1.04	101	61.4	128.8	5/8	15/16	1-3/16	1-11/16	2-1/8
61	0.92	91	54.3	145.6	11/16	1	1-1/4	1-11/16	2-1/8
53	0.91	79	53.7	147.2	11/16	1	1-1/4	1-11/16	2-1/8
48	0.83	72	49.0	161.4	11/16	1-1/16	1-3/8	1-7/8	2-5/16
43	0.75	64	44.3	178.6	11/16	1-1/16	1-7/16	1-7/8	2-5/16
38	0.7	57	41.3	191.4	11/16	1-1/8	1-7/16	1-7/8	2-5/16
34	0.63	51	37.2	212.7	11/16	1-1/8	1-9/16	2-3/8	3-1/8
30	0.56	45	33.0	239.3	7/8	1-1/4	1-11/16	2-1/2	3-5/16
26	0.55	39	32.5	243.6	7/8	1-1/4	1-11/16	2-1/2	3-5/16
22	0.47	33	27.7	285.1	1-1/8	1-11/16	2-1/4	3-3/8	NR
W12 x 336	4.06	W310 x 500	239.5	33.0	3/8	3/8	7/16	11/16	7/8
305	3.76	454	221.8	35.6	3/8	3/8	1/2	11/16	15/16
279	3.5	415	206.5	38.3	3/8	3/8	1/2	3/4	1
252	3.2	375	188.8	41.9	3/8	7/16	1/2	13/16	1-1/16
230	2.96	342	174.6	45.3	3/8	7/16	1/2	7/8	1-1/8
210	2.73	313	161.1	49.1	3/8	1/2	1/2	15/16	1-3/16
190	2.5	283	147.5	53.6	3/8	1/2	11/16	1	1-5/16
170	2.26	253	133.3	59.3	3/8	9/16	11/16	1-1/16	1-3/8
152	2.04	225	120.4	65.7	3/8	9/16	3/4	1-1/8	1-1/2
136	1.86	202	109.7	72.0	7/16	5/8	13/16	1-3/16	1-5/8
120	1.65	179	97.4	81.2	7/16	11/16	7/8	1-5/16	1-3/4
106	1.47	158	86.7	91.1	7/16	3/4	15/16	1-7/16	1-7/8
96	1.34	143	79.1	100.0	1/2	3/4	1	1-1/2	2
87	1.22	129	72.0	109.8	9/16	13/16	1-1/16	1-5/8	2-1/8
79	1.11	117	65.5	120.7	9/16	7/8	1-1/8	1-11/16	2-1/8
72	1.02	107	60.2	131.4	5/8	15/16	1-3/16	1-11/16	2-1/8
65	0.92	97	54.3	145.6	11/16	1	1-1/4	1-11/16	2-1/8
58	0.92	86	54.3	145.6	11/16	1	1-1/4	1-11/16	2-1/8
53	0.85	79	50.2	157.6	11/16	1	1-1/4	1-11/16	2-1/8
50	0.9	74	53.1	148.9	11/16	1	1-1/4	1-11/16	2-1/8
45	0.82	67	48.4	163.4	11/16	1-1/16	1-3/8	1-7/8	2-5/16
40	0.73	60	43.1	183.5	11/16	1-1/8	1-7/16	1-7/8	2-5/16
35	0.7	52	41.3	191.4	11/16	1-1/8	1-7/16	1-7/8	2-5/16
30	0.6	45	35.4	223.3	11/16	1-1/8	1-9/16	2-3/8	3-3/16
26	0.53	39	31.3	252.8	1-1/16	1-5/8	2-1/8	3-3/16	NR
22	0.56	33	33.0	239.3	7/8	1-1/4	1-11/16	2-1/2	3-5/16
19	0.48	28	28.3	279.1	1-1/8	1-11/16	2-1/4	3-5/16	NR
16	0.41	24	24.2	326.8	1-1/4	1-13/16	2-5/16	3-9/16	NR
14	0.36	25	21.2	372.2	1-1/4	1-13/16	2-5/16	3-9/16	NR
W10 x 112	1.81	W250 x 167	106.8	74.0	7/16	5/8	13/16	1-1/4	1-5/8
100	1.64	149	96.8	81.7	7/16	11/16	7/8	1-5/16	1-3/4

Note: Increased thicknesses may be applied when thickness applied to lower flange tips is reduced by one-half. Refer to alternate thickness tables.

