SECTION 000107 - SEALS PAGE

ARCHITECT:
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EDWARDS, CO 81632

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CIVIL ENGINEER:
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DIVISIONS: 02, 31, 32, 33

LANDSCAPE ARCHITECT:
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900 SOUTH BROADWAY
SUITE 300 DENVER, CO
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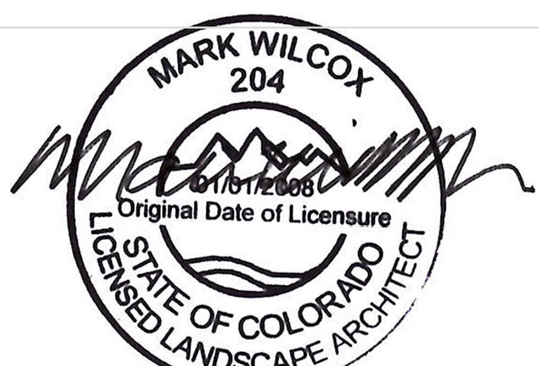
DIVISIONS: 11, 12, 31, 32



4.21.2020

STRUCTURAL ENGINEER:
MATTHEW HOOD
JIRSA HEDRICK STRUCTRUAL ENGINEERS
P.O. BOX 4989
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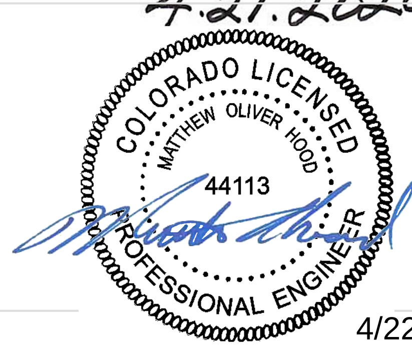
DIVISIONS: 03, 04, 05



4/22/2020

MECHANICAL AND PLUMBING ENGINEER:
DAVID LYLE
BG WORKS
P.O. BOX 9650
22 CHAPEL PLACE
AVON, CO 81620

DIVISIONS: 21, 22, 23

ELECTRICAL ENGINEER:
MARC SACONNI
BG WORKS
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22 CHAPEL PLACE
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DIVISIONS: 26

END OF SECTION

RCRBD Record Set
T.A.

05/14/2020

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The Architectural Balance
0056 Edwards Village Boulevard
Suite 210, Edwards, Colorado 81632
(970) 766-1470 (970) 766-1471 fax
www.tabassociates.com tab@vail.net

Memo

Project: Strawberry Park Elementary Project No: **TAB: 1935.02 RCRBD: TB-20-258**

Date: May 6, 2020

RE: Routt County Regional Building Department Permit Comments

FROM:
Warner Hopkins, Project Manager

TO:
Ted Allen, Plans Examiner/ Inspector,
Routt County Regional Building Department

VIA: Bluebeam Studio Session and Email

RCRBD Record Set
T.A.
05/14/2020

Remarks:

Permit Comment Letter from RCRBD:

1. **Should existing construction documents be available for any of the subject buildings, please share with RCRBD for reference, electronic or scanned files preferred but paper is acceptable.**
Response: Existing SP Elementary drawings have been uploaded to the TB-20-258 MS Bluebeam Studio Session with RCRBD.

2. **When submitting plans for construction, only documents that are complete and ready for construction shall be submitted to RCRBD for building permit. RCRBD interprets this to include all documents such as the shade structure.**
Response: This will be included in the Deferred Submittals.

3. **All plans submitted to RCRBD for review shall be signed and sealed in accordance with Colorado State Law. RCRBD interprets this to include all documents such as the food service plans and specifications where the Table of Contents is typically signed and sealed by each registered design professional of record if applicable as no specifications were submitted.**
Response: All Design Engineers have stamped and signed the Project Manual's seals page that is now included within the MS Project Manual. The food service drawings were prepared by a non-licensed professional. These have been coordinated with all stamped drawings.

4. **While there are exceptions, combustible materials shall not be permitted in concealed spaces of buildings of Type I or II construction. Please furnish explain how material(s) material testing to comply with IBC 603.1 Allowable materials use of combustible materials in concealed spaces of buildings of Type I or II construction shall be limited to the applications indicated in Section 718.5 (similar to Thermax ESR 1659 for foam plastic insulation).**
Response: According to 2015 IBC 603.1.3 "Combustible materials shall be permitted in the buildings of Type 1 or 2 construction in the following applications: Item 3. Foam plastics in accordance with Chapter 26". At Chapter 2603.3 foam plastic insulation is allowed when "the flame spread index is not more than 75 and a smoke-developed index of not more than 450 where tested in the maximum thickness intended for use in accordance with ASTM E84." When referencing the Project Manual specification 07-2100-3 Thermal Insulation calls out that the installed foam board insulation product must meet the code listed requirements to be installed. Class 1, Flame Spread Index: Class A – 0-25, when tested in accordance with ASTM E84, Smoke Developed Index: 450 or less, when tested in accordance with ASTM E84.

5. **Snow- and ice-melting systems shall include automatic controls capable of shutting off the system when the pavement temperature is above 50°F (10°C) and no precipitation is falling and an**

automatic or manual control that will allow shutoff when the outdoor temperature is above 40°F (4°C) per IECC C403.2.4.5 Snow- and ice-melt system controls. Also, radiant piping utilized in slab-on-grade applications shall be provided with insulating materials installed beneath the piping having a minimum R-value of 5 as per IMC 1209.5.1 Slab-on-grade installation. Provide details of snow/ice sensor(s) along with details of slab on grade installation per codes referenced above, as applicable.
Response: Under the Existing Building Energy Code we are tying into existing systems with existing controls. We have R-10 insulation called out below new heated slabs.

6. **Provide details of the location of boiler, fire rating per incidental uses, floor drain, as applicable.**
Response: Under the Existing Building Energy Code we are tying into existing systems with existing controls. No new Boiler is proposed.

7. **Deferred submittals shall be approved by the building official and otherwise processed in accordance with the provisions of IBC Section 107.3.4.1. Electronic copies of each deferred submittal shall be submitted to the design professional in responsible charge who shall review them and forward them to the Routt County Regional Building (RCRBD) official with a notation indicating that the deferred submittal documents have been reviewed and found to be in general conformance to the design of the building without any corrections.**

   Below is a list of deferred submittals that will be submitted to the RCRBD for review:
   - Installation (and removal of the existing) Modular Classroom
   - Playground Equipment
   - Playground Shade Structure
   - Playground Shed

2020 0406 Strawberry Park Elementary CD's – Stamp.pdf Markup Summary

1. **Callout #1**
Response: There was no text included in this note but it appears to be pointing to a 90min door. This exterior wall is a 2 hour fire rated wall providing Building Separation.

2. **Provide a narrative to explain calculation of occupants.**
Response: No additional occupants are being added to the Building. The new Cafeteria is being located where two existing classrooms are currently. These two classrooms are being removed for the Cafeteria and are proposed to be included in the new addition. The Cafeteria being an accessory use for the building.

3. **Callout #3**
Response: There was no text included in this note but it appears to be pointing to an existing wall. This wall is to remain and is not included as a Building Separation wall.

4. **In order to eliminate confusion, please remove future work for future phase from this construction set.**
Background: Late in the design process TAB Associates was notified the Pre-K work would be delayed until next spring/summer. We added these notes and the drawings were not removed from the set due to a request from the Contractor to have them included for bidding purposes.

   Response: We can see where the confusion came from with the vague 'future work' term but we are requesting this area be permitted at this time and then the School could operate for the coming school year under a TCO and then recommence Construction in the Pre-K area next spring/summer.

   The Pre-K area would not have any work done this year, so the existing egress from this area would not be affected.

5. **Comment #5 Food Service Drawing Type 1 Hood.**
Response: This is a warming kitchen. All food preparation is done offsite and meals are simply delivered to this location. No cooking will occur here. This will be included in the Deferred Submittals.

6. **Comment #6 Factory Built commercial exhaust hood.**
Response: This is a warming kitchen. All food preparation is done offsite and meals are simply delivered to this location. No cooking will occur here. This will be included in the Deferred Submittals.

7. **Comment #7 507.6 Performance Test.**
Response: This is a warming kitchen. All food preparation is done offsite and meals are simply delivered to this location. No cooking will occur here. This will be included in the Deferred Submittals. Make up air for the hood is supplied through the kitchen to Cafeteria countertop opening and through a supply air duct in the ceiling.

8. **Comment #8 Existing drawing request.**
Response: Existing drawings have been uploaded to the Bluebeam Session.

9. **Comment #9 Provide narrative detailing why existing 1-HR wall needs up-rating to 2-HR.**
Response: The single door in this CMU wall is being removed and the opening infilled with CMU to match existing. This wall is being used as a Building Fire Separation wall to separate the Gym from the rest of the structure.

10. **Comment #10 While there are exceptions, combustible materials shall not be permitted in concealed spaces of buildings of Type I or II construction. Please furnish explain how material(s) material testing to comply with IBC 603.1 Allowable materials use of combustible materials in concealed spaces of buildings of Type I or II construction shall be limited to the applications indicated in Section 718.5 (similar to Thermax ESR 1659 for foam plastic insulation).**
Response: According to 2015 IBC 603.1.3 "Combustible materials shall be permitted in the buildings of Type 1 or 2 construction in the following applications: Item 3. Foam plastics in accordance with Chapter 26". At Chapter 2603.3 foam plastic insulation is allowed when "the flame spread index is not more than 75 and a smoke-developed index of not more than 450 where tested in the maximum thickness intended for use in accordance with ASTM E84." When referencing the Project Manual specification 07-2100-3 Thermal Insulation calls out that the installed foam board insulation product must meet the code listed requirements to be installed. Class 1, Flame Spread Index: Class A – 0-25, when tested in accordance with ASTM E84, Smoke Developed Index: 450 or less, when tested in accordance with ASTM E84.

11. **Comment #11 Any discrepancy between the operational description and proposed function shall be accompanied with a narrative of explanation with details of code references in reference to Sheet A0.02 and specifications (if applicable as no specifications were submitted).**
Response: This note was added due to a question from the Contractor on some lock features which were associated with existing doors which have a key card integral with the lockset and are being utilized in the Pre-K area.

Please let me know if there are any additional question.

TAB Associates, Inc.
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Suite 210, Edwards, Colorado 81632
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www.tabassociates.com tab@vail.net

STATE OF COLORADO
GREGORY S. MACIK
305837
05/04/20
LICENSED ARCHITECT

Memo

Project: Steamboat Springs Strawberry Park Elementary

Project No: **1935.02**

Date: May 13th, 2020

RE: Kitchen Drawings

FROM:
Greg Macik, Project Architect

TO:
Ted Allen, Senior Plans Examiner

VIA: Email: tallen@co.routt.co.us

Remarks:

Concerning the kitchen drawings, FS201, FS202, FS203, and FS502.
While the drawings were prepared by a non-licensed professional, the drawings have been reviewed by the design team and they fit into the design intent.

RCRBD Record Set
T.A.

05/14/2020

TAB Associates, Inc.
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STATE OF COLORADO
GREGORY S MACIK
305837
05/04/20
LICENSED ARCHITECT

Memo

Project: Strawberry Park Elementary

Project No: **TAB: 1935.02 RCRBD: TB-20-258**

Date: May 14, 2020

RE: Routt County Regional Building Department Permit Comments

FROM:
Warner Hopkins, Project Manager

TO:
Ted Allen, Plans Examiner/ Inspector,
Routt County Regional Building Department

VIA: Bluebeam Studio Session and Email

Remarks:

Permit Comment Letter from RCRBD:

3. **All plans submitted to RCRBD for review shall be signed and sealed in accordance with Colorado State Law. RCRBD interprets this to include all documents such as the food service plans and specifications where the Table of Contents is typically signed and sealed by each registered design professional of record if applicable as no specifications were submitted.**
   Response: All Design Engineers have stamped and signed the Project Manual's seals page that is now included within the MS Project Manual. The food service drawings were prepared by a non-licensed professional. These have been coordinated with all stamped drawings.
   TAB Response: Refer to enclosed letter stating the Kitchen drawings have been coordinated.

Please let me know if there are any additional question.

RCRBD Record Set
T.A.

05/14/2020

COMcheck Software Version 4.1.1.0

Interior Lighting Compliance Certificate

RCRBD Record Set
T.A.
05/14/2020

Project Information

Energy Code: 2015 IECC
Project Title:
Project Type: Addition

Construction Site:
39620 Amethyst Drive
Steamboat Springs, CO

Owner/Agent:

Designer/Contractor:
BG Buildingworks
222 Chapel Place
Unit AC-201
Avon, CO 66213
970-949-6108

Allowed Interior Lighting Power

A Area Category	B Floor Area (ft2)	C Allowed Watts / ft2	D Allowed Watts (B X C)
1-School/University	8312	0.87	7231
		Total Allowed Watts =	7231

Proposed Interior Lighting Power

A Fixture ID : Description / Lamp / Wattage Per Lamp / Ballast	B Lamps/ Fixture	C # of Fixtures	D Fixture Watt.	E (C X D)
1-School/University				
LED 1: P1: Other:	1	6	128	768
LED 2: P2E: Other:	1	2	192	384
LED 3: P5: Other:	1	1	61	61
LED 4: P6/P6E: Other:	1	6	64	384
LED 5: R1E: Other:	1	12	11	132
LED 6: R2/R2E: Other:	1	36	49	1764
LED 7: R3/R3E: Other:	1	36	44	1584
LED 8: R4/R4E: Other:	1	3	44	132
LED 9: S1: Other:	1	3	41	123
LED 10: S2: Other:	1	1	36	36
LED 11: S3: Other:	1	2	53	106
LED 13: W1E: Other:	1	3	36	108
LED 14: W2: Other:	1	1	53	53
LED 14: S4: Other:	1	40	28	1120
			Total Proposed Watts =	6755

Interior Lighting PASSES: Design 7% better than code

Interior Lighting Compliance Statement

Compliance Statement: The proposed interior lighting design represented in this document is consistent with the building plans, specifications, and other calculations submitted with this permit application. The proposed interior lighting systems have been designed to meet the 2015 IECC requirements in COM*check* Version 4.1.1.0 and to comply with any applicable mandatory requirements listed in the Inspection Checklist.

Marc Sacconi, PE 04-6-20

Name - Title Signature Date

COLORADO LICENSED
MARC A. SACCONI
42215
PROFESSIONAL ENGINEER

4-6-20

RCRBD Record Set
T.A.

05/14/2020

COM*check* Software Version 4.1.1.0

Exterior Lighting Compliance Certificate

RCRBD Record Set

T.A.

05/14/2020

Project Information

Energy Code: 2015 IECC

Project Title:

Project Type: Addition

Exterior Lighting Zone: 2 (Residentially zoned area)

Construction Site:
39620 Amethyst Drive
Steamboat Springs, CO

Owner/Agent:

Designer/Contractor:
BG Buildingworks
222 Chapel Place
Unit AC-201
Avon, CO 66213
970-949-6108

Allowed Exterior Lighting Power

A Area/Surface Category	B Quantity	C Allowed Watts / Unit	D Tradable Wattage	E Allowed Watts (B X C)
Other door (not main entry)	12 ft of door	20	Yes	240
		Total Tradable Watts (a) =		240
		Total Allowed Watts =		240
		Total Allowed Supplemental Watts (b) =		600

(a) Wattage tradeoffs are only allowed between tradable areas/surfaces.

(b) A supplemental allowance equal to 600 watts may be applied toward compliance of both non-tradable and tradable areas/surfaces.

Proposed Exterior Lighting Power

A Fixture ID : Description / Lamp / Wattage Per Lamp / Ballast	B Lamps/ Fixture	C # of Fixtures	D Fixture Watt.	E (C X D)
Other door (not main entry) (12 ft of door width): Tradable Wattage				
LED 1: ZW1E: Other:	1	4	44	176
		Total Tradable Proposed Watts =		176

Exterior Lighting PASSES: Design 79% better than code

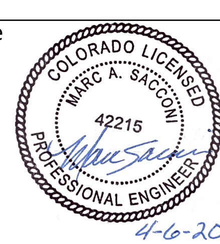
Exterior Lighting Compliance Statement

Compliance Statement: The proposed exterior lighting design represented in this document is consistent with the building plans, specifications, and other calculations submitted with this permit application. The proposed exterior lighting systems have been designed to meet the 2015 IECC requirements in COM*check* Version 4.1.1.0 and to comply with any applicable mandatory requirements listed in the Inspection Checklist.

Marc Sacconi, PE
Name - Title

Signature

04-6-20
Date



COM*check* Software Version 4.1.1.0

Inspection Checklist

Energy Code: 2015 IECC

RCRBD Record Set
T.A.
05/14/2020

Requirements: 64.0% were addressed directly in the COMcheck software

Text in the "Comments/Assumptions" column is provided by the user in the COMcheck Requirements screen. For each requirement, the user certifies that a code requirement will be met and how that is documented, or that an exception is being claimed. Where compliance is itemized in a separate table, a reference to that table is provided.