Miscellaneous Shapes

Single Angles

CAFCO® BLAZE-SHIELD® II, HP & ISOLATEK® Type II, HP

ASTM Desig.	W/D	Metric Desig.	M/D	Hp/A	1-Hour	1-1/2 Hour	2-Hour	3-Hour	4-Hour
L3.5 x 2.5 x 1/2	0.80	89 x 64 x 13	47.2	167.5	11/16	1-1/16	1-3/8	1-7/8	2-5/16
x 3/8	0.61		36.0	219.6	11/16	1-1/8	1-9/16	2-3/8	3-3/16
x 5/16	0.51	x 7.9	30.1	262.7	1-1/8	1-5/8	2-3/16	3-1/4	NR
x 1/4	0.41	x 6.4	24.2	326.8	1-1/4	1-13/16	2-5/16	3-9/16	NR
L3 x 3 x 1/2	0.79	76 x 76 x 13	46.6	169.6	11/16	1-1/16	1-3/8	1-7/8	2-5/16
x 7/16	0.70	x 11	41.3	191.4	11/16	1-1/8	1-7/16	1-7/8	2-5/16
x 3/8	0.60	x 9.5	35.4	223.3	11/16	1-1/8	1-9/16	2-3/8	3-3/16
x 5/16	0.51	x 7.9	30.1	262.7	1-1/8	1-5/8	2-3/16	3-1/4	NR
x 1/4	0.41	x 6.4	24.2	326.8	1-1/4	1-13/16	2-5/16	3-9/16	NR
L3 x 2.5 x 1/2	0.79	76 x 64 x 13	46.6	169.6	11/16	1-1/16	1-3/8	1-7/8	2-5/16
x 7/16	0.70	x 11	41.3	191.4	11/16	1-1/8	1-7/16	1-7/8	2-5/16
x 3/8	0.60	x 9.5	35.4	223.3	11/16	1-1/8	1-9/16	2-3/8	3-3/16
x 5/16	0.51	x 7.9	30.1	262.7	1-1/8	1-5/8	2-3/16	3-1/4	NR
x 1/4	0.41	x 6.4	24.2	326.8	1-1/4	1-13/16	2-5/16	3-9/16	NR
L3 x 2 x 1/2	0.78	76 x 51 x 13	46.0	171.8	11/16	1-1/16	1-7/16	1-7/8	2-5/16
x 3/8	0.60	x 9.5	35.4	223.3	11/16	1-1/8	1-9/16	2-3/8	3-3/16
x 5/16	0.51	x 7.9	30.1	262.7	1-1/8	1-5/8	2-3/16	3-1/4	NR
x 1/4	0.41	x 6.4	24.2	326.8	1-1/4	1-13/16	2-5/16	3-9/16	NR
L2.5 x 2.5 x 1/2	0.77	64 x 64 x 13	45.4	174.0	11/16	1-1/16	1-7/16	1-7/8	2-5/16
x 3/8	0.59	x 9.5	34.8	227.1	11/16	1-1/8	1-9/16	2-7/16	3-3/16
x 5/16	0.50	x 7.9	29.5	268.0	1-1/8	1-5/8	2-3/16	3-1/4	NR
x 1/4	0.40	x 6.4	23.6	335.0	1-1/4	1-13/16	2-5/16	3-9/16	NR
L2.5 x 2 x 3/8	0.59	64 x 51 x 9.5	34.8	227.1	11/16	1-1/8	1-9/16	2-7/16	3-3/16
x 5/16	0.50	x 7.9	29.5	268.0	1-1/8	1-5/8	2-3/16	3-1/4	NR
x 1/4	0.41	x 6.4	24.2	326.8	1-1/4	1-13/16	2-5/16	3-9/16	NR
L2 x 2 x 3/8	0.58	51 x 51 x 9.5	34.2	231.0	11/16	1-1/8	1-9/16	2-7/16	3-1/4
x 5/16	0.49	x 7.9	28.9	273.4	1-1/8	1-11/16	2-3/16	3-5/16	NR
x 1/4	0.40	x 6.4	23.6	335.0	1-1/4	1-13/16	2-5/16	3-9/16	NR

Miscellaneous Shapes

Miscellaneous Channels

CAFCO® BLAZE-SHIELD® II, HP & ISOLATEK® Type II, HP

ASTM Desig.	Weight	W/D	Metric Desig.	M/D	Hp/A	1-Hour	1-1/2 Hour	2-Hour	3-Hour	4-Hour
MC18 x	58	1.13	460 x 86	66.7	118.6	9/16	7/8	1-1/8	1-11/16	2-1/8
	51.9	1.02	x 77	60.2	131.4	5/8	15/16	1-3/16	1-11/16	2-1/8
	45.8	0.90	x 68	53.1	148.9	11/16	1	1-1/4	1-11/16	2-1/8
	42.7	0.84	x 64	49.6	159.5	11/16	1	1-1/4	1-11/16	2-1/8
MC13 x	50	1.19	330 x 74	70.2	112.6	9/16	13/16	1-1/8	1-5/8	2-1/8
	40	0.97	x 60	57.2	138.1	5/8	15/16	1-1/4	1-11/16	2-1/8
	35	0.86	x 52	50.7	155.8	11/16	1	1-1/4	1-11/16	2-1/8
	31.8	0.78	x 47	46.0	171.8	11/16	1-1/16	1-7/16	1-7/8	2-5/16
MC12 x	50	1.28	310 x 74	75.5	104.7	9/16	13/16	1-1/16	1-9/16	2-1/16
	45	1.17	x 67	69.0	114.5	9/16	7/8	1-1/8	1-11/16	2-1/8
	40	1.05	x 60	62.0	127.6	5/8	7/8	1-3/16	1-11/16	2-1/8
	35	0.92	x 52	54.3	145.6	11/16	1	1-1/4	1-11/16	2-1/8
	31	0.82	x 46	48.4	163.4	11/16	1-1/16	1-3/8	1-7/8	2-5/16
	10.6	0.36	x 16	21.2	372.2	1-1/4	1-13/16	2-5/16	3-9/16	NR
MC10 x	41.1	1.15	250 x 61	67.9	116.5	9/16	7/8	1-1/8	1-11/16	2-1/8
	33.6	0.96	x 50	56.6	139.6	5/8	15/16	1-1/4	1-11/16	2-1/8
	28.5	0.83	x 42	49.0	161.4	11/16	1-1/16	1-3/8	1-7/8	2-5/16
	25	0.77	x 37	45.4	174.0	11/16	1-1/16	1-7/16	1-7/8	2-5/16
	22	0.68	x 33	40.1	197.0	11/16	1-1/8	1-7/16	1-7/8	2-5/16
	8.4	0.33	x 12	19.5	406.0	1-1/4	1-13/16	2-5/16	3-9/16	NR
MC9 x	25.4	0.82	230 x 38	48.4	163.4	11/16	1-1/16	1-3/8	1-7/8	2-5/16
	23.9	0.78	x 36	46.0	171.8	11/16	1-1/16	1-7/16	1-7/8	2-5/16
MC8 x	22.8	0.79	200 x 34	46.6	169.6	11/16	1-1/16	1-3/8	1-7/8	2-5/16
	21.4	0.75	x 32	44.3	178.6	11/16	1-1/16	1-7/16	1-7/8	2-5/16
	20	0.74	x 30	43.7	181.1	11/16	1-1/8	1-7/16	1-7/8	2-5/16
	18.7	0.69	x 28	40.7	194.2	11/16	1-1/8	1-7/16	1-7/8	2-5/16
	8.5	0.37	x 13	21.8	362.1	1-1/4	1-13/16	2-5/16	3-9/16	NR
MC7 x	22.7	0.83	180 x 34	49.0	161.4	11/16	1-1/16	1-3/8	1-7/8	2-5/16
	19.1	0.72	x 28	42.5	186.1	11/16	1-1/8	1-7/16	1-7/8	2-5/16
MC6 x	18	0.72	150 x 27	42.5	186.1	11/16	1-1/8	1-7/16	1-7/8	2-5/16
	16.3	0.71	x 24	41.9	188.7	11/16	1-1/8	1-7/16	1-7/8	2-5/16
	15.3	0.61	x 23	36.0	219.6	11/16	1-1/8	1-9/16	2-3/8	3-3/16
	15.1	0.66	x 22	38.9	203.0	11/16	1-1/8	1-9/16	2-5/16	3-1/16
	12	0.56	x 18	33.0	239.3	7/8	1-1/4	1-11/16	2-1/2	3-5/16