Section # & Req.ID	Plan Review	Complies?	Comments/Assumptions
C103.2 [PR4][1]	Plans, specifications, and/or calculations provide all information with which compliance can be determined for the interior lighting and electrical systems and equipment and document where exceptions to the standard are claimed. Information provided should include interior lighting power calculations, wattage of bulbs and ballasts, transformers and control devices.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	
C103.2 [PR8][1]	Plans, specifications, and/or calculations provide all information with which compliance can be determined for the exterior lighting and electrical systems and equipment and document where exceptions to the standard are claimed. Information provided should include exterior lighting power calculations, wattage of bulbs and ballasts, transformers and control devices.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	
C406 [PR9][1]	Plans, specifications, and/or calculations provide all information with which compliance can be determined for the additional energy efficiency package options.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	

Additional Comments/Assumptions:

1	High Impact (Tier 1)	2	Medium Impact (Tier 2)	3	Low Impact (Tier 3)

Section # & Req.ID	Rough-In Electrical Inspection	Complies?	Comments/Assumptions
C405.2.1 [EL15][1]	Lighting controls installed to uniformly reduce the lighting load by at least 50%.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met. **Location on plans/spec:** E0.1, E2.11, E2.12
C405.2.1 [EL18][1]	Occupancy sensors installed in required spaces.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met. **Location on plans/spec:** E0.1, E2.11, E2.12
C405.2.1, C405.2.2.3 [EL23][2]	Independent lighting controls installed per approved lighting plans and all manual controls readily accessible and visible to occupants.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met. **Location on plans/spec:** E0.1, E2.11, E2.12
C405.2.2.1 [EL22][2]	Automatic controls to shut off all building lighting installed in all buildings.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	**Exception:** Lighting controlled by occupancy sensors. **Location on plans/spec:** E0.1, E2.11, E2.12
C405.2.3 [EL16][2]	Daylight zones provided with individual controls that control the lights independent of general area lighting.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met. **Location on plans/spec:** E0.1, E2.11, E2.12
C405.2.3, C405.2.3.1, C405.2.3.2 [EL20][1]	Primary sidelighted areas are equipped with required lighting controls.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met. **Location on plans/spec:** E0.1, E2.11, E2.12
C405.2.3, C405.2.3.1, C405.2.3.3 [EL21][1]	Enclosed spaces with daylight area under skylights and rooftop monitors are equipped with required lighting controls.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	**Exception:** Requirement does not apply.
C405.2.4 [EL4][1]	Separate lighting control devices for specific uses installed per approved lighting plans.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met. **Location on plans/spec:** E0.1, E2.11, E2.12
C405.2.4 [EL8][1]	Additional interior lighting power allowed for special functions per the approved lighting plans and is automatically controlled and separated from general lighting.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met. **Location on plans/spec:** E0.1, E2.11, E2.12
C405.2.5 [EL25][null]	Automatic lighting controls for exterior lighting installed. Controls will be daylight controlled, set based on business operation time-of-day, or reduce connected lighting > 30%.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met. **Location on plans/spec:** E0.1, E2.11
C405.3 [EL6][1]	Exit signs do not exceed 5 watts per face.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met. **Location on plans/spec:** E0.1

Additional Comments/Assumptions:

1	High Impact (Tier 1)	2	Medium Impact (Tier 2)	3	Low Impact (Tier 3)

RCRBD Record Set
T.A.

05/14/2020

1	High Impact (Tier 1)	2	Medium Impact (Tier 2)	3	Low Impact (Tier 3)

Section # & Req.ID	Final Inspection	Complies?	Comments/Assumptions
C303.3, C408.2.5.2 [FI17][3]	Furnished O&M instructions for systems and equipment to the building owner or designated representative.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	
C405.4.1 [FI18][1]	Interior installed lamp and fixture lighting power is consistent with what is shown on the approved lighting plans, demonstrating proposed watts are less than or equal to allowed watts.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	*See the Interior Lighting fixture schedule for values.*
C405.5.1 [FI19][1]	Exterior lighting power is consistent with what is shown on the approved lighting plans, demonstrating proposed watts are less than or equal to allowed watts.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	*See the Exterior Lighting fixture schedule for values.*
C408.2.5.1 [FI16][3]	Furnished as-built drawings for electric power systems within 90 days of system acceptance.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	
C408.3 [FI33][1]	Lighting systems have been tested to ensure proper calibration, adjustment, programming, and operation.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	

RCRBD Record Set
T.A.
05/14/2020

Additional Comments/Assumptions:

1	High Impact (Tier 1)	2	Medium Impact (Tier 2)	3	Low Impact (Tier 3)

RCRBD Record Set
T.A.

05/14/2020

COMcheck Software Version 4.1.1.0

Mechanical Compliance Certificate

RCRBD Record Set
T.A.
05/14/2020

Project Information

Energy Code:	2015 IECC
Project Title:	
Location:	Yampa, Colorado
Climate Zone:	7
Project Type:	Addition

Construction Site:
39620 Amethyst Drive
Steamboat Springs, CO

Owner/Agent:

Designer/Contractor:
BG Buildingworks
222 Chapel Place
Unit AC-201
Avon, CO 66213
970-949-6108

Mechanical Systems List

Quantity	System Type & Description
1	VAV-01 (Single Zone): Heating: 1 each - Hydronic or Steam Coil, Hot Water, Capacity = 16 kBtu/h No minimum efficiency requirement applies Fan System: None
1	VAV-02 (Single Zone): Heating: 1 each - Hydronic or Steam Coil, Hot Water, Capacity = 90 kBtu/h No minimum efficiency requirement applies Fan System: None
1	VAV-03 (Single Zone): Heating: 1 each - Hydronic or Steam Coil, Hot Water, Capacity = 5 kBtu/h No minimum efficiency requirement applies Fan System: None
1	VAV-04 (Single Zone): Heating: 1 each - Hydronic or Steam Coil, Hot Water, Capacity = 28 kBtu/h No minimum efficiency requirement applies Fan System: None
1	VAV-05 (Single Zone): Heating: 1 each - Hydronic or Steam Coil, Hot Water, Capacity = 28 kBtu/h No minimum efficiency requirement applies Fan System: None
1	AHU-1 HW Coil (Multiple-Zone): Heating: 1 each - Hydronic or Steam Coil, Hot Water, Capacity = 263 kBtu/h No minimum efficiency requirement applies Fan System: AHU-1 Supply Fan | Cafeteria, Art, Music -- Compliance (Brake HP method) : Passes Fans: FAN 1 Supply, Multi-Zone VAV, 6500 CFM, 5.0 motor nameplate hp, 3.0 design brake hp (3.0 max. BHP), 89.5 fan efficiency grade
1	AHU-1 DX Coil (Multiple-Zone): Cooling: 1 each - Split System, Capacity = 156 kBtu/h, Air-Cooled Condenser, Air Economizer Proposed Efficiency = 13.40 EER, Required Efficiency: 11.00 EER + 12.4 IEER Fan System: AHU-1 Supply Fan | Cafeteria, Art, Music -- Compliance (Brake HP method) : Passes

Quantity	System Type & Description
	Fans: FAN 1 Supply, Multi-Zone VAV, 6500 CFM, 5.0 motor nameplate hp, 3.0 design brake hp (3.0 max. BHP), 89.5 fan efficiency grade
1	(E) FPB-1-9 (Single Zone): Heating: 1 each - Hydronic or Steam Coil, Hot Water, Capacity = 40 kBtu/h No minimum efficiency requirement applies Fan System: (E) FPB-1-9 | Pre-K East -- Compliance (Brake HP method) : Passes Fans: FAN 2 Supply, Single-Zone VAV, 480 CFM, 0.8 motor nameplate hp, 0.8 design brake hp (0.8 max. BHP), 70.0 fan efficiency grade
1	(E) FPB-1-10 (Single Zone): Heating: 1 each - Hydronic or Steam Coil, Hot Water, Capacity = 39 kBtu/h No minimum efficiency requirement applies Fan System: (E) FPB-1-10 | Pre-K West -- Compliance (Brake HP method) : Passes Fans: FAN 4 Supply, Single-Zone VAV, 450 CFM, 0.8 motor nameplate hp, 0.8 design brake hp (0.8 max. BHP), 70.0 fan efficiency grade

RCRBD Record Set
T.A.
05/14/2020

Mechanical Compliance Statement

Compliance Statement: The proposed mechanical design represented in this document is consistent with the building plans, specifications, and other calculations submitted with this permit application. The proposed mechanical systems have been designed to meet the 2015 IECC requirements in COM*check* Version 4.1.1.0 and to comply with any applicable mandatory requirements listed in the Inspection Checklist.

David Lyle - Principal, PE		04.06.2020
Name - Title	Signature	Date

COM*check* Software Version 4.1.1.0

Inspection Checklist

Energy Code: 2015 IECC

RCRBD Record Set
T.A.
05/14/2020

Requirements: 90.0% were addressed directly in the COMcheck software

Text in the "Comments/Assumptions" column is provided by the user in the COMcheck Requirements screen. For each requirement, the user certifies that a code requirement will be met and how that is documented, or that an exception is being claimed. Where compliance is itemized in a separate table, a reference to that table is provided.

Section # & Req.ID	Plan Review	Complies?	Comments/Assumptions
C103.2 [PR2][1]	Plans, specifications, and/or calculations provide all information with which compliance can be determined for the mechanical systems and equipment and document where exceptions to the standard are claimed. Load calculations per acceptable engineering standards and handbooks.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	
C406 [PR9][1]	Plans, specifications, and/or calculations provide all information with which compliance can be determined for the additional energy efficiency package options.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.

Additional Comments/Assumptions:

1	High Impact (Tier 1)	2	Medium Impact (Tier 2)	3	Low Impact (Tier 3)

Section # & Req.ID	Footing / Foundation Inspection	Complies?	Comments/Assumptions
C403.2.4.5, C403.2.4.6 [FO9][3]	Snow/ice melting system sensors for future connection to controls. Freeze protection systems have automatic controls installed.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met. **Location on plans/spec:** RE: Control Diagrams on M4.0 Series Mechanical Diagrams

Additional Comments/Assumptions:

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Section # & Req.ID	Plumbing Rough-In Inspection	Complies?	Comments/Assumptions
C404.5, C404.5.1, C404.5.2 [PL6][3]	Heated water supply piping conforms to pipe length and volume requirements. Refer to section details.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.
C404.5, C404.5.1, C404.5.2 [PL6][3]	Heated water supply piping conforms to pipe length and volume requirements. Refer to section details.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.
C404.5, C404.5.1, C404.5.2 [PL6][3]	Heated water supply piping conforms to pipe length and volume requirements. Refer to section details.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.
C404.5, C404.5.1, C404.5.2 [PL6][3]	Heated water supply piping conforms to pipe length and volume requirements. Refer to section details.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.
C404.5, C404.5.1, C404.5.2 [PL6][3]	Heated water supply piping conforms to pipe length and volume requirements. Refer to section details.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.
C404.5, C404.5.1, C404.5.2 [PL6][3]	Heated water supply piping conforms to pipe length and volume requirements. Refer to section details.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.
C404.5, C404.5.1, C404.5.2 [PL6][3]	Heated water supply piping conforms to pipe length and volume requirements. Refer to section details.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.
C404.5, C404.5.1, C404.5.2 [PL6][3]	Heated water supply piping conforms to pipe length and volume requirements. Refer to section details.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.
C404.5, C404.5.1, C404.5.2 [PL6][3]	Heated water supply piping conforms to pipe length and volume requirements. Refer to section details.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.
C404.6.3 [PL7][3]	Pumps that circulate water between a heater and storage tank have controls that limit operation from startup to <= 5 minutes after end of heating cycle.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	**Exception:** Requirement does not apply.
C404.6.3 [PL7][3]	Pumps that circulate water between a heater and storage tank have controls that limit operation from startup to <= 5 minutes after end of heating cycle.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	**Exception:** Requirement does not apply.

1	High Impact (Tier 1)	2	Medium Impact (Tier 2)	3	Low Impact (Tier 3)

Section # & Req.ID	Plumbing Rough-In Inspection	Complies?	Comments/Assumptions
C404.6.3 [PL7][3]	Pumps that circulate water between a heater and storage tank have controls that limit operation from startup to <= 5 minutes after end of heating cycle.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	**Exception:** Requirement does not apply.
C404.6.3 [PL7][3]	Pumps that circulate water between a heater and storage tank have controls that limit operation from startup to <= 5 minutes after end of heating cycle.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	**Exception:** Requirement does not apply.
C404.6.3 [PL7][3]	Pumps that circulate water between a heater and storage tank have controls that limit operation from startup to <= 5 minutes after end of heating cycle.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	**Exception:** Requirement does not apply.
C404.6.3 [PL7][3]	Pumps that circulate water between a heater and storage tank have controls that limit operation from startup to <= 5 minutes after end of heating cycle.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	**Exception:** Requirement does not apply.
C404.6.3 [PL7][3]	Pumps that circulate water between a heater and storage tank have controls that limit operation from startup to <= 5 minutes after end of heating cycle.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	**Exception:** Requirement does not apply.
C404.6.3 [PL7][3]	Pumps that circulate water between a heater and storage tank have controls that limit operation from startup to <= 5 minutes after end of heating cycle.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	**Exception:** Requirement does not apply.
C404.6.3 [PL7][3]	Pumps that circulate water between a heater and storage tank have controls that limit operation from startup to <= 5 minutes after end of heating cycle.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	**Exception:** Requirement does not apply.
C404.7 [PL8][3]	Water distribution system that pumps water from a heated-water supply pipe back to the heated-water source through a cold-water supply pipe is a demand recirculation water system. Pumps within this system have controls that start the pump upon receiving a signal from the action of a user of a fixture or appliance and limits the temperature of the water entering the cold-water piping to 104°F.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	**Exception:** Requirement does not apply.
C404.7 [PL8][3]	Water distribution system that pumps water from a heated-water supply pipe back to the heated-water source through a cold-water supply pipe is a demand recirculation water system. Pumps within this system have controls that start the pump upon receiving a signal from the action of a user of a fixture or appliance and limits the temperature of the water entering the cold-water piping to 104°F.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	**Exception:** Requirement does not apply.

1	High Impact (Tier 1)	2	Medium Impact (Tier 2)	3	Low Impact (Tier 3)

Section # & Req.ID	Plumbing Rough-In Inspection	Complies?	Comments/Assumptions
C404.7 [PL8][3]	Water distribution system that pumps water from a heated-water supply pipe back to the heated-water source through a cold-water supply pipe is a demand recirculation water system. Pumps within this system have controls that start the pump upon receiving a signal from the action of a user of a fixture or appliance and limits the temperature of the water entering the cold-water piping to 104°F.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	**Exception:** Requirement does not apply.
C404.7 [PL8][3]	Water distribution system that pumps water from a heated-water supply pipe back to the heated-water source through a cold-water supply pipe is a demand recirculation water system. Pumps within this system have controls that start the pump upon receiving a signal from the action of a user of a fixture or appliance and limits the temperature of the water entering the cold-water piping to 104°F.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	**Exception:** Requirement does not apply.
C404.7 [PL8][3]	Water distribution system that pumps water from a heated-water supply pipe back to the heated-water source through a cold-water supply pipe is a demand recirculation water system. Pumps within this system have controls that start the pump upon receiving a signal from the action of a user of a fixture or appliance and limits the temperature of the water entering the cold-water piping to 104°F.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	**Exception:** Requirement does not apply.
C404.7 [PL8][3]	Water distribution system that pumps water from a heated-water supply pipe back to the heated-water source through a cold-water supply pipe is a demand recirculation water system. Pumps within this system have controls that start the pump upon receiving a signal from the action of a user of a fixture or appliance and limits the temperature of the water entering the cold-water piping to 104°F.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	**Exception:** Requirement does not apply.
C404.7 [PL8][3]	Water distribution system that pumps water from a heated-water supply pipe back to the heated-water source through a cold-water supply pipe is a demand recirculation water system. Pumps within this system have controls that start the pump upon receiving a signal from the action of a user of a fixture or appliance and limits the temperature of the water entering the cold-water piping to 104°F.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	**Exception:** Requirement does not apply.

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1	High Impact (Tier 1)	2	Medium Impact (Tier 2)	3	Low Impact (Tier 3)

Section # & Req.ID	Plumbing Rough-In Inspection	Complies?	Comments/Assumptions
C404.7 [PL8][3]	Water distribution system that pumps water from a heated-water supply pipe back to the heated-water source through a cold-water supply pipe is a demand recirculation water system. Pumps within this system have controls that start the pump upon receiving a signal from the action of a user of a fixture or appliance and limits the temperature of the water entering the cold-water piping to 104°F.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	**Exception:** Requirement does not apply.
C404.7 [PL8][3]	Water distribution system that pumps water from a heated-water supply pipe back to the heated-water source through a cold-water supply pipe is a demand recirculation water system. Pumps within this system have controls that start the pump upon receiving a signal from the action of a user of a fixture or appliance and limits the temperature of the water entering the cold-water piping to 104°F.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	**Exception:** Requirement does not apply.