Miscellaneous Shapes

Miscellaneous Channels

CAFCO® BLAZE-SHIELD® II, HP & ISOLATEK® Type II, HP

ASTM Desig.	Weight	W/D	Metric Desig.	M/D	Hp/A	1-Hour	1-1/2 Hour	2-Hour	3-Hour	4-Hour
MC18 x	58	1.13	460 x 86	66.7	118.6	9/16	7/8	1-1/8	1-11/16	2-1/8
	51.9	1.02	x 77	60.2	131.4	5/8	15/16	1-3/16	1-11/16	2-1/8
	45.8	0.90	x 68	53.1	148.9	11/16	1	1-1/4	1-11/16	2-1/8
	42.7	0.84	x 64	49.6	159.5	11/16	1	1-1/4	1-11/16	2-1/8
MC13 x	50	1.19	330 x 74	70.2	112.6	9/16	13/16	1-1/8	1-5/8	2-1/8
	40	0.97	x 60	57.2	138.1	5/8	15/16	1-1/4	1-11/16	2-1/8
	35	0.86	x 52	50.7	155.8	11/16	1	1-1/4	1-11/16	2-1/8
	31.8	0.78	x 47	46.0	171.8	11/16	1-1/16	1-7/16	1-7/8	2-5/16
MC12 x	50	1.28	310 x 74	75.5	104.7	9/16	13/16	1-1/16	1-9/16	2-1/16
	45	1.17	x 67	69.0	114.5	9/16	7/8	1-1/8	1-11/16	2-1/8
	40	1.05	x 60	62.0	127.6	5/8	7/8	1-3/16	1-11/16	2-1/8
	35	0.92	x 52	54.3	145.6	11/16	1	1-1/4	1-11/16	2-1/8
	31	0.82	x 46	48.4	163.4	11/16	1-1/16	1-3/8	1-7/8	2-5/16
	10.6	0.36	x 16	21.2	372.2	1-1/4	1-13/16	2-5/16	3-9/16	NR
MC10 x	41.1	1.15	250 x 61	67.9	116.5	9/16	7/8	1-1/8	1-11/16	2-1/8
	33.6	0.96	x 50	56.6	139.6	5/8	15/16	1-1/4	1-11/16	2-1/8
	28.5	0.83	x 42	49.0	161.4	11/16	1-1/16	1-3/8	1-7/8	2-5/16
	25	0.77	x 37	45.4	174.0	11/16	1-1/16	1-7/16	1-7/8	2-5/16
	22	0.68	x 33	40.1	197.0	11/16	1-1/8	1-7/16	1-7/8	2-5/16
	8.4	0.33	x 12	19.5	406.0	1-1/4	1-13/16	2-5/16	3-9/16	NR
MC9 x	25.4	0.82	230 x 38	48.4	163.4	11/16	1-1/16	1-3/8	1-7/8	2-5/16
	23.9	0.78	x 36	46.0	171.8	11/16	1-1/16	1-7/16	1-7/8	2-5/16
MC8 x	22.8	0.79	200 x 34	46.6	169.6	11/16	1-1/16	1-3/8	1-7/8	2-5/16
	21.4	0.75	x 32	44.3	178.6	11/16	1-1/16	1-7/16	1-7/8	2-5/16
	20	0.74	x 30	43.7	181.1	11/16	1-1/8	1-7/16	1-7/8	2-5/16
	18.7	0.69	x 28	40.7	194.2	11/16	1-1/8	1-7/16	1-7/8	2-5/16
	8.5	0.37	x 13	21.8	362.1	1-1/4	1-13/16	2-5/16	3-9/16	NR
MC7 x	22.7	0.83	180 x 34	49.0	161.4	11/16	1-1/16	1-3/8	1-7/8	2-5/16
	19.1	0.72	x 28	42.5	186.1	11/16	1-1/8	1-7/16	1-7/8	2-5/16
MC6 x	18	0.72	150 x 27	42.5	186.1	11/16	1-1/8	1-7/16	1-7/8	2-5/16
	16.3	0.71	x 24	41.9	188.7	11/16	1-1/8	1-7/16	1-7/8	2-5/16
	15.3	0.61	x 23	36.0	219.6	11/16	1-1/8	1-9/16	2-3/8	3-3/16
	15.1	0.66	x 22	38.9	203.0	11/16	1-1/8	1-9/16	2-5/16	3-1/16
	12	0.56	x 18	33.0	239.3	7/8	1-1/4	1-11/16	2-1/2	3-5/16