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Additional Comments/Assumptions:

1	High Impact (Tier 1)	2	Medium Impact (Tier 2)	3	Low Impact (Tier 3)

Section # & Req.ID	Mechanical Rough-In Inspection	Complies?	Comments/Assumptions
C402.2.6 [ME41][3]	Thermally ineffective panel surfaces of sensible heating panels have insulation >= R-3.5.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	**Exception:** Requirement does not apply.
C403.2.12 .1 [ME65][3]	HVAC fan systems at design conditions do not exceed allowable fan system motor nameplate hp or fan system bhp.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	**Exception:** Requirement does not apply. *See the Mechanical Systems list for values.*
C403.2.12 .1 [ME65][3]	HVAC fan systems at design conditions do not exceed allowable fan system motor nameplate hp or fan system bhp.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	**Exception:** Requirement does not apply. *See the Mechanical Systems list for values.*
C403.2.12 .1 [ME65][3]	HVAC fan systems at design conditions do not exceed allowable fan system motor nameplate hp or fan system bhp.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	**Exception:** Requirement does not apply. *See the Mechanical Systems list for values.*
C403.2.12 .1 [ME65][3]	HVAC fan systems at design conditions do not exceed allowable fan system motor nameplate hp or fan system bhp.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	**Exception:** Requirement does not apply. *See the Mechanical Systems list for values.*
C403.2.12 .1 [ME65][3]	HVAC fan systems at design conditions do not exceed allowable fan system motor nameplate hp or fan system bhp.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	**Exception:** Requirement does not apply. *See the Mechanical Systems list for values.*
C403.2.12 .3 [ME117][2]	Fans have efficiency grade (FEG) >= 67. The total efficiency of the fan at the design point of operation <= 15% of maximum total efficiency of the fan.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met. **Location on plans/spec:** RE: Control Diagrams on M4.0 Series Mechanical Diagrams - No fan powered box on new VAV-01 thru VAV-05
C403.2.12 .3 [ME117][2]	Fans have efficiency grade (FEG) >= 67. The total efficiency of the fan at the design point of operation <= 15% of maximum total efficiency of the fan.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met. **Location on plans/spec:** RE: Control Diagrams on M4.0 Series Mechanical Diagrams - No fan powered box on new VAV-01 thru VAV-05
C403.2.12 .3 [ME117][2]	Fans have efficiency grade (FEG) >= 67. The total efficiency of the fan at the design point of operation <= 15% of maximum total efficiency of the fan.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met. **Location on plans/spec:** RE: Control Diagrams on M4.0 Series Mechanical Diagrams - No fan powered box on new VAV-01 thru VAV-05
C403.2.12 .3 [ME117][2]	Fans have efficiency grade (FEG) >= 67. The total efficiency of the fan at the design point of operation <= 15% of maximum total efficiency of the fan.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met. **Location on plans/spec:** RE: Control Diagrams on M4.0 Series Mechanical Diagrams - No fan powered box on new VAV-01 thru VAV-05
C403.2.12 .3 [ME117][2]	Fans have efficiency grade (FEG) >= 67. The total efficiency of the fan at the design point of operation <= 15% of maximum total efficiency of the fan.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met. **Location on plans/spec:** RE: Control Diagrams on M4.0 Series Mechanical Diagrams - No fan powered box on new VAV-01 thru VAV-05
C403.2.13 [ME71][2]	Unenclosed spaces that are heated use only radiant heat.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.

1	High Impact (Tier 1)	2	Medium Impact (Tier 2)	3	Low Impact (Tier 3)

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Section # & Req.ID	Mechanical Rough-In Inspection	Complies?	Comments/Assumptions
C403.2.3 [ME55][2]	HVAC equipment efficiency verified.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	*See the Mechanical Systems list for values.*
C403.2.4.4 [ME112][3]	Zone isolation devices and controls installed where applicable.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met. **Location on plans/spec:** RE: Control Diagrams on M4.0 Series Mechanical Diagrams
C403.2.4.4 [ME112][3]	Zone isolation devices and controls installed where applicable.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met. **Location on plans/spec:** RE: Control Diagrams on M4.0 Series Mechanical Diagrams
C403.2.4.7 [ME113][2]	Fault detection and diagnostics installed with air-cooled unitary DX units having economizers.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met. **Location on plans/spec:** RE: M2.1 Main Level Area A Mechanical Plan
C403.2.6.1 [ME59][1]	Demand control ventilation provided for spaces >500 ft2 and >25 people/1000 ft2 occupant density and served by systems with air side economizer, auto modulating outside air damper control, or design airflow >3,000 cfm.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	**Exception:** Multiple-zone systems without DDC. **Location on plans/spec:** RE: Control Diagrams on M4.0 Series Mechanical Diagrams
C403.2.6.2 [ME115][3]	Enclosed parking garage ventilation has automatic contaminant detection and capacity to stage or modulate fans to 50% or less of design capacity.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	**Exception:** Requirement does not apply.
C403.2.7 [ME57][1]	Exhaust air energy recovery on systems meeting Table C403.2.7(1) and C403.2.7(2).	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	**Exception:** Where the largest exhaust source is less than 75% of the design outdoor airflow. **Location on plans/spec:** RE: M2.2 Pre-K Plan Area B Mechanical Plan
C403.2.8 [ME116][3]	Kitchen exhaust systems comply with replacement air and conditioned supply air limitations, and satisfy hood rating requirements and maximum exhaust rate criteria.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met. **Location on plans/spec:** RE: Control Diagrams on M4.0 Series Mechanical Diagrams
C403.2.9 [ME60][2]	HVAC ducts and plenums insulated. Where ducts or plenums are installed in or under a slab, verification may need to occur during Foundation Inspection.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met. **Location on plans/spec:** RE: M2.2 Pre-K Plan Area B Mechanical Plan
C403.2.9 [ME10][2]	Ducts and plenums sealed based on static pressure and location.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.
C403.2.9.1.3 [ME11][3]	Ductwork operating >3 in. water column requires air leakage testing.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.
C403.2.9.1.3 [ME11][3]	Ductwork operating >3 in. water column requires air leakage testing.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.

1	High Impact (Tier 1)	2	Medium Impact (Tier 2)	3	Low Impact (Tier 3)

Section # & Req.ID	Mechanical Rough-In Inspection	Complies?	Comments/Assumptions
C403.2.9.1.3 [ME11][3]	Ductwork operating >3 in. water column requires air leakage testing.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.
C403.2.9.1.3 [ME11][3]	Ductwork operating >3 in. water column requires air leakage testing.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.
C403.2.9.1.3 [ME11][3]	Ductwork operating >3 in. water column requires air leakage testing.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.
C403.2.9.1.3 [ME11][3]	Ductwork operating >3 in. water column requires air leakage testing.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	**Exception:** Requirement does not apply.
C403.2.9.1.3 [ME11][3]	Ductwork operating >3 in. water column requires air leakage testing.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.
C403.3 [ME62][1]	Air economizers provided where required, meet the requirements for design capacity, control signal, ventilation controls, high-limit shut-off, integrated economizer control, and provide a means to relieve excess outside air during operation.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met. **Location on plans/spec:** RE: Control Diagrams on M4.0 Series Mechanical Diagrams
C403.4.1.1 [ME75][2]	Hydronic and multizone HVAC system controls areVAV fans driven by mechanical or electrical variable speed drive per Table C403.4.1.1.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	**Exception:** Requirement does not apply.
C403.4.1.1 [ME75][2]	Hydronic and multizone HVAC system controls areVAV fans driven by mechanical or electrical variable speed drive per Table C403.4.1.1.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	**Exception:** Requirement does not apply.
C403.4.1.2 [ME67][2]	VAV fans have static pressure sensors located so controller setpoint <=1.2 w.c..	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	**Exception:** Requirement does not apply.
C403.4.1.2 [ME67][2]	VAV fans have static pressure sensors located so controller setpoint <=1.2 w.c..	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	**Exception:** Requirement does not apply.
C403.4.1.3 [ME24][2]	Reset static pressure setpoint for DDC controlled VAV boxes reporting to central controller based on the zones requiring the most pressure.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	**Exception:** Requirement does not apply.
C403.4.1.3 [ME24][2]	Reset static pressure setpoint for DDC controlled VAV boxes reporting to central controller based on the zones requiring the most pressure.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	**Exception:** Requirement does not apply.

1	High Impact (Tier 1)	2	Medium Impact (Tier 2)	3	Low Impact (Tier 3)

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Section # & Req.ID	Mechanical Rough-In Inspection	Complies?	Comments/Assumptions
C403.4.2.1 [ME50][2]	Three-pipe hydronic systems using a common return for hot and chilled water are not used.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.
C403.4.2.1 [ME50][2]	Three-pipe hydronic systems using a common return for hot and chilled water are not used.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.
C403.4.2.1 [ME50][2]	Three-pipe hydronic systems using a common return for hot and chilled water are not used.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.
C403.4.2.1 [ME50][2]	Three-pipe hydronic systems using a common return for hot and chilled water are not used.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.
C403.4.2.1 [ME50][2]	Three-pipe hydronic systems using a common return for hot and chilled water are not used.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.
C403.4.2.1 [ME50][2]	Three-pipe hydronic systems using a common return for hot and chilled water are not used.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.
C403.4.2.1 [ME50][2]	Three-pipe hydronic systems using a common return for hot and chilled water are not used.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.
C403.4.2.1 [ME50][2]	Three-pipe hydronic systems using a common return for hot and chilled water are not used.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.
C403.4.2.6 [ME26][3]	Chilled water plants with multiple chillers have capability to reduce flow automatically through the chiller plant when a chiller is shut down. Boiler plants with multiple boilers have the capability to reduce flow automatically through the boiler plant when a boiler is shut down.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.
C403.4.2.6 [ME26][3]	Chilled water plants with multiple chillers have capability to reduce flow automatically through the chiller plant when a chiller is shut down. Boiler plants with multiple boilers have the capability to reduce flow automatically through the boiler plant when a boiler is shut down.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.
C403.4.2.6 [ME26][3]	Chilled water plants with multiple chillers have capability to reduce flow automatically through the chiller plant when a chiller is shut down. Boiler plants with multiple boilers have the capability to reduce flow automatically through the boiler plant when a boiler is shut down.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.

1	High Impact (Tier 1)	2	Medium Impact (Tier 2)	3	Low Impact (Tier 3)

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Section # & Req.ID	Mechanical Rough-In Inspection	Complies?	Comments/Assumptions
C403.4.2.6 [ME26][3]	Chilled water plants with multiple chillers have capability to reduce flow automatically through the chiller plant when a chiller is shut down. Boiler plants with multiple boilers have the capability to reduce flow automatically through the boiler plant when a boiler is shut down.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.
C403.4.2.6 [ME26][3]	Chilled water plants with multiple chillers have capability to reduce flow automatically through the chiller plant when a chiller is shut down. Boiler plants with multiple boilers have the capability to reduce flow automatically through the boiler plant when a boiler is shut down.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.
C403.4.2.6 [ME26][3]	Chilled water plants with multiple chillers have capability to reduce flow automatically through the chiller plant when a chiller is shut down. Boiler plants with multiple boilers have the capability to reduce flow automatically through the boiler plant when a boiler is shut down.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met. **Location on plans/spec:** RE: Control Diagrams on M4.0 Series Mechanical Diagrams
C403.4.2.6 [ME26][3]	Chilled water plants with multiple chillers have capability to reduce flow automatically through the chiller plant when a chiller is shut down. Boiler plants with multiple boilers have the capability to reduce flow automatically through the boiler plant when a boiler is shut down.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met. **Location on plans/spec:** RE: Control Diagrams on M4.0 Series Mechanical Diagrams
C403.4.2.6 [ME26][3]	Chilled water plants with multiple chillers have capability to reduce flow automatically through the chiller plant when a chiller is shut down. Boiler plants with multiple boilers have the capability to reduce flow automatically through the boiler plant when a boiler is shut down.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met. **Location on plans/spec:** RE: Control Diagrams on M4.0 Series Mechanical Diagrams
C403.4.4.6 [ME110][3]	Multiple zone VAV systems with DDC of individual zone boxes have static pressure setpoint reset controls.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met. **Location on plans/spec:** RE: Control Diagrams on M4.0 Series Mechanical Diagrams - No fan powered box on new VAV-01 thru VAV-05 *See the Mechanical Systems list for values.*
C403.4.4.6 [ME110][3]	Multiple zone VAV systems with DDC of individual zone boxes have static pressure setpoint reset controls.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met. **Location on plans/spec:** RE: Control Diagrams on M4.0 Series Mechanical Diagrams - No fan powered box on new VAV-01 thru VAV-05 *See the Mechanical Systems list for values.*
C403.4.4.6 [ME110][3]	Multiple zone VAV systems with DDC of individual zone boxes have static pressure setpoint reset controls.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met. **Location on plans/spec:** RE: Control Diagrams on M4.0 Series Mechanical Diagrams - No fan powered box on new VAV-01 thru VAV-05 *See the Mechanical Systems list for values.*

1	High Impact (Tier 1)	2	Medium Impact (Tier 2)	3	Low Impact (Tier 3)

Section # & Req.ID	Mechanical Rough-In Inspection	Complies?	Comments/Assumptions
C403.4.4.6 [ME110][3]	Multiple zone VAV systems with DDC of individual zone boxes have static pressure setpoint reset controls.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met. **Location on plans/spec:** RE: Control Diagrams on M4.0 Series Mechanical Diagrams - No fan powered box on new VAV-01 thru VAV-05 *See the Mechanical Systems list for values.*
C403.4.4.6 [ME110][3]	Multiple zone VAV systems with DDC of individual zone boxes have static pressure setpoint reset controls.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met. **Location on plans/spec:** RE: Control Diagrams on M4.0 Series Mechanical Diagrams - No fan powered box on new VAV-01 thru VAV-05 *See the Mechanical Systems list for values.*
C403.4.4.6 [ME110][3]	Multiple zone VAV systems with DDC of individual zone boxes have static pressure setpoint reset controls.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met. **Location on plans/spec:** RE: Control Diagrams on M4.0 Series Mechanical Diagrams *See the Mechanical Systems list for values.*
C403.4.4.6 [ME110][3]	Multiple zone VAV systems with DDC of individual zone boxes have static pressure setpoint reset controls.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met. **Location on plans/spec:** RE: Control Diagrams on M4.0 Series Mechanical Diagrams *See the Mechanical Systems list for values.*
C403.4.4.6 [ME110][3]	Multiple zone VAV systems with DDC of individual zone boxes have static pressure setpoint reset controls.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	**Exception:** Requirement does not apply. *See the Mechanical Systems list for values.*
C403.4.4.6 [ME110][3]	Multiple zone VAV systems with DDC of individual zone boxes have static pressure setpoint reset controls.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	**Exception:** Requirement does not apply. *See the Mechanical Systems list for values.*
C403.4.5 [ME31][3]	Condenser heat recovery system that can heat water to 85 ºF or provide 60% of peak heat rejection is installed for preheating of service hot water.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	**Exception:** Design SWH load = 1 MMBtu/h. **Location on plans/spec:** RE: Terminal Box Schedule on M0.1 Mechanical Schedules
C403.4.5 [ME31][3]	Condenser heat recovery system that can heat water to 85 ºF or provide 60% of peak heat rejection is installed for preheating of service hot water.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	**Exception:** Design SWH load = 1 MMBtu/h. **Location on plans/spec:** RE: Terminal Box Schedule on M0.1 Mechanical Schedules
C403.4.5 [ME31][3]	Condenser heat recovery system that can heat water to 85 ºF or provide 60% of peak heat rejection is installed for preheating of service hot water.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	**Exception:** Design SWH load = 1 MMBtu/h. **Location on plans/spec:** RE: Terminal Box Schedule on M0.1 Mechanical Schedules
C403.4.5 [ME31][3]	Condenser heat recovery system that can heat water to 85 ºF or provide 60% of peak heat rejection is installed for preheating of service hot water.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	**Exception:** Design SWH load = 1 MMBtu/h. **Location on plans/spec:** RE: Terminal Box Schedule on M0.1 Mechanical Schedules
C403.4.5 [ME31][3]	Condenser heat recovery system that can heat water to 85 ºF or provide 60% of peak heat rejection is installed for preheating of service hot water.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	**Exception:** Design SWH load = 1 MMBtu/h. **Location on plans/spec:** RE: Terminal Box Schedule on M0.1 Mechanical Schedules

RCRBD Record Set
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05/14/2020

1	High Impact (Tier 1)	2	Medium Impact (Tier 2)	3	Low Impact (Tier 3)

Section # & Req.ID	Mechanical Rough-In Inspection	Complies?	Comments/Assumptions
C403.4.5 [ME31][3]	Condenser heat recovery system that can heat water to 85 ºF or provide 60% of peak heat rejection is installed for preheating of service hot water.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	**Exception:** Design SWH load = 1 MMBtu/h. **Location on plans/spec:** RE: Hydronic Air Handling Unit Schedule on M0.1 Mechanical Schedules
C403.4.5 [ME31][3]	Condenser heat recovery system that can heat water to 85 ºF or provide 60% of peak heat rejection is installed for preheating of service hot water.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	**Exception:** Design SWH load = 1 MMBtu/h. **Location on plans/spec:** RE: Hydronic Air Handling Unit Schedule on M0.1 Mechanical Schedules
C403.4.5 [ME31][3]	Condenser heat recovery system that can heat water to 85 ºF or provide 60% of peak heat rejection is installed for preheating of service hot water.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	**Exception:** Design SWH load = 1 MMBtu/h. **Location on plans/spec:** RE: Hydronic Air Handling Unit Schedule on M0.1 Mechanical Schedules
C408.2.2.1 [ME53][3]	Air outlets and zone terminal devices have means for air balancing.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met. **Location on plans/spec:** RE: M2.1 Main Level Area A Mechanical Plan
C408.2.2.2 [ME54][3]	HVAC hydronic heating and cooling coils have means to balance and have pressure test connections.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met. **Location on plans/spec:** RE: Control Diagrams on M4.0 Series Mechanical Diagrams
C408.2.2.2 [ME54][3]	HVAC hydronic heating and cooling coils have means to balance and have pressure test connections.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met. **Location on plans/spec:** RE: Control Diagrams on M4.0 Series Mechanical Diagrams
C408.2.2.2 [ME54][3]	HVAC hydronic heating and cooling coils have means to balance and have pressure test connections.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met. **Location on plans/spec:** RE: Control Diagrams on M4.0 Series Mechanical Diagrams
C408.2.2.2 [ME54][3]	HVAC hydronic heating and cooling coils have means to balance and have pressure test connections.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met. **Location on plans/spec:** RE: Control Diagrams on M4.0 Series Mechanical Diagrams
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C408.2.2.2 [ME54][3]	HVAC hydronic heating and cooling coils have means to balance and have pressure test connections.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met. **Location on plans/spec:** RE: Control Diagrams on M4.0 Series Mechanical Diagrams
C408.2.2.2 [ME54][3]	HVAC hydronic heating and cooling coils have means to balance and have pressure test connections.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met. **Location on plans/spec:** RE: Control Diagrams on M4.0 Series Mechanical Diagrams
C408.2.2.2 [ME54][3]	HVAC hydronic heating and cooling coils have means to balance and have pressure test connections.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met. **Location on plans/spec:** RE: Control Diagrams on M4.0 Series Mechanical Diagrams

RCRBD Record Set
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05/14/2020

1	High Impact (Tier 1)	2	Medium Impact (Tier 2)	3	Low Impact (Tier 3)

Section # & Req.ID	Mechanical Rough-In Inspection	Complies?	Comments/Assumptions
C403.5, C403.5.1, C403.5.2 [ME123][3]	Refrigerated display cases, walk-in coolers or walk-in freezers served by remote compressors and remote condensers not located in a condensing unit, have fan-powered condensers that comply with Sections C403.5.1 and refrigeration compressor systems that comply with C403.5.2..	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	**Exception:** Requirement does not apply.

Additional Comments/Assumptions:

RCRBD Record Set
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05/14/2020

1	High Impact (Tier 1)	2	Medium Impact (Tier 2)	3	Low Impact (Tier 3)

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05/14/2020

Section # & Req.ID	Final Inspection	Complies?	Comments/Assumptions
C303.3, C408.2.5.3 [FI8][3]	Furnished O&M manuals for HVAC systems within 90 days of system acceptance.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	
C403.2.2 [FI27][3]	HVAC systems and equipment capacity does not exceed calculated loads.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.
C403.2.4.1 [FI47][3]	Heating and cooling to each zone is controlled by a thermostat control. Minimum one humidity control device per installed humidification/dehumidification system.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met. **Location on plans/spec:** RE: M2.1 Main Level Area A Mechanical Plan
C403.2.4.1 [FI47][3]	Heating and cooling to each zone is controlled by a thermostat control. Minimum one humidity control device per installed humidification/dehumidification system.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met. **Location on plans/spec:** RE: M2.1 Main Level Area A Mechanical Plan
C403.2.4.1 [FI47][3]	Heating and cooling to each zone is controlled by a thermostat control. Minimum one humidity control device per installed humidification/dehumidification system.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met. **Location on plans/spec:** RE: M2.1 Main Level Area A Mechanical Plan
C403.2.4.1 [FI47][3]	Heating and cooling to each zone is controlled by a thermostat control. Minimum one humidity control device per installed humidification/dehumidification system.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met. **Location on plans/spec:** RE: M2.1 Main Level Area A Mechanical Plan
C403.2.4.1 [FI47][3]	Heating and cooling to each zone is controlled by a thermostat control. Minimum one humidity control device per installed humidification/dehumidification system.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met. **Location on plans/spec:** RE: M2.1 Main Level Area A Mechanical Plan
C403.2.4.1 [FI47][3]	Heating and cooling to each zone is controlled by a thermostat control. Minimum one humidity control device per installed humidification/dehumidification system.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met. **Location on plans/spec:** RE: M2.1 Main Level Area A Mechanical Plan
C403.2.4.1 [FI47][3]	Heating and cooling to each zone is controlled by a thermostat control. Minimum one humidity control device per installed humidification/dehumidification system.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met. **Location on plans/spec:** RE: M2.1 Main Level Area A Mechanical Plan
C403.2.4.1 [FI47][3]	Heating and cooling to each zone is controlled by a thermostat control. Minimum one humidity control device per installed humidification/dehumidification system.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met. **Location on plans/spec:** RE: M2.2 Pre-K Plan Area B Mechanical Plan

1	High Impact (Tier 1)	2	Medium Impact (Tier 2)	3	Low Impact (Tier 3)

Section # & Req.ID	Final Inspection	Complies?	Comments/Assumptions
C403.2.4.1 [FI47][3]	Heating and cooling to each zone is controlled by a thermostat control. Minimum one humidity control device per installed humidification/dehumidification system.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met. **Location on plans/spec:** RE: M2.2 Pre-K Plan Area B Mechanical Plan
C403.2.4.1.2 [FI38][3]	Thermostatic controls have a 5 °F deadband.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met. **Location on plans/spec:** RE: Control Diagrams on M4.0 Series Mechanical Diagrams
C403.2.4.1.3 [FI20][3]	Temperature controls have setpoint overlap restrictions.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met. **Location on plans/spec:** RE: Control Diagrams on M4.0 Series Mechanical Diagrams
C403.2.4.2 [FI39][3]	Each zone equipped with setback controls using automatic time clock or programmable control system.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met. **Location on plans/spec:** RE: Control Diagrams on M4.0 Series Mechanical Diagrams
C403.2.4.2.1, C403.2.4.2.2 [FI40][3]	Automatic Controls: Setback to 55°F (heat) and 85°F (cool); 7-day clock, 2-hour occupant override, 10-hour backup	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met. **Location on plans/spec:** RE: Control Diagrams on M4.0 Series Mechanical Diagrams
C403.2.4.2.3 [FI41][3]	Systems include optimum start controls.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met. **Location on plans/spec:** RE: Control Diagrams on M4.0 Series Mechanical Diagrams
C403.2.4.2.3 [FI41][3]	Systems include optimum start controls.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met. **Location on plans/spec:** RE: Control Diagrams on M4.0 Series Mechanical Diagrams
C403.2.4.2.3 [FI41][3]	Systems include optimum start controls.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met. **Location on plans/spec:** RE: Control Diagrams on M4.0 Series Mechanical Diagrams
C403.2.4.2.3 [FI41][3]	Systems include optimum start controls.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met. **Location on plans/spec:** RE: Control Diagrams on M4.0 Series Mechanical Diagrams
C408.2.1 [FI28][1]	Commissioning plan developed by registered design professional or approved agency.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	
C408.2.3.1 [FI31][1]	HVAC equipment has been tested to ensure proper operation.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	
C408.2.3.2 [FI10][1]	HVAC control systems have been tested to ensure proper operation, calibration and adjustment of controls.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	

1	High Impact (Tier 1)	2	Medium Impact (Tier 2)	3	Low Impact (Tier 3)

Section # & Req.ID	Final Inspection	Complies?	Comments/Assumptions
C408.2.3.3 [FI32][1]	Economizers have been tested to ensure proper operation.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	
C408.2.4 [FI29][1]	Preliminary commissioning report completed and certified by registered design professional or approved agency.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	
C408.2.5.1 [FI7][3]	Furnished HVAC as-built drawings submitted within 90 days of system acceptance.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	
C408.2.5.3 [FI43][1]	An air and/or hydronic system balancing report is provided for HVAC systems.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	
C408.2.5.4 [FI30][1]	Final commissioning report due to building owner within 90 days of receipt of certificate of occupancy.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	

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05/14/2020

Additional Comments/Assumptions:

1	High Impact (Tier 1)	2	Medium Impact (Tier 2)	3	Low Impact (Tier 3)

RCRBD Record Set
T.A.

05/14/2020

Structural Engineering Calculations

Strawberry Park Elementary
Steamboat Springs, CO

COLORADO LICENSED
MATTHEW OLIVER HOOD
44113
04/06/20
PROFESSIONAL ENGINEER

RCRBD Record Set
T.A.

05/14/2020

SUPPORTING YOUR VISION

JIRSA HEDRICK
Structural Engineers

Prepared For: TAB Associates

Date: April 6, 2020

JIRSA HEDRICK
Structural Engineers

Table of Contents **Strawberry Park**

Calculation Index

Design Loads

JIRSA HEDRICK Structural Engineers	PROJECT NO.	20191103	SHEET ___ OF ___
	PROJECT	Steamboat Schools	BY VSW
	SUBJECT	Design Loads - SP	DATE 4/6/2020

Design Code: 2015 IBC w/ Routt County Amendments

Design Loads - Gravity

Roof

Dead Load

Roofing		3 psf	*
Insulation		2 psf	*
Metal Deck		3 psf	
Joists		3 psf	*
Beams		2 psf	
MEP/Sprinklers		5 psf	*
Miscellaneous		7 psf	*
	Total =	**25** psf	**20** psf SDL*

Mechanical Area (as req'd)

Mechanical Equipment		40 psf	
6" concrete		75 psf	
Roof DL		25 psf	
	Total =	**140** psf	**135** psf SDL

Snow Load

Uniform roof snow	**65** psf	(plus drift)
Ground snow	**90** psf	

Design Loads - Lateral

Wind Loads

Occupancy Category	III		
Wind Speed	120	mph	(ASCE 7-10)
Exposure	C		

Seismic Loads

I_E = 1.25
Seismic Design Category B
Site Class D
T_L 4 sec

S_S = 0.27
S_1 = 0.074
S_{MS} = 0.428
S_{M1} = 0.178
S_{DS} = 0.285
S_{D1} = 0.119

SNOW LOADING

In accordance with ASCE7-10

Tedds calculation version 1.0.09

Building details

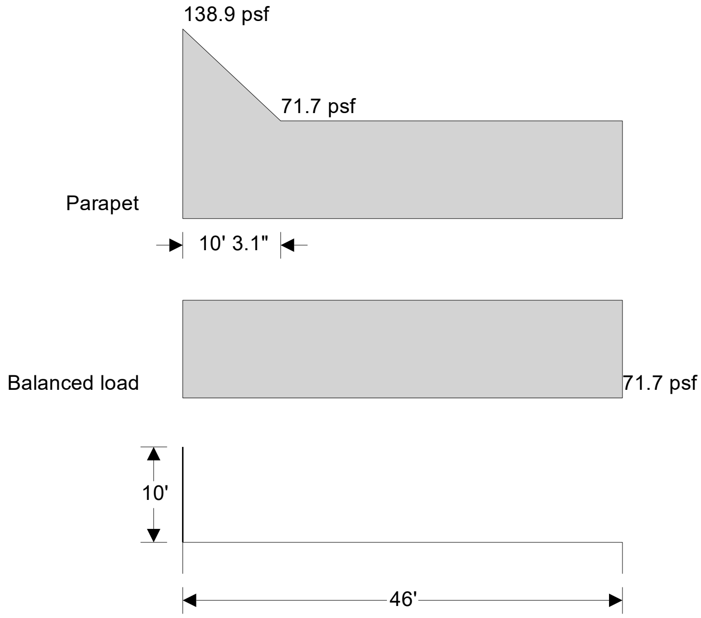
Roof type	Flat
Width of roof	b = **46.00** ft

Ground snow load

Ground snow load (Figure 7-1)	p_g = **94.00** lb/ft^2
Density of snow	$\gamma = \min(0.13 \times p_g / 1\text{ft} + 14\text{lb/ft}^3, 30\text{lb/ft}^3)$ = **26.22** lb/ft^3
Terrain typeSect. 26.7	C
Exposure condition (Table 7-2)	Fully exposed
Exposure factor (Table 7-2)	C_e = **0.90**
Thermal condition (Table 7-3)	Structures kept just above freezing
Thermal factor (Table 7-3)	C_t = **1.10**
Importance category (Table 1.5-1)	III
Importance factor (Table 1.5-2)	I_s = **1.10**
Min snow load for low slope roofs (Sect 7.3.4)	$p_{f\_min} = I_s \times 20$ lb/ft^2 = **22.00** lb/ft^2
Flat roof snow load (Sect 7.3)	$p_f = 0.7 \times C_e \times C_t \times I_s \times p_g$ = **71.66** lb/ft^2

Left parapet

Balanced snow load height	$h_b = p_f / \gamma$ = **2.73** ft
Height of left parapet	h_{pptL} = **10.00** ft
Height from balance load to top of left parapet	$h_{c\_pptL} = h_{pptL} - h_b$ = **7.27** ft
Length of roof - left parapet	$l_{u\_pptL} = b$ = **46.00** ft
Drift height windward drift - left parpet	$h_{d\_l\_pptL} = 0.75 \times (0.43 \times (\max(20\text{ ft}, l_{u\_pptL}) \times 1\text{ft}^2)^{1/3} \times (p_g / 1\text{lb/ft}^2 + 10)^{1/4} - 1.5\text{ft})$ = **2.57** ft
Drift height - left parapet	$h_{d\_pptL} = \min(h_{d\_l\_pptL}, h_{pptL} - h_b)$ = **2.57** ft
Drift width	$W_{d\_pptL} = \min(4 \times h_{d\_l\_pptL}, 8 \times (h_{pptL} - h_b), b)$ = **10.26** ft
Drift surcharge load - left parapet	$p_{d\_pptL} = h_{d\_pptL} \times \gamma$ = **67.26** lb/ft^2



Roof elevation

SNOW LOADING

In accordance with ASCE7-10

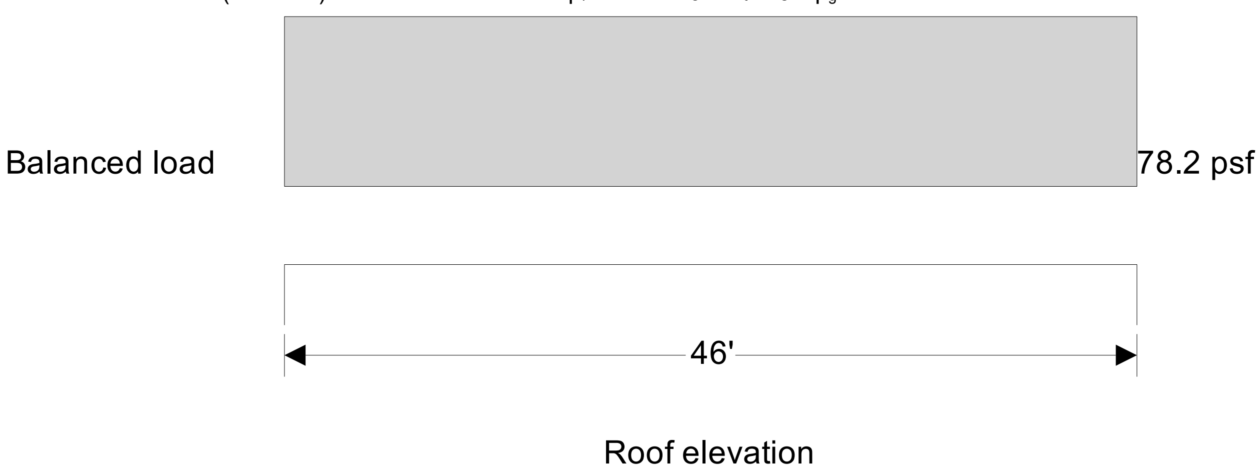
Tedds calculation version 1.0.09

Building details

Roof type	Flat
Width of roof	b = **46.00** ft

Ground snow load

Ground snow load (Figure 7-1)	p_g = **94.00** lb/ft^2
Density of snow	γ = min(0.13 $\times$ p_g / 1ft + 14lb/ft^3, 30lb/ft^3) = **26.22** lb/ft^3
Terrain typeSect. 26.7	C
Exposure condition (Table 7-2)	Fully exposed
Exposure factor (Table 7-2)	C_e = **0.90**
Thermal condition (Table 7-3)	Unheated structures
Thermal factor (Table 7-3)	C_t = **1.20**
Importance category (Table 1.5-1)	III
Importance factor (Table 1.5-2)	I_s = **1.10**
Min snow load for low slope roofs (Sect 7.3.4)	p_{f_min} = I_s $\times$ 20 lb/ft^2 = **22.00** lb/ft^2
Flat roof snow load (Sect 7.3)	p_f = 0.7 $\times$ C_e $\times$ C_t $\times$ I_s $\times$ p_g = **78.17** lb/ft^2