W16 X 36 as a COLUMN

X829

Wide Flange Structural Steel Columns

CAFCO® BLAZE-SHIELD® II, HP & ISOLATEK® Type II, HP

ASTM Desig.	W/D	Metric Desig.	M/D	Hp/A	1-Hour	1-1/2 Hour	2-Hour	3-Hour	4-Hour
W18 x 143	1.77	W460 x 213	104.4	75.7	7/16	5/8	7/8	1-1/4	1-11/16
130	1.61	193	95.0	83.2	7/16	11/16	7/8	1-5/16	1-3/4
119	1.48	177	87.3	90.5	7/16	3/4	15/16	1-7/16	1-7/8
106	1.33	158	78.5	100.7	1/2	3/4	1	1-1/2	2
97	1.22	144	72.0	109.8	9/16	13/16	1-1/16	1-5/8	2-1/8
86	1.09	128	64.3	122.9	5/8	7/8	1-3/16	1-11/16	2-1/8
76	0.97	113	57.2	138.1	5/8	15/16	1-1/4	1-11/16	2-1/8
71	1.08	106	63.7	124.1	5/8	7/8	1-3/16	1-11/16	2-1/8
65	0.99	97	58.4	135.3	5/8	15/16	1-1/4	1-11/16	2-1/8
60	0.92	89	54.3	145.6	11/16	1	1-1/4	1-11/16	2-1/8
55	0.85	82	50.2	157.6	11/16	1	1-1/4	1-11/16	2-1/8
50	0.77	74	45.4	174.0	11/16	1-1/16	1-7/16	1-7/8	2-5/16
46	0.78	68	46.0	171.8	11/16	1-1/16	1-7/16	1-7/8	2-5/16
40	0.68	60	40.1	197.0	11/16	1-1/8	1-7/16	1-7/8	2-5/16
35	0.6	52	35.4	223.3	11/16	1-1/8	1-9/16	2-3/8	3-3/16
W16 x 100	1.37	W410 x 149	80.8	97.8	1/2	3/4	1	1-1/2	2
89	1.22	132	72.0	109.8	9/16	13/16	1-1/16	1-5/8	2-1/8
77	1.07	114	63.1	125.2	5/8	7/8	1-3/16	1-11/16	2-1/8
67	0.93	100	54.9	144.1	11/16	1	1-1/4	1-11/16	2-1/8
57	0.96	85	56.6	139.6	5/8	15/16	1-1/4	1-11/16	2-1/8
50	0.84	74	49.6	159.5	11/16	1	1-1/4	1-11/16	2-1/8
45	0.76	67	44.8	176.3	11/16	1-1/16	1-7/16	1-7/8	2-5/16
40	0.68	60	40.1	197.0	11/16	1-1/8	1-7/16	1-7/8	2-5/16
36	0.61	53	36.0	219.6	11/16	1-1/8	1-9/16	2-3/8	3-3/16
31	0.59	46	34.8	227.1	11/16	1-1/8	1-9/16	2-7/16	3-3/16
26	0.49	39	28.9	273.4	1-1/8	1-11/16	2-3/16	3-5/16	NR
W14 x 808	7.28	W360 x 1202	429.5	18.4	3/8	3/8	3/8	3/8	1/2
730	6.76	1086	398.8	19.8	3/8	3/8	3/8	7/16	9/16
665	6.21	990	366.4	21.6	3/8	3/8	3/8	7/16	5/8
605	5.82	900	343.4	23.0	3/8	3/8	3/8	1/2	5/8
550	5.34	818	315.1	25.1	3/8	3/8	3/8	1/2	11/16
500	4.95	744	292.1	27.1	3/8	3/8	3/8	9/16	3/4
455	4.59	677	270.8	29.2	3/8	3/8	7/16	5/8	13/16
426	4.32	634	254.9	31.0	3/8	3/8	7/16	5/8	13/16
398	4.09	592	241.3	32.8	3/8	3/8	7/16	11/16	7/8
370	3.84	551	226.6	34.9	3/8	3/8	1/2	11/16	15/16
342	3.58	509	211.2	37.4	3/8	3/8	1/2	3/4	15/16
311	3.3	463	194.7	40.6	3/8	7/16	1/2	13/16	1-1/16
283	3.03	421	178.8	44.2	3/8	7/16	1/2	13/16	1-1/8
257	2.78	382	164.0	48.2	3/8	7/16	1/2	7/8	1-3/16
233	2.55	347	150.5	52.5	3/8	1/2	1/2	15/16	1-1/4
211	2.32	314	136.9	57.8	3/8	1/2	11/16	1	1-3/8
193	2.14	287	126.3	62.6	3/8	9/16	3/4	1-1/8	1-7/16
176	1.96	262	115.6	68.4	7/16	5/8	13/16	1-3/16	1-9/16
159	1.78	237	105.0	75.3	7/16	5/8	7/8	1-1/4	1-11/16
145	1.64	216	96.8	81.7	7/16	11/16	7/8	1-5/16	1-3/4
132	1.56	196	92.0	85.9	7/16	11/16	15/16	1-3/8	1-13/16

Note: Increased thicknesses may be applied when thickness applied to lower flange tips is reduced by one-half. Refer to alternate thickness tables.

FLOOR BEAM

N823 *Unrestrained Beam*

All-Fluted Deck
Normal Weight Concrete
CAFCO® BLAZE-SHIELD® II, HP & ISOLATEK® Type II, HP

ASTM Desig.	W/D	Metric Desig.	M/D	Hp/A	1-Hour	1-1/2 Hour	2-Hour	3-Hour	4-Hour
W16 x 40	0.78	W410 x 60	46.0	171.8	7/16	9/16	13/16	1-1/4	1-5/8
36	0.7	53	41.3	191.4	7/16	9/16	7/8	1-5/16	1-3/4
31	0.66	46	38.9	203.0	7/16	9/16	7/8	1-3/8	1-3/4
26	0.55	39	32.5	243.6	1/2	5/8	15/16	1-1/2	1-15/16
W14 x 808	8.75	W360 x 1202	516.3	15.3	3/8	3/8	3/8	3/8	3/8
730	8.08	1086	476.7	16.6	3/8	3/8	3/8	3/8	3/8
665	7.49	990	441.9	17.9	3/8	3/8	3/8	3/8	3/8
605	6.96	900	410.6	19.3	3/8	3/8	3/8	3/8	3/8
550	6.43	818	379.4	20.8	3/8	3/8	3/8	3/8	3/8
500	5.95	744	351.1	22.5	3/8	3/8	3/8	3/8	3/8
455	5.53	677	326.3	24.2	3/8	3/8	3/8	3/8	3/8
426	5.21	634	307.4	25.7	3/8	3/8	3/8	3/8	7/16
398	4.93	592	290.9	27.2	3/8	3/8	3/8	3/8	7/16
370	4.63	551	273.2	28.9	3/8	3/8	3/8	3/8	7/16
342	4.32	509	254.9	31.0	3/8	3/8	3/8	3/8	1/2
311	3.98	463	234.8	33.7	3/8	3/8	3/8	3/8	1/2
283	3.66	421	215.9	36.6	3/8	3/8	3/8	7/16	9/16
257	3.36	382	198.2	39.9	3/8	3/8	3/8	7/16	9/16
233	3.08	347	181.7	43.5	3/8	3/8	3/8	1/2	5/8
211	2.81	314	165.8	47.7	3/8	3/8	3/8	1/2	11/16
193	2.6	287	153.4	51.5	3/8	3/8	3/8	9/16	3/4
176	2.38	262	140.4	56.3	3/8	3/8	3/8	9/16	3/4
159	2.16	237	127.4	62.0	3/8	3/8	7/16	5/8	13/16
145	1.99	216	117.4	67.3	3/8	3/8	7/16	11/16	7/8
132	1.89	196	111.5	70.9	3/8	3/8	7/16	11/16	15/16
120	1.71	179	100.9	78.4	3/8	3/8	1/2	3/4	1
109	1.57	162	92.6	85.3	3/8	3/8	1/2	13/16	1-1/16
99	1.43	147	84.4	93.7	3/8	3/8	9/16	7/8	1-1/8
90	1.31	134	77.3	102.3	3/8	3/8	9/16	15/16	1-3/16
82	1.45	122	85.6	92.4	3/8	3/8	9/16	7/8	1-1/8
74	1.32	110	77.9	101.5	3/8	3/8	9/16	7/8	1-3/16
68	1.22	101	72.0	109.8	3/8	7/16	5/8	15/16	1-1/4
61	1.1	91	64.9	121.8	3/8	7/16	5/8	1	1-5/16
53	1.06	79	62.5	126.4	3/8	7/16	11/16	1-1/16	1-3/8
48	0.97	72	57.2	138.1	3/8	1/2	11/16	1-1/8	1-7/16
43	0.87	64	51.3	154.0	3/8	1/2	3/4	1-3/16	1-1/2
38	0.8	57	47.2	167.5	7/16	9/16	13/16	1-1/4	1-5/8
34	0.72	51	42.5	186.1	7/16	9/16	13/16	1-5/16	1-11/16
30	0.64	45	37.8	209.3	7/16	5/8	7/8	1-3/8	1-13/16
26	0.62	39	36.6	216.1	7/16	5/8	7/8	1-3/8	1-13/16
22	0.53	33	31.3	252.8	1/2	5/8	15/16	1-1/2	2

Note: Increased thicknesses may be applied when thickness applied to lower flange tips is reduced by one-half. Refer to alternate thickness tables.

ROOF BEAM

S801

Unrestrained Beam

Unprotected Roof Deck

CAFCO® BLAZE-SHIELD® II, HP & ISOLATEK® Type II, HP

ASTM Desig.	W/D	Metric Desig.	M/D	Hp/A	1-Hour	1-1/2 Hour	2-Hour	3-Hour
W16 x 40	0.78	W410 x 60	46.0	171.8	11/16	1	1-11/16	2-5/8
36	0.7	53	41.3	191.4	11/16	1-1/16	1-13/16	2-13/16
31	0.66	46	38.9	203.0	3/4	1-1/16	1-7/8	2-7/8
26	0.55	39	32.5	243.6	13/16	1-3/16	2	3-3/16
W14 x 808	8.75	W360 x 1202	516.3	15.3	3/8	3/8	3/8	7/16
730	8.08	1086	476.7	16.6	3/8	3/8	3/8	7/16
665	7.49	990	441.9	17.9	3/8	3/8	3/8	1/2
605	6.96	900	410.6	19.3	3/8	3/8	3/8	1/2
550	6.43	818	379.4	20.8	3/8	3/8	3/8	9/16
500	5.95	744	351.1	22.5	3/8	3/8	3/8	9/16
455	5.53	677	326.3	24.2	3/8	3/8	3/8	5/8
426	5.21	634	307.4	25.7	3/8	3/8	7/16	5/8
398	4.93	592	290.9	27.2	3/8	3/8	7/16	11/16
370	4.63	551	273.2	28.9	3/8	3/8	1/2	3/4
342	4.32	509	254.9	31.0	3/8	3/8	1/2	3/4
311	3.98	463	234.8	33.7	3/8	3/8	9/16	13/16
283	3.66	421	215.9	36.6	3/8	3/8	9/16	7/8
257	3.36	382	198.2	39.9	3/8	3/8	5/8	15/16
233	3.08	347	181.7	43.5	3/8	3/8	5/8	1
211	2.81	314	165.8	47.7	3/8	7/16	11/16	1-1/16
193	2.6	287	153.4	51.5	3/8	7/16	3/4	1-3/16
176	2.38	262	140.4	56.3	3/8	1/2	13/16	1-1/4
159	2.16	237	127.4	62.0	3/8	1/2	7/8	1-5/16
145	1.99	216	117.4	67.3	3/8	9/16	15/16	1-7/16
132	1.89	196	111.5	70.9	3/8	9/16	15/16	1-1/2
120	1.71	179	100.9	78.4	7/16	5/8	1	1-5/8
109	1.57	162	92.6	85.3	7/16	5/8	1-1/16	1-11/16
99	1.43	147	84.4	93.7	7/16	11/16	1-3/16	1-13/16
90	1.31	134	77.3	102.3	1/2	3/4	1-1/4	1-15/16
82	1.45	122	85.6	92.4	7/16	11/16	1-1/8	1-13/16
74	1.32	110	77.9	101.5	1/2	3/4	1-1/4	1-15/16
68	1.22	101	72.0	109.8	1/2	3/4	1-5/16	2
61	1.1	91	64.9	121.8	9/16	13/16	1-3/8	2-3/16
53	1.06	79	62.5	126.4	9/16	13/16	1-7/16	2-3/16
48	0.97	72	57.2	138.1	9/16	7/8	1-1/2	2-5/16
43	0.87	64	51.3	154.0	5/8	15/16	1-9/16	2-1/2
38	0.8	57	47.2	167.5	11/16	1	1-11/16	2-5/8
34	0.72	51	42.5	186.1	11/16	1-1/16	1-3/4	2-3/4
30	0.64	45	37.8	209.3	3/4	1-1/8	1-7/8	2-15/16
26	0.62	39	36.6	216.1	3/4	1-1/8	1-15/16	3
22	0.53	33	31.3	252.8	13/16	1-3/16	2-1/16	3-1/4