ATC Hazards by Location

Search Information

Address: 39620 Amethyst Dr, Steamboat Springs, CO 80487, USA

Coordinates: 40.5009297, -106.8213135

Elevation: 6878 ft

Timestamp: 2020-03-19T21:25:26.261Z

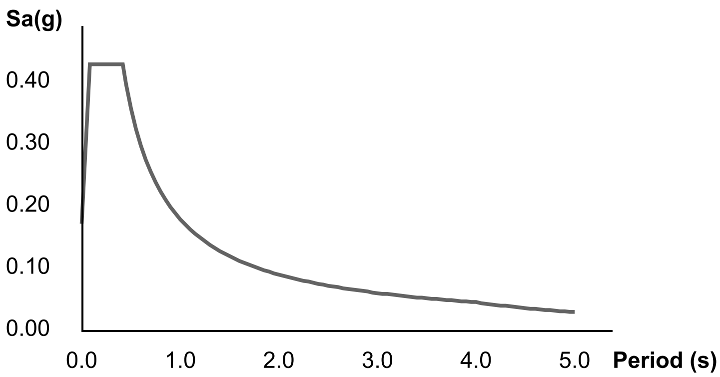
Hazard Type: Seismic

Reference Document: ASCE7-10

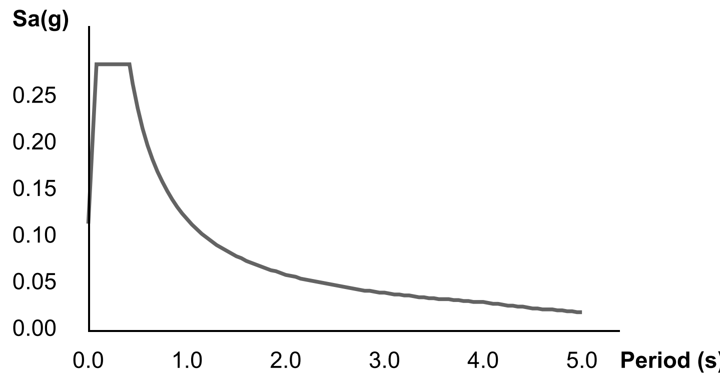
Risk Category: III

Site Class: D

MCER Horizontal Response Spectrum



Design Horizontal Response Spectrum



Basic Parameters

Name	Value	Description
S_S	0.27	MCE_R ground motion (period=0.2s)
S_1	0.074	MCE_R ground motion (period=1.0s)
S_{MS}	0.428	Site-modified spectral acceleration value
S_{M1}	0.178	Site-modified spectral acceleration value
S_{DS}	0.285	Numeric seismic design value at 0.2s SA
S_{D1}	0.119	Numeric seismic design value at 1.0s SA

▾Additional Information

Name	Value	Description
SDC	B	Seismic design category
F_a	1.584	Site amplification factor at 0.2s
F_v	2.4	Site amplification factor at 1.0s

CR_S	0.901	Coefficient of risk (0.2s)
CR_1	0.9	Coefficient of risk (1.0s)
PGA	0.15	MCE_G peak ground acceleration
F_{PGA}	1.499	Site amplification factor at PGA
PGA_M	0.225	Site modified peak ground acceleration
T_L	4	Long-period transition period (s)
SsRT	0.27	Probabilistic risk-targeted ground motion (0.2s)
SsUH	0.3	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
SsD	1.5	Factored deterministic acceleration value (0.2s)
S1RT	0.074	Probabilistic risk-targeted ground motion (1.0s)
S1UH	0.083	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
S1D	0.6	Factored deterministic acceleration value (1.0s)
PGAd	0.5	Factored deterministic acceleration value (PGA)

The results indicated here DO NOT reflect any state or local amendments to the values or any delineation lines made during the building code adoption process. Users should confirm any output obtained from this tool with the local Authority Having Jurisdiction before proceeding with design.

Disclaimer

Hazard loads are provided by the U.S. Geological Survey Seismic Design Web Services.

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SEISMIC FORCES (ASCE 7-10)

Tedds calculation version 3.1.00

Site parameters

Site class D

Mapped acceleration parameters (Section 11.4.1)

at short period S_S = **0.27**

at 1 sec period S_1 = **0.074**

Site coefficientat short period (Table 11.4-1) F_a = **1.584**

at 1 sec period (Table 11.4-2) F_v = **2.400**

Spectral response acceleration parameters

at short period (Eq. 11.4-1) $S_{MS} = F_a \times S_S$ = **0.428**

at 1 sec period (Eq. 11.4-2) $S_{M1} = F_v \times S_1$ = **0.178**

Design spectral acceleration parameters (Sect 11.4.4)

at short period (Eq. 11.4-3) $S_{DS} = 2 / 3 \times S_{MS}$ = **0.285**

at 1 sec period (Eq. 11.4-4) $S_{D1} = 2 / 3 \times S_{M1}$ = **0.118**

Seismic design category

Risk category (Table 1.5-1) II

Seismic design category based on short period response acceleration (Table 11.6-1)

B

Seismic design category based on 1 sec period response acceleration (Table 11.6-2)

B

Seismic design category B

Approximate fundamental period

Height above base to highest level of building h_n = **18** ft

From Table 12.8-2:

Structure type All other systems

Building period parameter C_t C_t = **0.02**

Building period parameter x x = **0.75**

Approximate fundamental period (Eq 12.8-7) $T_a = C_t \times (h_n)^x \times 1sec / (1ft)^x$= **0.175** sec

Building fundamental period (Sect 12.8.2) $T = T_a$ = **0.175** sec

Long-period transition period T_L = **4** sec

Seismic response coefficient

Seismic force-resisting system (Table 12.2-1) A. Bearing_Wall_Systems

8. Intermediate reinforced masonry shear walls

Response modification factor (Table 12.2-1) R = **3.5**

Seismic importance factor (Table 1.5-2) I_e = **1.000**

Seismic response coefficient (Sect 12.8.1.1)

Calculated (Eq 12.8-3) $Cs_{\_calc} = S_{DS} / (R / I_e)$ = **0.0815**

Maximum (Eq 12.8-3) $Cs_{\_max} = S_{D1} / ((T / 1 sec) \times (R / I_e))$ = **0.1936**

Minimum (Eq 12.8-5) $Cs_{\_min} = max(0.044 \times S_{DS} \times I_e, 0.01)$ = **0.0125**

Seismic response coefficient C_s = **0.0815**

Seismic base shear (Sect 12.8.1)

Effective seismic weight of the structure W = **1029.0** kips

Seismic response coefficient C_s = **0.0815**

Seismic base shear (Eq 12.8-1) $V = C_s \times W$ = **83.8** kips

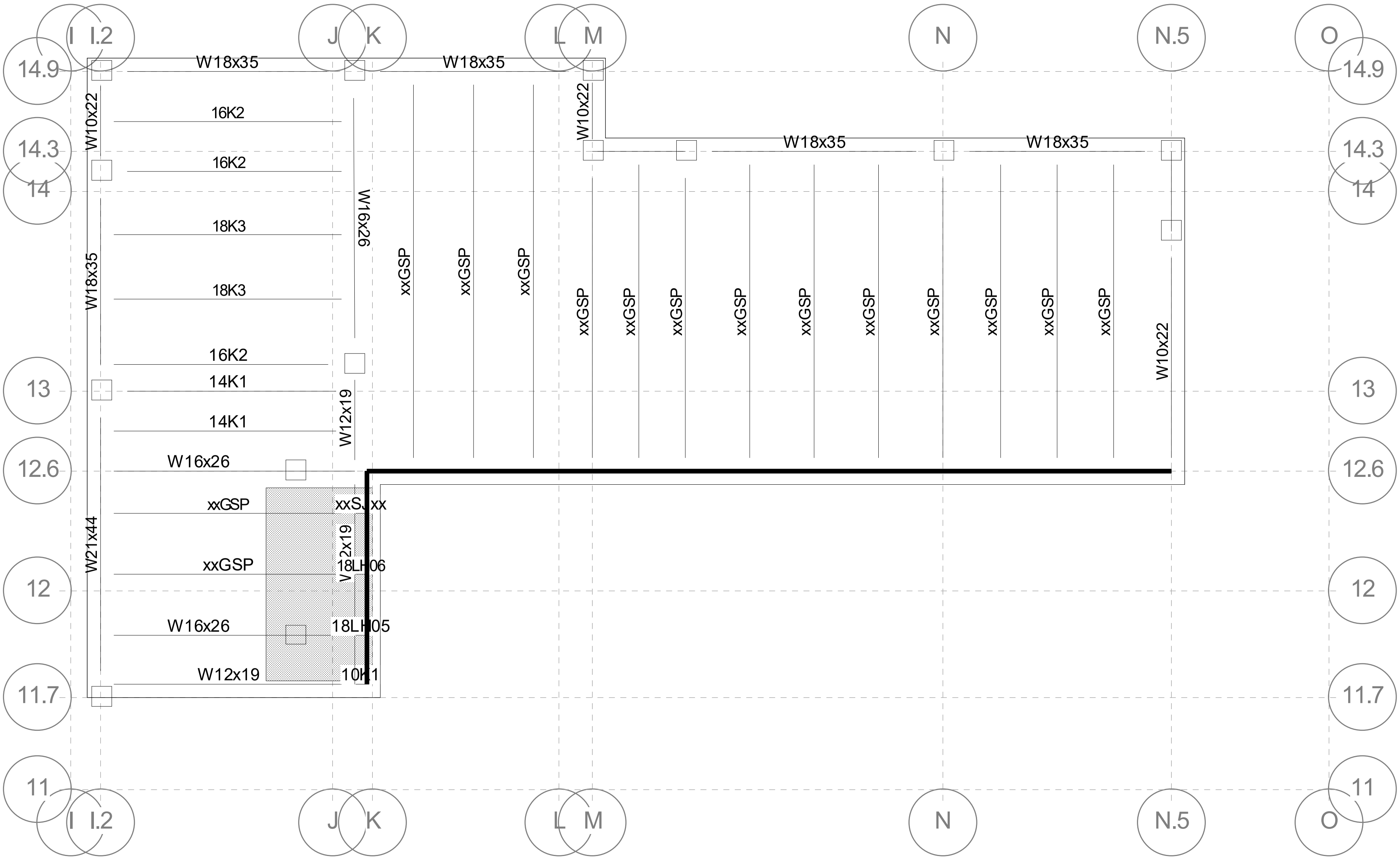
Gravity Framing

Floor Map

RAM Steel 17.00.01.09
DataBase: Strawberry Park - East Addition
Building Code: IBC

04/03/20 10:38:33
Steel Code: AISC 360-16 LRFD

Floor Type: Roof **Beam Designs**



Floor Map

Surface Loads

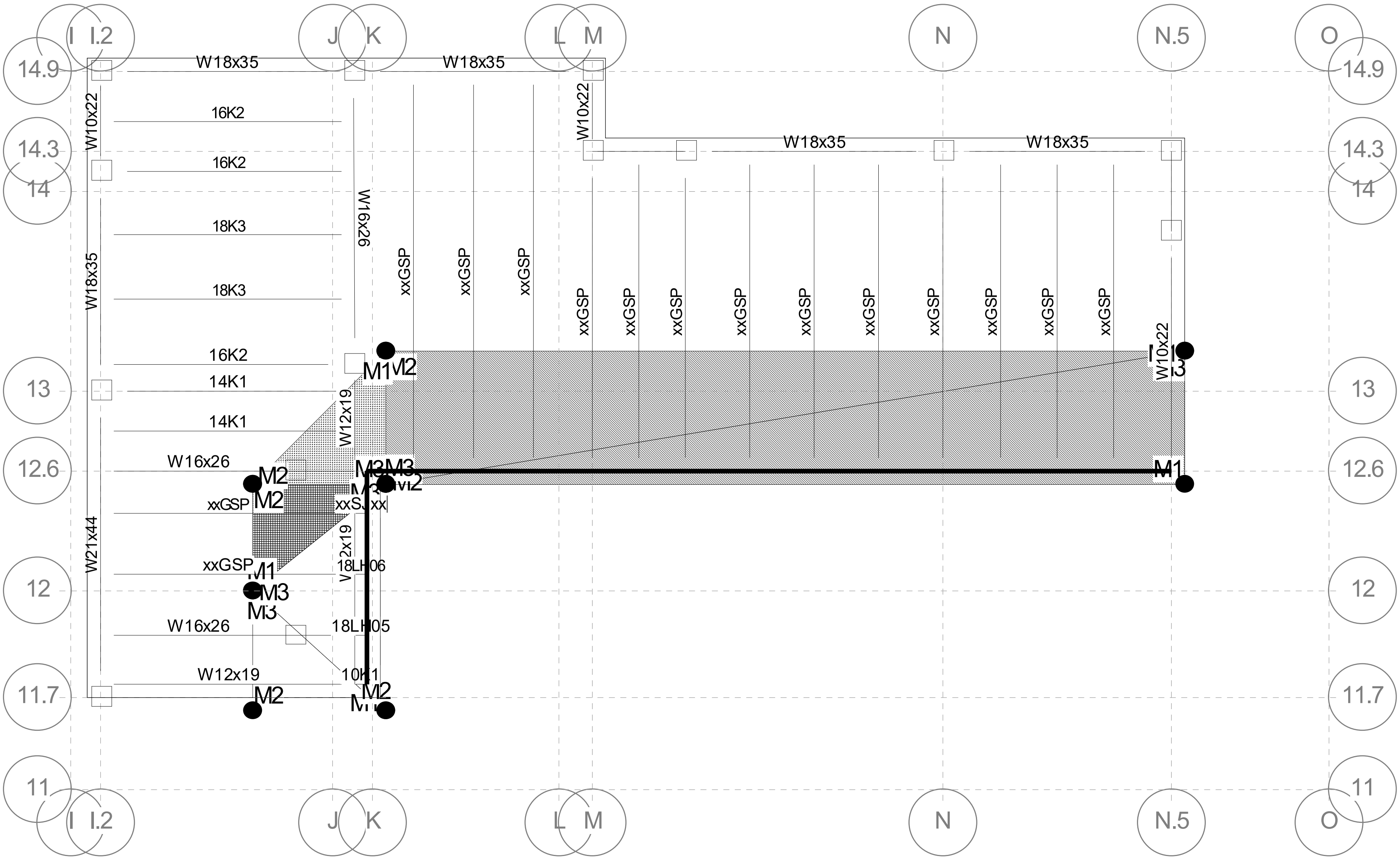
Label	DL psf	CDL psf	LL psf	Reduction Type	PLL psf	CLL psf	Mass DL psf
Dead	20.0	0.0	0.0	Reducible	0.0	0.0	20.0
RTU + Dead	54.0	0.0	0.0	Reducible	0.0	0.0	54.0

Floor Map

RAM Steel 17.00.01.09
DataBase: Strawberry Park - East Addition
Building Code: IBC

04/03/20 10:38:33
Steel Code: AISC 360-16 LRFD

Floor Type: Roof **Beam Designs**



Floor Map

Snow Loads

Label	Type	Magnitude 1 psf	Magnitude 2 psf	Magnitude 3 psf
Snow	Constant	72.000	---	---
Snow Drift 1	Drift	150.000	150.000	72.000
Snow Drift 1	Drift	150.000	150.000	72.000
Snow Drift 1	Drift	150.000	150.000	72.000
Snow Drift 2	Drift	72.000	72.000	150.000
Snow Drift 2	Drift	72.000	72.000	150.000
Snow Drift 2	Drift	72.000	72.000	150.000

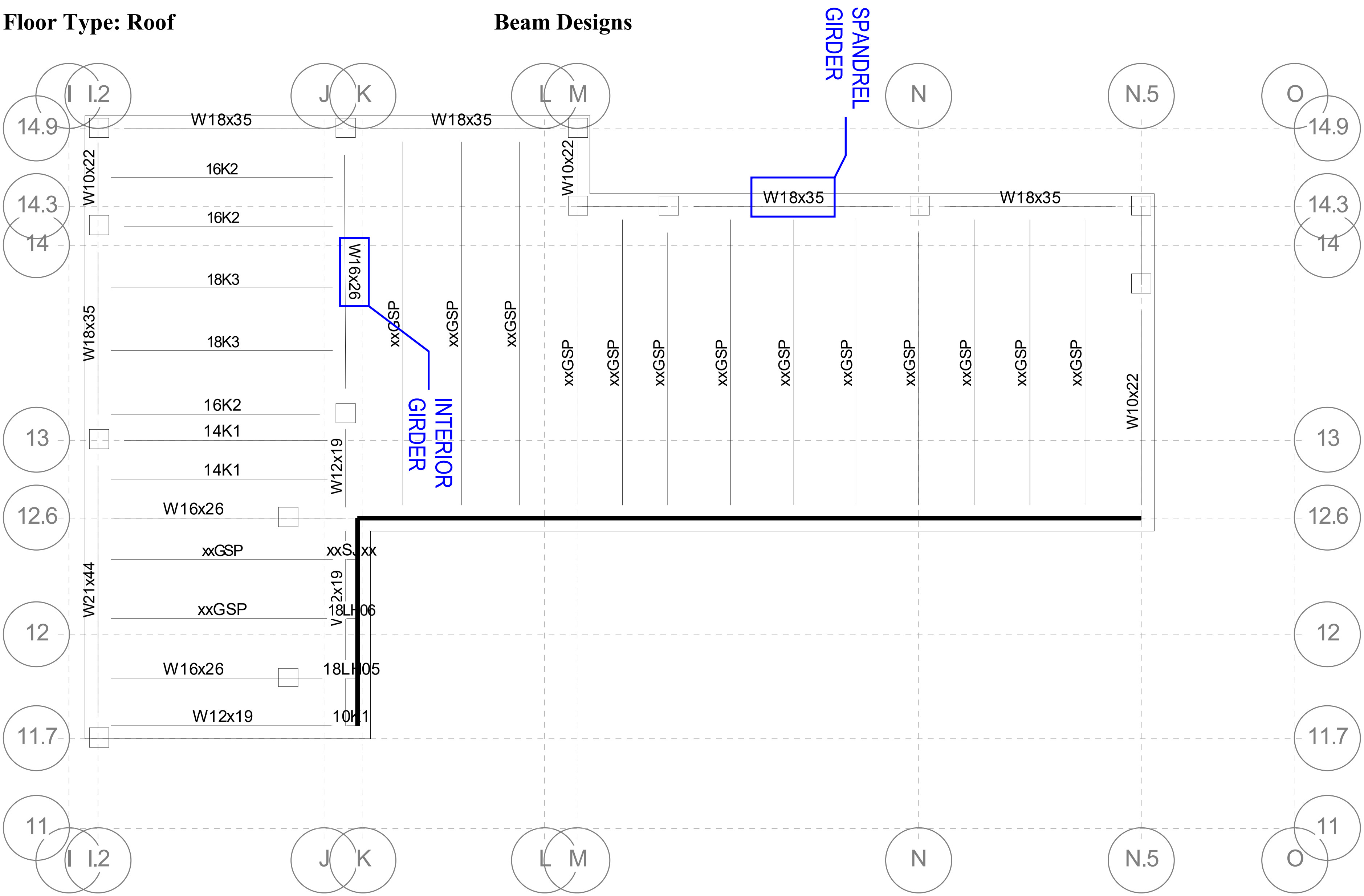
Floor Map

RAM Steel 17.00.01.09
DataBase: Strawberry Park - East Addition
Building Code: IBC