SINGLE ANGLES TABLE

Miscellaneous Shapes

Single Angles

CAFCO® BLAZE-SHIELD® II, HP & ISOLATEK® Type II, HP

ASTM Desig.	W/D	Metric Desig.	M/D	Hp/A	1-Hour	1-1/2 Hour	2-Hour	3-Hour	4-Hour
L3.5 x 2.5 x 1/2	0.80	89 x 64 x 13	47.2	167.5	11/16	1-1/16	1-3/8	1-7/8	2-5/16
x 3/8	0.61		36.0	219.6	11/16	1-1/8	1-9/16	2-3/8	3-3/16
x 5/16	0.51	x 7.9	30.1	262.7	1-1/8	1-5/8	2-3/16	3-1/4	NR
x 1/4	0.41	x 6.4	24.2	326.8	1-1/4	1-13/16	2-5/16	3-9/16	NR
L3 x 3 x 1/2	0.79	76 x 76 x 13	46.6	169.6	11/16	1-1/16	1-3/8	1-7/8	2-5/16
x 7/16	0.70	x 11	41.3	191.4	11/16	1-1/8	1-7/16	1-7/8	2-5/16
x 3/8	0.60	x 9.5	35.4	223.3	11/16	1-1/8	1-9/16	2-3/8	3-3/16
x 5/16	0.51	x 7.9	30.1	262.7	1-1/8	1-5/8	2-3/16	3-1/4	NR
x 1/4	0.41	x 6.4	24.2	326.8	1-1/4	1-13/16	2-5/16	3-9/16	NR
L3 x 2.5 x 1/2	0.79	76 x 64 x 13	46.6	169.6	11/16	1-1/16	1-3/8	1-7/8	2-5/16
x 7/16	0.70	x 11	41.3	191.4	11/16	1-1/8	1-7/16	1-7/8	2-5/16
x 3/8	0.60	x 9.5	35.4	223.3	11/16	1-1/8	1-9/16	2-3/8	3-3/16
x 5/16	0.51	x 7.9	30.1	262.7	1-1/8	1-5/8	2-3/16	3-1/4	NR
x 1/4	0.41	x 6.4	24.2	326.8	1-1/4	1-13/16	2-5/16	3-9/16	NR
L3 x 2 x 1/2	0.78	76 x 51 x 13	46.0	171.8	11/16	1-1/16	1-7/16	1-7/8	2-5/16
x 3/8	0.60	x 9.5	35.4	223.3	11/16	1-1/8	1-9/16	2-3/8	3-3/16
x 5/16	0.51	x 7.9	30.1	262.7	1-1/8	1-5/8	2-3/16	3-1/4	NR
x 1/4	0.41	x 6.4	24.2	326.8	1-1/4	1-13/16	2-5/16	3-9/16	NR
L2.5 x 2.5 x 1/2	0.77	64 x 64 x 13	45.4	174.0	11/16	1-1/16	1-7/16	1-7/8	2-5/16
x 3/8	0.59	x 9.5	34.8	227.1	11/16	1-1/8	1-9/16	2-7/16	3-3/16
x 5/16	0.50	x 7.9	29.5	268.0	1-1/8	1-5/8	2-3/16	3-1/4	NR
x 1/4	0.40	x 6.4	23.6	335.0	1-1/4	1-13/16	2-5/16	3-9/16	NR
L2.5 x 2 x 3/8	0.59	64 x 51 x 9.5	34.8	227.1	11/16	1-1/8	1-9/16	2-7/16	3-3/16
x 5/16	0.50	x 7.9	29.5	268.0	1-1/8	1-5/8	2-3/16	3-1/4	NR
x 1/4	0.41	x 6.4	24.2	326.8	1-1/4	1-13/16	2-5/16	3-9/16	NR
L2 x 2 x 3/8	0.58	51 x 51 x 9.5	34.2	231.0	11/16	1-1/8	1-9/16	2-7/16	3-1/4
x 5/16	0.49	x 7.9	28.9	273.4	1-1/8	1-11/16	2-3/16	3-5/16	NR
x 1/4	0.40	x 6.4	23.6	335.0	1-1/4	1-13/16	2-5/16	3-9/16	NR