04/03/20 10:38:33
Steel Code: AISC 360-16 LRFD

Floor Type: Roof

Beam Designs



Gravity Beam Design

INTERIOR GIRDER

RAM Structural System
Bentley

RAM Steel 17.00.01.09
DataBase: Strawberry Park - East Addition — 04/03/20 10:38:33
Building Code: IBC — Steel Code: AISC 360-16 LRFD

Floor Type: Roof **Beam Number = 10**

SPAN INFORMATION (ft): I-End (21.33,54.00) J-End (21.33,32.00)

Beam Size (Optimum) = W16X26 Fy = 50.0 ksi
Total Beam Length (ft) = 22.00
Mp (kip-ft) = 184.17

POINT LOADS (kips):

Dist	DL	RedLL	Red%	NonRLL	StorLL	Red%	RoofLL	Red%	PartL
3.750	0.82	0.00	0.0	0.00	0.00	0.0	2.56	Snow	0.00
7.500	0.94	0.00	0.0	0.00	0.00	0.0	2.94	Snow	0.00
12.333	1.06	0.00	0.0	0.00	0.00	0.0	3.31	Snow	0.00
17.167	1.06	0.00	0.0	0.00	0.00	0.0	3.31	Snow	0.00

LINE LOADS (k/ft):

Load	Dist	DL	LL	Red%	Type	PartL
1	0.000	0.007	0.000	---	NonR	0.000
	22.000	0.007	0.000			0.000
2	0.000	0.045	0.000	0.0%	Red	0.000
	22.000	0.045	0.000			0.000
3	0.000	0.000	0.161	---	Snow	0.000
	21.000	0.000	0.161			0.000
4	21.000	0.000	0.124	---	Snow	0.000
	21.333	0.000	0.112			0.000
5	21.000	0.000	0.037	---	Snow	0.000
	21.333	0.000	0.051			0.000
6	21.334	0.000	0.112	---	Snow	0.000
	21.666	0.000	0.098			0.000
7	21.334	0.000	0.051	---	Snow	0.000
	21.666	0.000	0.067			0.000
8	21.667	0.000	0.098	---	Snow	0.000
	22.000	0.000	0.082			0.000
9	21.667	0.000	0.067	---	Snow	0.000
	22.000	0.000	0.086			0.000
10	0.000	0.026	0.000	---	NonR	0.000
	22.000	0.026	0.000			0.000

SHEAR (Ultimate): Max Vu (1.2DL+1.6LL) = 16.24 kips 0.90Vn = 105.97 kips

MOMENTS (Ultimate):

Span	Cond	LoadCombo	Mu kip-ft	@ ft	Lb ft	Cb	Phi	Phi*Mn kip-ft
Center	Max +	1.2DL+1.6LL	101.8	12.3	0.0	1.00	0.90	165.75
Controlling		1.2DL+1.6LL	101.8	12.3	0.0	1.00	0.90	165.75

REACTIONS (kips):

	Left	**Right**
DL reaction	2.85	2.73
Max +LL reaction	8.01	7.65
Max +total reaction (factored)	16.24	15.51

DEFLECTIONS:									**Ratio**
Dead load (in)	at 11.00 ft	=	-0.174	L/D	=	1516			
Live load (in)	at 11.00 ft	=	-0.496	L/D	=	533	>	360	0.68
Net Total load (in)	at 11.00 ft	=	-0.670	L/D	=	394			

Gravity Beam Design

SPANDREL GIRDER

Floor Type: Roof **Beam Number = 43**

SPAN INFORMATION (ft): I-End (46.25,48.00) J-End (65.58,48.00)

Beam Size (User Selected) = W18X35 Fy = 50.0 ksi
Total Beam Length (ft) = 19.33
Mp (kip-ft) = 277.08

POINT LOADS (kips):

Dist	DL	RedLL	Red%	NonRLL	StorLL	Red%	RoofLL	Red%	PartL
4.833	1.33	0.00	0.0	0.00	0.00	0.0	4.37	Snow	0.00
9.667	1.33	0.00	0.0	0.00	0.00	0.0	4.37	Snow	0.00
14.500	1.33	0.00	0.0	0.00	0.00	0.0	4.37	Snow	0.00

LINE LOADS (k/ft):

Load	Dist	DL	LL	Red%	Type	PartL
1	0.000	0.003	0.000	---	NonR	0.000
	19.333	0.003	0.000			0.000
2	0.000	0.020	0.000	0.0%	Red	0.000
	19.333	0.020	0.000			0.000
3	0.000	0.000	0.073	---	Snow	0.000
	19.333	0.000	0.073			0.000
4	0.000	0.035	0.000	---	NonR	0.000
	19.333	0.035	0.000			0.000

SHEAR (Ultimate): Max Vu (1.2DL+1.6LL) = 14.68 kips 1.00Vn = 159.30 kips

MOMENTS (Ultimate):

Span	Cond	LoadCombo	Mu kip-ft	@ ft	Lb ft	Cb	Phi	Phi*Mn kip-ft
Center	Max +	1.2DL+1.6LL	91.7	9.7	4.8	1.11	0.90	249.38
Controlling		1.2DL+1.6LL	91.7	9.7	4.8	1.11	0.90	249.38

REACTIONS (kips):

	Left	**Right**
DL reaction	2.56	2.56
Max +LL reaction	7.25	7.25
Max +total reaction (factored)	14.68	14.68

DEFLECTIONS:

						Ratio
Dead load (in)	at 9.67 ft	= -0.068	L/D = 3407			
Live load (in)	at 9.67 ft	= -0.198	L/D = 1173	>	360	0.31
Net Total load (in)	at 9.67 ft	= -0.266	L/D = 872			

Column Line I.2-11.7

Level	Pu	Mux	Muy	LC	Interaction Eq.	Angle	Fy	Size
Roof	24.7	9.2	0.0	1	0.68 Eq H1-1a	90.0	50	HSS4X4X5/16

Column Line I.2-13

Level	Pu	Mux	Muy	LC	Interaction Eq.	Angle	Fy	Size
Roof	25.7	-6.4	1.3	12	0.62 Eq H1-1a	90.0	50	HSS4X4X5/16

Column Line 2.33ft-46.50ft

Level	Pu	Mux	Muy	LC	Interaction Eq.	Angle	Fy	Size
Roof	18.7	-2.3	2.2	1	0.41 Eq H1-1a	90.0	50	HSS4X4X5/16

Column Line I.2-14.9

Level	Pu	Mux	Muy	LC	Interaction Eq.	Angle	Fy	Size
Roof	7.7	-1.2	1.6	1	0.18 Eq H1-1b	90.0	50	HSS4X4X5/16

Column Line 9.17ft-8.00ft

Level	Pu	Mux	Muy	LC	Interaction Eq.	Angle	Fy	Size
Penthouse	11.0	1.1	-3.0	1	0.24 Eq H1-1b	0.0	50	HSS4X4X5/16

Column Line 9.17ft-24.00ft

Level	Pu	Mux	Muy	LC	Interaction Eq.	Angle	Fy	Size
Penthouse	11.0	1.1	3.0	1	0.24 Eq H1-1b	0.0	50	HSS4X4X5/16

Column Line 16.92ft-11.60ft

Level	Pu	Mux	Muy	LC	Interaction Eq.	Angle	Fy	Size
Roof	39.9	0.0	0.0	1	0.47 Eq Axial	0.0	46	HSS4X4X5/16

Column Line 16.92ft-24.00ft

Level	Pu	Mux	Muy	LC	Interaction Eq.	Angle	Fy	Size
Roof	32.1	0.0	0.0	1	0.38 Eq Axial	0.0	46	HSS4X4X5/16

Column Line 21.33ft-32.00ft

Level	Pu	Mux	Muy	LC	Interaction Eq.	Angle	Fy	Size
Roof	21.5	5.4	-1.7	8	0.55 Eq H1-1a	90.0	50	HSS4X4X5/16

Column Line 21.33ft-54.00ft

Level	Pu	Mux	Muy	LC	Interaction Eq.	Angle	Fy	Size
Roof	34.1	-6.8	6.3	6	0.57 Eq H1-1a	90.0	50	HSS5X5X5/16

Column Line M-14.9

Level	Pu	Mux	Muy	LC	Interaction Eq.	Angle	Fy	Size

Roof	18.1	-6.1	0.5	1	0.49 Eq H1-1a	0.0	50	HSS4X4X5/16

Column Line N-14.3

Level	Pu	Mux	Muy	LC	Interaction Eq.	Angle	Fy	Size
Roof	25.7	-4.5	3.0	12	0.62 Eq H1-1a	0.0	50	HSS4X4X5/16

BASE PLATES:

Design Code: AISC360-16 LRFD

Plate Fy (ksi)	36.000
Minimum Dimension From Face of Column to Edge of Plate (in)	1.000
Minimum Dimension From Side of Column to Edge of Plate (in)	1.000
Increment of Plate Dimensions (in)	0.500
Increment of Plate Thickness (in)	0.250
Minimum Footing Dimension Parallel to Web (ft)	10.00
Minimum Footing Dimension Perpendicular to Web (ft)	10.00
Keep Base Plate Square:	Y

Column Line	Column Size	Fy (ksi)	N (in)	B (in)	tp (in)
I.2-11.7	HSS4X4X5/16	36	6.00	6.00	0.250
I.2-13	HSS4X4X5/16	36	6.00	6.00	0.500
2.33ft-46.50ft	HSS4X4X5/16	36	6.00	6.00	0.250
I.2-14.9	HSS4X4X5/16	36	6.00	6.00	0.250
16.92ft-11.60ft	HSS4X4X5/16	36	6.00	6.00	0.500
16.92ft-24.00ft	HSS4X4X5/16	36	6.00	6.00	0.500
21.33ft-32.00ft	HSS4X4X5/16	36	6.00	6.00	0.250
21.33ft-54.00ft	HSS5X5X5/16	36	7.00	7.00	0.250
M-14.9	HSS4X4X5/16	36	6.00	6.00	0.250
N-14.3	HSS4X4X5/16	36	6.00	6.00	0.500

Spread Footing Design Summary

RAM Structural System
Bentley
RAM Foundation v17.00.01.09
DataBase: Strawberry Park - East Addition
Building Code: IBC

Date: 04/06/20 09:21:32
Design Code: ACI318-14

Grid	Orientation	Dimensions (ft)			f'c/fy	Bottom Reinforcement		Top Reinforcement	
	Col/Foot	Length	Width	Thick	ksi	Parallel to Length	Parallel to Width	Parallel to Length	Parallel to Width
(I.2 - 11.7)	90.00/90.00	3.50	3.50	1.00	4.00/60.00	5-#5	5-#5	5-#5	5-#5
(I.2 - 13)	90.00/90.00	3.50	3.50	1.00	4.00/60.00	5-#5	5-#5	None	None
(2.33 - 46.50)	90.00/90.00	3.50	3.50	1.00	4.00/60.00	5-#5	5-#5	None	None
(I.2 - 14.9)	90.00/90.00	3.50	3.50	1.00	4.00/60.00	5-#5	5-#5	None	None
(21.33 - 54.00)	90.00/90.00	3.50	3.50	1.00	4.00/60.00	5-#5	5-#5	None	None
(21.33 - 32.00)	90.00/90.00	3.50	3.50	1.00	4.00/60.00	5-#5	5-#5	None	None
(M - 14.9)	0.00/ 0.00	3.50	3.50	1.00	4.00/60.00	5-#5	5-#5	None	None
(N - 14.3)	0.00/ 0.00	3.50	3.50	1.00	4.00/60.00	5-#5	5-#5	None	None
(16.92 - 11.60)	0.00/ 0.00	3.50	3.50	1.00	4.00/60.00	5-#5	5-#5	None	None
(16.92 - 24.00)	0.00/ 0.00	3.50	3.50	1.00	4.00/60.00	5-#5	5-#5	None	None

Note: Number between () in reinforcement is quantity of bars in center strip of rectangular footing

FOOTING AT I.2/11.5

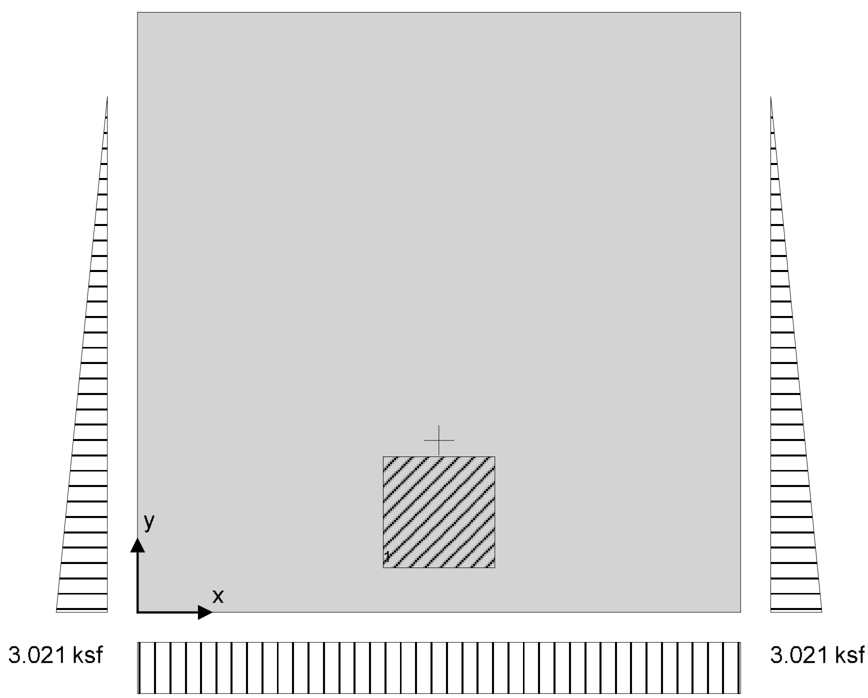
FOUNDATION ANALYSIS & DESIGN (ACI318)

In accordance with ACI318-14

Tedds calculation version 3.2.09

FOOTING ANALYSIS

Length of foundation L_x = **4.5** ft
Width of foundation L_y = **4.5** ft
Foundation area A = **20.25** ft^2
Depth of foundation h = **12** in
Depth of soil over foundation h_{soil} = **42** in
Density of concrete γ_{conc} = **150.0** lb/ft^3



Column no.1 details

Length of column l_{x1} = **10.00** in
Width of column l_{y1} = **10.00** in
position in x-axis x_1 = **27.00** in
position in y-axis y_1 = **9.00** in

Soil properties

Net allow. bearing press. q_{allow_Net} = **3** ksf
Density of soil γ_{soil} = **120.0** lb/ft^3
Angle of internal friction ϕ_b = **30.0** deg
Design base friction angle δ_{bb} = **30.0** deg
Coefficient of base friction $\tan(\delta_{bb})$ = **0.577**
Self weight F_{swt} = **150** psf
Soil weight F_{soil} = **420** psf

Column no.1 loads

Dead load in z F_{Dz1} = **3.7** kips Snow load in z F_{Sz1} = **12.7** kips

Footing analysis for soil and stability

Load combinations per ASCE 7-10

1.0D (0.318)

1.0D + 1.0L (0.318)

1.0D + 1.0S (0.853)

Combination 4 results: 1.0D + 1.0S

Forces on foundation

Force in z-axis F_{dz} = **27.9** kips

Moments on foundation

Moment in x-axis, about x is 0 M_{dx} = **62.8** kip_ft Moment in y-axis, about y is 0 M_{dy} = **38.3** kip_ft

Uplift verification

Vertical force F_{dz} = **27.933** kips

PASS - Foundation is not subject to uplift

Bearing resistance

Eccentricity of base reaction

Eccentricity in x-axis e_{dx} = **0** in Eccentricity in y-axis e_{dy} = **-10.562** in

Length of bearing, y-axis L'_{yd} = **49.314** in

Pad base pressures

Min. base press. q_{min} = **0** ksf Max. base press. q_{max} = **3.021** ksf

Allowable bearing capacity

Allowable bearing capacity q_{allow} = **3.54** ksf q_{max} / q_{allow} =
0.853

PASS - Allowable bearing capacity exceeds design base pressure

<u>FOOTING DESIGN (ACI318)</u>

In accordance with ACI318-14

Material details

Compr. strength of concrete f'_c = **4000** psi Yield strength of reinforcement f_y = **60000** psi