MISCELLANEOUS CHANNELS TABLE

Miscellaneous Shapes

Miscellaneous Channels

CAFCO® BLAZE-SHIELD® II, HP & ISOLATEK® Type II, HP

ASTM Desig.	Weight	W/D	Metric Desig.	M/D	Hp/A	1-Hour	1-1/2 Hour	2-Hour	3-Hour	4-Hour
MC18 x	58	1.13	460 x 86	66.7	118.6	9/16	7/8	1-1/8	1-11/16	2-1/8
	51.9	1.02	x 77	60.2	131.4	5/8	15/16	1-3/16	1-11/16	2-1/8
	45.8	0.90	x 68	53.1	148.9	11/16	1	1-1/4	1-11/16	2-1/8
	42.7	0.84	x 64	49.6	159.5	11/16	1	1-1/4	1-11/16	2-1/8
MC13 x	50	1.19	330 x 74	70.2	112.6	9/16	13/16	1-1/8	1-5/8	2-1/8
	40	0.97	x 60	57.2	138.1	5/8	15/16	1-1/4	1-11/16	2-1/8
	35	0.86	x 52	50.7	155.8	11/16	1	1-1/4	1-11/16	2-1/8
	31.8	0.78	x 47	46.0	171.8	11/16	1-1/16	1-7/16	1-7/8	2-5/16
MC12 x	50	1.28	310 x 74	75.5	104.7	9/16	13/16	1-1/16	1-9/16	2-1/16
	45	1.17	x 67	69.0	114.5	9/16	7/8	1-1/8	1-11/16	2-1/8
	40	1.05	x 60	62.0	127.6	5/8	7/8	1-3/16	1-11/16	2-1/8
	35	0.92	x 52	54.3	145.6	11/16	1	1-1/4	1-11/16	2-1/8
	31	0.82	x 46	48.4	163.4	11/16	1-1/16	1-3/8	1-7/8	2-5/16
	10.6	0.36	x 16	21.2	372.2	1-1/4	1-13/16	2-5/16	3-9/16	NR
MC10 x	41.1	1.15	250 x 61	67.9	116.5	9/16	7/8	1-1/8	1-11/16	2-1/8
	33.6	0.96	x 50	56.6	139.6	5/8	15/16	1-1/4	1-11/16	2-1/8
	28.5	0.83	x 42	49.0	161.4	11/16	1-1/16	1-3/8	1-7/8	2-5/16
	25	0.77	x 37	45.4	174.0	11/16	1-1/16	1-7/16	1-7/8	2-5/16
	22	0.68	x 33	40.1	197.0	11/16	1-1/8	1-7/16	1-7/8	2-5/16
	8.4	0.33	x 12	19.5	406.0	1-1/4	1-13/16	2-5/16	3-9/16	NR
MC9 x	25.4	0.82	230 x 38	48.4	163.4	11/16	1-1/16	1-3/8	1-7/8	2-5/16
	23.9	0.78	x 36	46.0	171.8	11/16	1-1/16	1-7/16	1-7/8	2-5/16
MC8 x	22.8	0.79	200 x 34	46.6	169.6	11/16	1-1/16	1-3/8	1-7/8	2-5/16
	21.4	0.75	x 32	44.3	178.6	11/16	1-1/16	1-7/16	1-7/8	2-5/16
	20	0.74	x 30	43.7	181.1	11/16	1-1/8	1-7/16	1-7/8	2-5/16
	18.7	0.69	x 28	40.7	194.2	11/16	1-1/8	1-7/16	1-7/8	2-5/16
	8.5	0.37	x 13	21.8	362.1	1-1/4	1-13/16	2-5/16	3-9/16	NR
MC7 x	22.7	0.83	180 x 34	49.0	161.4	11/16	1-1/16	1-3/8	1-7/8	2-5/16
	19.1	0.72	x 28	42.5	186.1	11/16	1-1/8	1-7/16	1-7/8	2-5/16
MC6 x	18	0.72	150 x 27	42.5	186.1	11/16	1-1/8	1-7/16	1-7/8	2-5/16
	16.3	0.71	x 24	41.9	188.7	11/16	1-1/8	1-7/16	1-7/8	2-5/16
	15.3	0.61	x 23	36.0	219.6	11/16	1-1/8	1-9/16	2-3/8	3-3/16
	15.1	0.66	x 22	38.9	203.0	11/16	1-1/8	1-9/16	2-5/16	3-1/16
	12	0.56	x 18	33.0	239.3	7/8	1-1/4	1-11/16	2-1/2	3-5/16