Cover to reinforcement c_{nom} = **3** in Concrete type Normal weight

Concrete modification factor λ = **1.00** Column type Concrete

Analysis and design of concrete footing

Load combinations per ASCE 7-10

1.4D (0.049)

1.2D + 1.0L + 1.6S (0.250)

Combination 6 results: 1.2D + 1.0L + 1.6S

Forces on foundation

Ultimate force in z-axis F_{uz} = **38.6** kips

Moments on foundation

Ultimate moment in x-axis, about x is 0 M_{ux} = **86.8** kip_ft Ultimate moment in y-axis, about y is 0 M_{uy} = **49.7** kip_ft

Eccentricity of base reaction

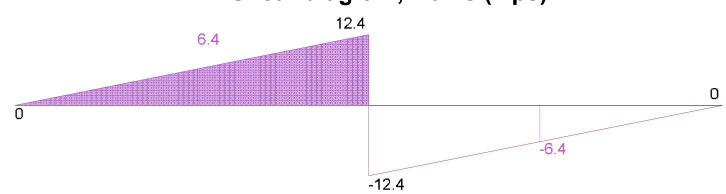
Eccentricity in x-axis e_{ux} = **0** in Eccentricity in y-axis e_{uy} = **-11.537** in

Length of bearing, y-axis L'_{yu} = **46.388** in

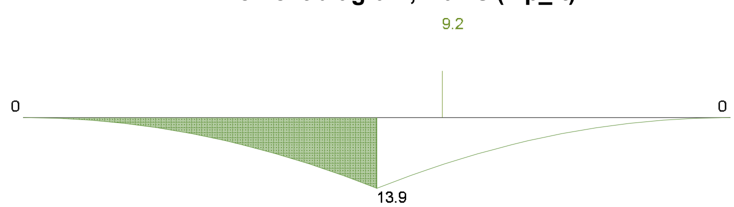
Pad base pressures

Min. ultimate base press. q_{umin} = **0** ksf Max. ultimate base press. q_{umax} = **4.436** ksf

Shear diagram, x axis (kips)



Moment diagram, x axis (kip_ft)



Moment design, x direction, positive moment

Ultimate bending moment $M_{u.x.max}$ = **9.235** kip_ft Tension reinf. provided 5 No.5 bot. bars (11.8 in c/c)

Area of tension reinf. provided $A_{sx.bot.prov}$ = **1.55** in^2 Min. area of reinforcement $A_{s.min}$ = **1.166** in^2

PASS - Area of reinforcement provided exceeds minimum

Maximum spacing of reinf. s_{max} = **18** in

PASS - Maximum permissible reinforcement spacing exceeds actual spacing

Depth to tension reinf. d = **8.688** in Depth of compression block a = **0.507** in

Neutral axis factor β_1 = **0.85** Depth to neutral axis c = **0.596** in

Strain in tensile reinf. ε_t = **0.04073**

PASS - Tensile strain exceeds minimum required, 0.004

Nominal moment capacity M_n = **65.365** kip_ft Flexural strength red. factor ϕ_f = **0.900**

Design moment capacity ϕM_n = **58.829** kip_ft $M_{u.x.max}$ / ϕM_n = **0.157**

PASS - Design moment capacity exceeds ultimate moment load

One-way shear design, x direction

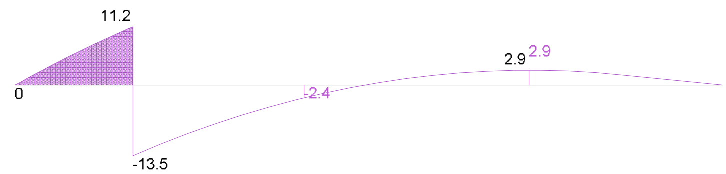
Ultimate shear force $V_{u.x}$ = **6.382** kips   Depth to reinforcement d_v = **8.062** in

Shear strength red. factor ϕ_v = **0.75**   Nominal shear capacity V_n = **55.071** kips

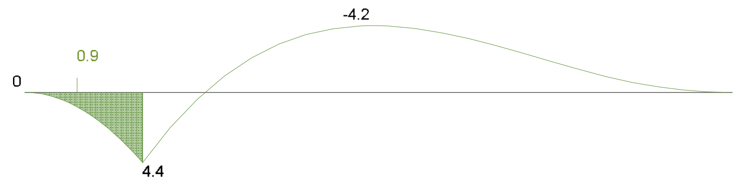
Design shear capacity ϕV_n = **41.303** kips $V_{u.x} / \phi V_n$ = **0.155**

PASS - Design shear capacity exceeds ultimate shear load

Shear diagram, y axis (kips)



Moment diagram, y axis (kip_ft)



Moment design, y direction, positive moment

Ultimate bending moment $M_{u.y.max}$ = **0.906** kip_ft   Tension reinf. provided 5 No.5 bot. bars (11.8 in c/c)

Area of tension reinf. provided $A_{sy.bot.prov}$ = **1.55** in^2 Min. area of reinforcement $A_{s.min}$ = **1.166** in^2

PASS - Area of reinforcement provided exceeds minimum

Maximum spacing of reinf. s_{max} = **18** in

PASS - Maximum permissible reinforcement spacing exceeds actual spacing

Depth to tension reinf. d = **8.062** in   Depth of compression block a = **0.507** in

Neutral axis factor β_1 = **0.85**   Depth to neutral axis c = **0.596** in

Strain in tensile reinf. ε_t = **0.03759**

PASS - Tensile strain exceeds minimum required, 0.004

Nominal moment capacity M_n = **60.522** kip_ft   Flexural strength red. factor ϕ_f = **0.900**

Design moment capacity ϕM_n = **54.469** kip_ft $M_{u.y.max} / \phi M_n$ = **0.017**

PASS - Design moment capacity exceeds ultimate moment load

Moment design, y direction, negative moment

Ultimate bending moment $M_{u.y.min}$ = **-4.165** kip_ft   Tension reinf. provided 5 No.5 top bars (11.8 in c/c)

Area of tension reinf. provided $A_{sy.top.prov}$ = **1.55** in^2 Min. area of reinforcement $A_{s.min}$ = **1.166** in^2

PASS - Area of reinforcement provided exceeds minimum

Maximum spacing of reinf. s_{max} = **18** in

PASS - Maximum permissible reinforcement spacing exceeds actual spacing

Depth to tension reinf. d = **8.688** in   Depth of compression block a = **0.507** in

Neutral axis factor β_1 = **0.85** Depth to neutral axis c = **0.596** in

Strain in tensile reinf. ε_t = **0.04073**

PASS - Tensile strain exceeds minimum required, 0.004

Nominal moment capacity M_n = **65.365** kip_ft Flexural strength red. factor ϕ_f = **0.900**

Design moment capacity ϕM_n = **58.829** kip_ft abs($M_{u.y.min}$) / ϕM_n = **0.071**

PASS - Design moment capacity exceeds ultimate moment load

One-way shear design, y direction

Ultimate shear force $V_{u.y}$ = **2.87** kips Depth to reinforcement d_v = **8.688** in

Shear strength red. factor ϕ_v = **0.75** Nominal shear capacity V_n = **59.34** kips

Design shear capacity ϕV_n = **44.505** kips $V_{u.y}$ / ϕV_n = **0.064**

PASS - Design shear capacity exceeds ultimate shear load

Two-way shear design at column 1

Depth to reinforcement d_{v2} = **8.375** in Shear perimeter length l_{xp} = **18.375** in

Shear perimeter width l_{yp} = **18.188** in Shear perimeter b_o = **54.750** in

Shear area A_p = **334.195** in^2 Surcharge loaded area A_{sur} = **234.195** in^2

Ult. bearing press. $q_{up.avg}$ = **1.827** ksf Ultimate shear load F_{up} = **21.725** kips

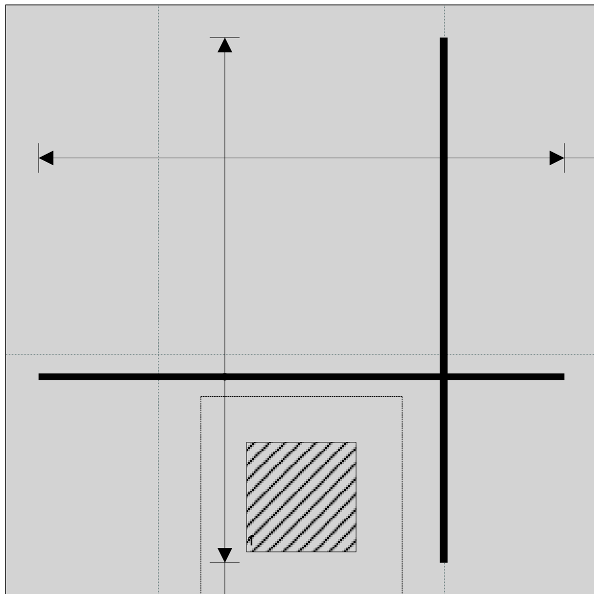
Ult. shear stress, vertical load v_{ug} = **47.381** psi Column geometry factor β = **1.00**

Column location factor α_s =**30** Concrete shear strength v_{cp} = **252.982** psi

Shear strength red. factor ϕ_v = **0.75** Nominal shear stress capacity v_n = **252.982** psi

Design shear stress capacity ϕv_n = **189.737** psi v_{ug} / ϕv_n = **0.250**

PASS - Design shear stress capacity exceeds ultimate shear stress load



FOOTING AT N.5/12.6

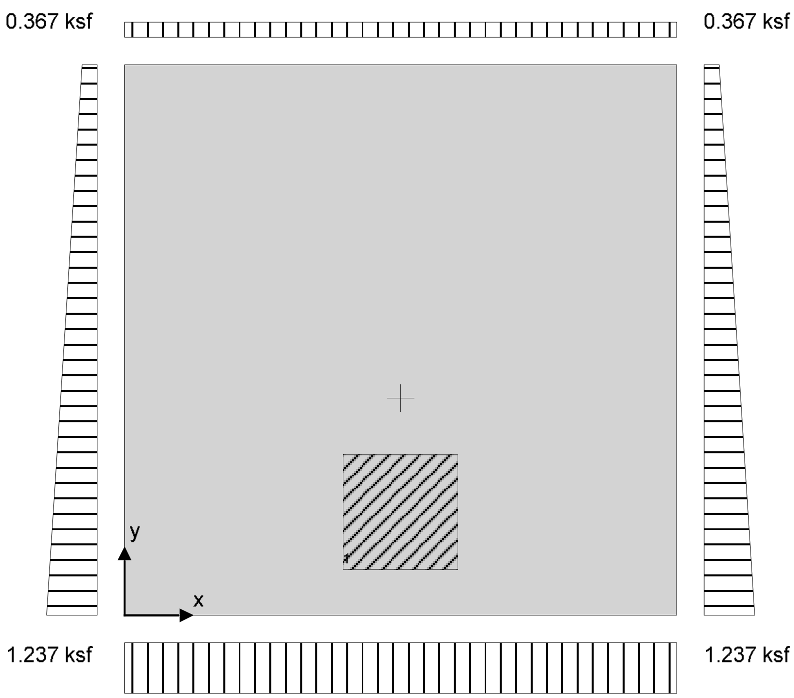
FOUNDATION ANALYSIS & DESIGN (ACI318)

In accordance with ACI318-14

Tedds calculation version 3.2.09

FOOTING ANALYSIS

Length of foundation	L_x = **4** ft	Width of foundation	L_y = **4** ft
Foundation area	A = **16** ft^2	Depth of foundation	h = **12** in
Depth of soil over foundation	h_{soil} = **42** in	Density of concrete	γ_{conc} = **150.0** lb/ft^3



Column no.1 details

Length of column l_{x1} = **10.00** in

position in x-axis x_1 = **24.00** in

Width of column l_{y1} = **10.00** in

position in y-axis y_1 = **9.00** in

Soil properties

Net allow. bearing press. q_{allow_Net} = **3** ksf

Density of soil γ_{soil} = **120.0** lb/ft^3

Angle of internal friction ϕ_b = **30.0** deg

Design base friction angle δ_{bb} = **30.0** deg

Coefficient of base friction $\tan(\delta_{bb})$ = **0.577**

Self weight F_{swt} = **150** psf

Soil weight F_{soil} = **420** psf

Column no.1 loads

Dead load in z F_{Dz1} = **0.9** kips

Snow load in z F_{Sz1} = **2.9** kips

Footing analysis for soil and stability

Load combinations per ASCE 7-10

1.0D (0.204)

1.0D + 1.0L (0.204)

1.0D + 1.0S (0.349)

Combination 4 results: 1.0D + 1.0S

Forces on foundation

Force in z-axis F_{dz} = **12.8** kips

Moments on foundation

Moment in x-axis, about x is 0 M_{dx} = **25.7** kip_ft

Moment in y-axis, about y is 0 M_{dy} = **21.0** kip_ft

Uplift verification

Vertical force F_{dz} = **12.83** kips

PASS - Foundation is not subject to uplift

Bearing resistance

Eccentricity of base reaction

Eccentricity in x-axis e_{dx} = **0** in Eccentricity in y-axis e_{dy} = **-4.337** in

Pad base pressures

Min. base press. q_{min} = **0.367** ksf Max. base press. q_{max} = **1.237** ksf

Allowable bearing capacity

Allowable bearing capacity q_{allow} = **3.54** ksf q_{max} / q_{allow} = **0.349**

PASS - Allowable bearing capacity exceeds design base pressure

<u>FOOTING DESIGN (ACI318)</u>

In accordance with ACI318-14

Material details

Compr. strength of concrete f'_c = **4000** psi Yield strength of reinforcement f_y = **60000** psi

Cover to reinforcement c_{nom} = **3** in Concrete type Normal weight

Concrete modification factor λ = **1.00** Column type Concrete

Analysis and design of concrete footing

Load combinations per ASCE 7-10

1.4D (0.008)

1.2D + 1.0L + 1.6S (0.053)

Combination 6 results: 1.2D + 1.0L + 1.6S

Forces on foundation

Ultimate force in z-axis F_{uz} = **16.5** kips

Moments on foundation

Ultimate moment in x-axis, about x is 0 M_{ux} = **33.1** kip_ft Ultimate moment in y-axis, about y is 0 M_{uy} = **26.1** kip_ft

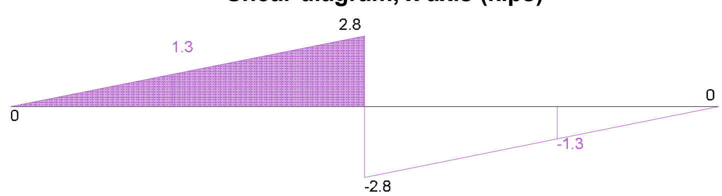
Eccentricity of base reaction

Eccentricity in x-axis e_{ux} = **0** in Eccentricity in y-axis e_{uy} = **-5.075** in

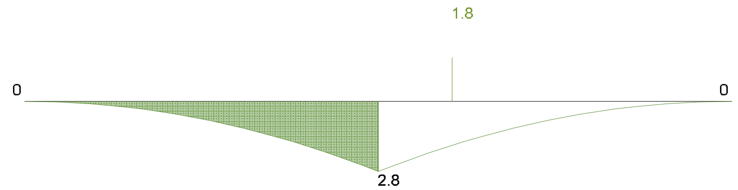
Pad base pressures

Min. ultimate base press. q_{umin} = **0.378** ksf Max. ultimate base press. q_{umax} = **1.69** ksf

Shear diagram, x axis (kips)



Moment diagram, x axis (kip_ft)



Moment design, x direction, positive moment

Ultimate bending moment $M_{u.x.max}$ = **1.754** kip_ft   Tension reinf. provided   4 No.5 bot. bars (13.7 in c/c)

Area of tension reinf. provided $A_{sx.bot.prov}$ = **1.24** in^2 Min. area of reinforcement $A_{s.min}$ = **1.037** in^2

PASS - Area of reinforcement provided exceeds minimum

Maximum spacing of reinf. s_{max} = **18** in

PASS - Maximum permissible reinforcement spacing exceeds actual spacing

Depth to tension reinf. d = **8.688** in   Depth of compression block a = **0.456** in

Neutral axis factor β_1 = **0.85**   Depth to neutral axis c = **0.536** in

Strain in tensile reinf. ε_t = **0.04559**

PASS - Tensile strain exceeds minimum required, 0.004

Nominal moment capacity M_n = **52.449** kip_ft   Flexural strength red. factor ϕ_f = **0.900**

Design moment capacity ϕM_n = **47.204** kip_ft $M_{u.x.max} / \phi M_n$ = **0.037**

PASS - Design moment capacity exceeds ultimate moment load

One-way shear design, x direction

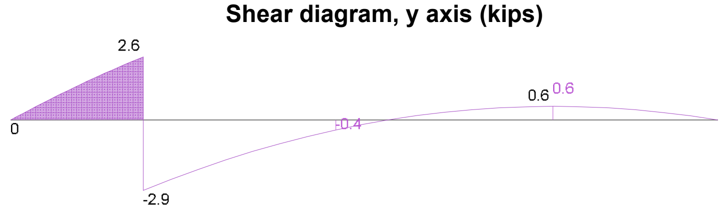
Ultimate shear force $V_{u.x}$ = **1.275** kips   Depth to reinforcement d_v = **8.062** in

Shear strength red. factor ϕ_v = **0.75**   Nominal shear capacity V_n = **48.952** kips

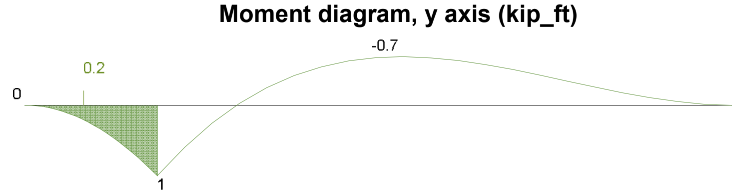
Design shear capacity ϕV_n = **36.714** kips $V_{u.x} / \phi V_n$ = **0.035**

PASS - Design shear capacity exceeds ultimate shear load

Shear diagram, y axis (kips)



Moment diagram, y axis (kip_ft)



Moment design, y direction, positive moment

Ultimate bending moment $M_{u.y.max}$ = **0.215** kip_ft Tension reinf. provided 4 No.5 bot. bars (13.7 in c/c)

Area of tension reinf. provided $A_{sy.bot.prov}$ = **1.24** in^2 Min. area of reinforcement $A_{s.min}$ = **1.037** in^2

PASS - Area of reinforcement provided exceeds minimum

Maximum spacing of reinf. s_{max} = **18** in

PASS - Maximum permissible reinforcement spacing exceeds actual spacing

Depth to tension reinf. d = **8.062** in Depth of compression block a = **0.456** in

Neutral axis factor β_1 = **0.85** Depth to neutral axis c = **0.536** in

Strain in tensile reinf. ε_t = **0.04210**

PASS - Tensile strain exceeds minimum required, 0.004

Nominal moment capacity M_n = **48.574** kip_ft Flexural strength red. factor ϕ_f = **0.900**

Design moment capacity ϕM_n = **43.717** kip_ft $M_{u.y.max}$ / ϕM_n = **0.005**

PASS - Design moment capacity exceeds ultimate moment load

Moment design, y direction, negative moment

Ultimate bending moment $M_{u.y.min}$ = **-0.711** kip_ft Tension reinf. provided 4 No.5 top bars (13.7 in c/c)

Area of tension reinf. provided $A_{sy.top.prov}$ = **1.24** in^2 Min. area of reinforcement $A_{s.min}$ = **1.037** in^2

PASS - Area of reinforcement provided exceeds minimum

Maximum spacing of reinf. s_{max} = **18** in

PASS - Maximum permissible reinforcement spacing exceeds actual spacing

Depth to tension reinf. d = **8.688** in Depth of compression block a = **0.456** in

Neutral axis factor β_1 = **0.85** Depth to neutral axis c = **0.536** in

Strain in tensile reinf. ε_t = **0.04559**

PASS - Tensile strain exceeds minimum required, 0.004

Nominal moment capacity M_n = **52.449** kip_ft Flexural strength red. factor ϕ_f = **0.900**

Design moment capacity ϕM_n = **47.204** kip_ft abs($M_{u.y.min}$) / ϕM_n = **0.015**

PASS - Design moment capacity exceeds ultimate moment load

One-way shear design, y direction

Ultimate shear force $V_{u.y}$ = **0.571** kips Depth to reinforcement d_v = **8.688** in

Shear strength red. factor ϕ_v = **0.75** Nominal shear capacity V_n = **52.747** kips

Design shear capacity ϕV_n = **39.56** kips $V_{u.y}$ / ϕV_n = **0.014**

PASS - Design shear capacity exceeds ultimate shear load

Two-way shear design at column 1

Depth to reinforcement d_{v2} = **8.375** in Shear perimeter length l_{xp} = **18.375** in

Shear perimeter width l_{yp} = **18.188** in Shear perimeter b_o = **54.750** in

Shear area A_p = **334.195** in^2 Surcharge loaded area A_{sur} = **234.195** in^2

Ult. bearing press. $q_{up.avg}$ = **0.944** ksf Ultimate shear load F_{up} = **4.642** kips

Ult. shear stress, vertical load v_{ug} = **10.124** psi

Column geometry factor β = **1.00**

Column location factor α_s =**30**

Concrete shear strength v_{cp} = **252.982**

psi

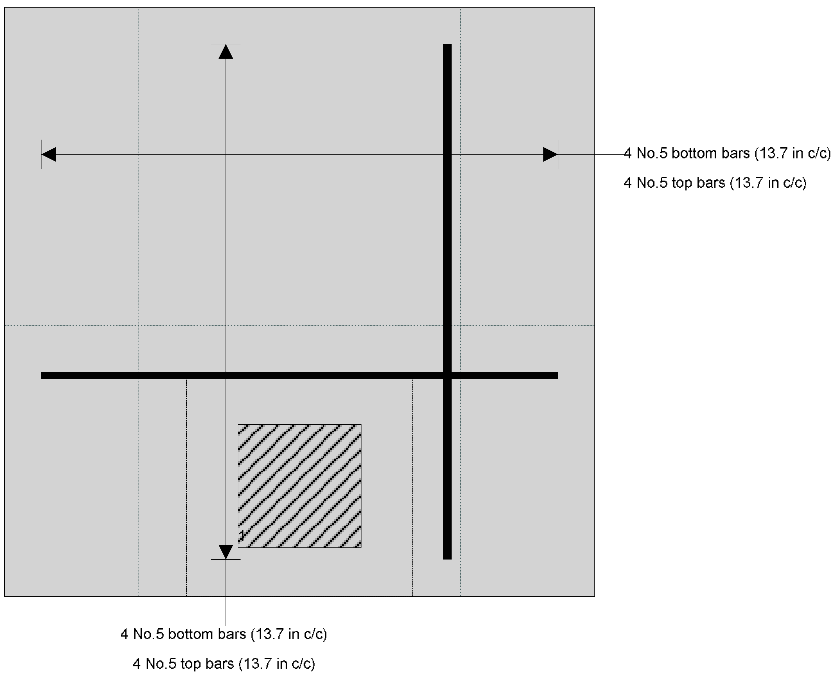
Shear strength red. factor ϕ_v = **0.75**

Nominal shear stress capacity v_n = **252.982** psi

Design shear stress capacity ϕv_n = **189.737** psi

$v_{ug} / \phi v_n$ = **0.053**

PASS - Design shear stress capacity exceeds ultimate shear stress load

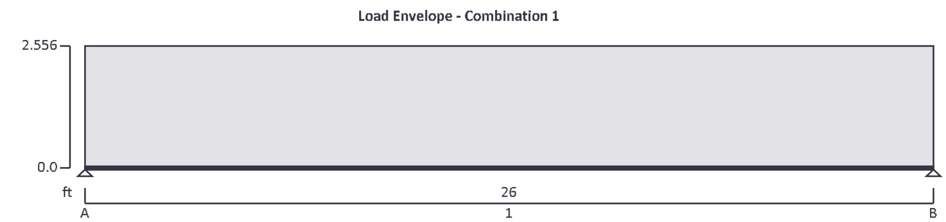


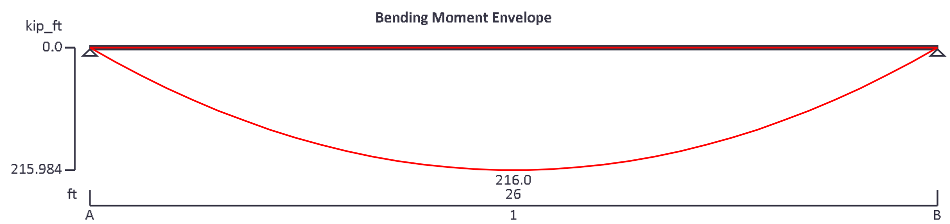
STEEL BEAM - GRID 9.7-11.5 STEEL FRAMING AT REMODEL ALONG GRID H

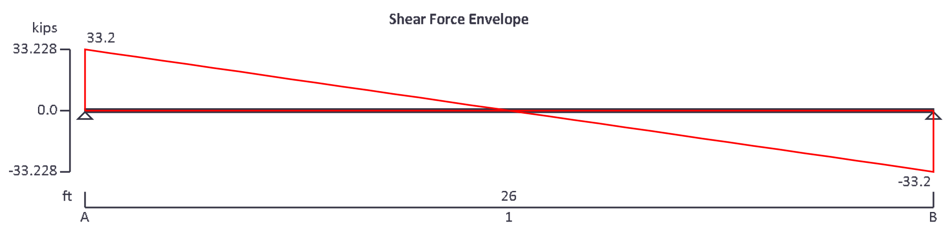
STEEL BEAM ANALYSIS & DESIGN (AISC360-10)

In accordance with AISC360-10 using the LRFD method

Tedds calculation version 3.0.14







Support conditions

Support A	Vertically restrained
	Rotationally free
Support B	Vertically restrained
	Rotationally free

Applied loading

Beam loads	Dead self weight of beam × 1
	DL - Dead full UDL 0.48 kips/ft
	SL - Snow full UDL 1.2 kips/ft

Load combinations

Load combination 1	Support A	Dead × 1.20
		Live × 1.60
		Roof live × 1.60

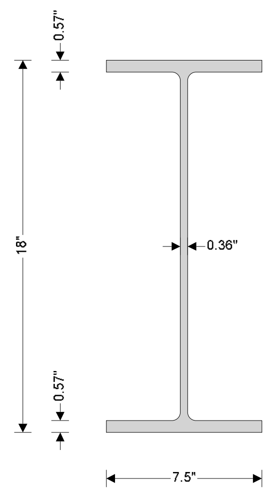
		Snow × 1.60
		Dead × 1.20
		Live × 1.60
		Roof live × 1.60
		Snow × 1.60
	Support B	Dead × 1.20
		Live × 1.60
		Roof live × 1.60
		Snow × 1.60

Analysis results

Maximum moment	M_{max} = **216** kips_ft	M_{min} = **0** kips_ft
Maximum shear	V_{max} = **33.2** kips	V_{min} = **-33.2** kips
Deflection	δ_{max} = **0.8** in	δ_{min} = **0** in
Maximum reaction at support A	R_{A_max} = **33.2** kips	R_{A_min} = **33.2** kips
Unfactored dead load reaction at support A	R_{A_Dead} = **6.9** kips	
Unfactored snow load reaction at support A	R_{A_Snow} = **15.6** kips	
Maximum reaction at support B	R_{B_max} = **33.2** kips	R_{B_min} = **33.2** kips
Unfactored dead load reaction at support B	R_{B_Dead} = **6.9** kips	
Unfactored snow load reaction at support B	R_{B_Snow} = **15.6** kips	

Section details

Section type	**W 18x50 (AISC 15th Edn (v15.0))**
ASTM steel designation	**A992**
Steel yield stress	F_y = **50** ksi
Steel tensile stress	F_u = **65** ksi
Modulus of elasticity	E = **29000** ksi



Resistance factors

Resistance factor for tensile yielding	ϕ_{ty} = **0.90**
Resistance factor for tensile rupture	ϕ_{tr} = **0.75**
Resistance factor for compression	ϕ_c = **0.90**

Resistance factor for flexure ϕ_b = **0.90**

Lateral bracing

Span 1 has continuous lateral bracing

Classification of sections for local buckling - Section B4.1

Classification of flanges in flexure - Table B4.1b (case 10)

Width to thickness ratio $b_f / (2 \times t_f)$ = **6.58**

Limiting ratio for compact section $\lambda_{pff} = 0.38 \times \sqrt{[E / F_y]}$ = **9.15**

Limiting ratio for non-compact section $\lambda_{rff} = 1.0 \times \sqrt{[E / F_y]}$ = **24.08** Compact

Classification of web in flexure - Table B4.1b (case 15)

Width to thickness ratio $(d - 2 \times k) / t_w$ = **45.23**

Limiting ratio for compact section $\lambda_{pwf} = 3.76 \times \sqrt{[E / F_y]}$ = **90.55**

Limiting ratio for non-compact section $\lambda_{rwf} = 5.70 \times \sqrt{[E / F_y]}$ = **137.27** Compact

Section is compact in flexure

Design of members for shear - Chapter G

Required shear strength $V_r = \max(\text{abs}(V_{max}), \text{abs}(V_{min}))$ = **33.228** kips

Web area $A_w = d \times t_w$ = **6.39** in^2

Web plate buckling coefficient k_v = **5**

Web shear coefficient - eq G2-3 C_v = **1**

Nominal shear strength – eq G2-1 $V_n = 0.6 \times F_y \times A_w \times C_v$ = **191.700** kips

Resistance factor for shear ϕ_v = **1.00**

Design shear strength $V_c = \phi_v \times V_n$ = **191.700** kips

PASS - Design shear strength exceeds required shear strength

Design of members for flexure in the major axis - Chapter F

Required flexural strength $M_r = \max(\text{abs}(M_{s1\_max}), \text{abs}(M_{s1\_min}))$ = **215.984** kips_ft

Yielding - Section F2.1

Nominal flexural strength for yielding - eq F2-1 $M_{nyld} = M_p = F_y \times Z_x$ = **420.833** kips_ft

Nominal flexural strength $M_n = M_{nyld}$ = **420.833** kips_ft

Design flexural strength $M_c = \phi_b \times M_n$ = **378.750** kips_ft

PASS - Design flexural strength exceeds required flexural strength

Design of members for vertical deflection

Consider deflection due to dead, live, roof live and snow loads

Limiting deflection $\delta_{lim} = L_{s1} / 360$ = **0.867** in

Maximum deflection span 1 $\delta = \max(\text{abs}(\delta_{max}), \text{abs}(\delta_{min}))$ = **0.767** in

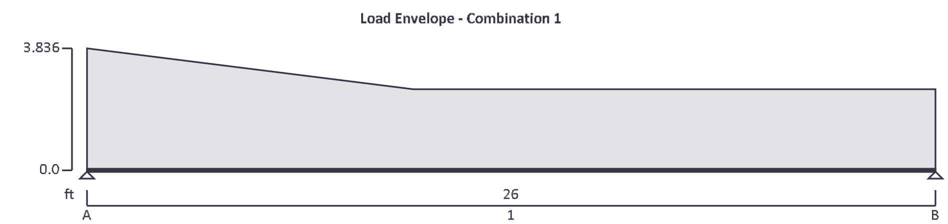
PASS - Maximum deflection does not exceed deflection limit

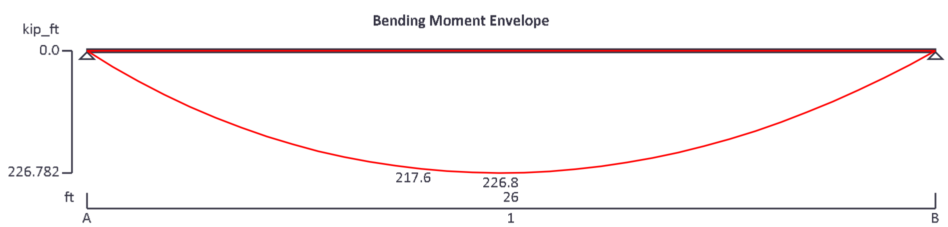
STEEL BEAM - GRID 8 - 9.7

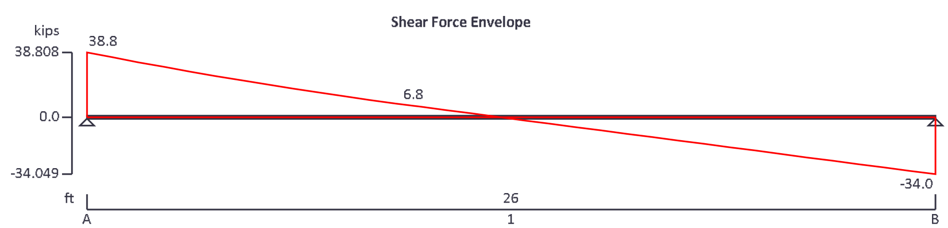
STEEL BEAM ANALYSIS & DESIGN (AISC360-10)

In accordance with AISC360-10 using the LRFD method

Tedds calculation version 3.0.14







Support conditions

Support A	Vertically restrained
	Rotationally free
Support B	Vertically restrained
	Rotationally free

Applied loading

Beam loads	Dead self weight of beam × 1
	DL - Dead full UDL 0.48 kips/ft
	SL - Snow partial UDL 1.2 kips/ft from 120.00 in to 312.00 in
	Drift - Snow partial VDL 2 kips/ft at 0.00 in to 1.2 kips/ft at 120.00 in

Load combinations

Load combination 1	Support A	Dead × 1.20

Live × 1.60
Roof live × 1.60
Snow × 1.60
Dead × 1.20
Live × 1.60
Roof live × 1.60
Snow × 1.60

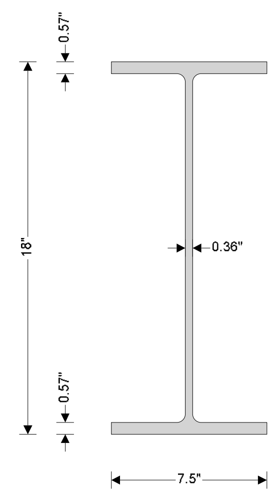
Support B — Dead × 1.20
Live × 1.60
Roof live × 1.60
Snow × 1.60

Analysis results

Maximum moment	M_{max} = **226.8** kips_ft	M_{min} = **0** kips_ft
Maximum shear	V_{max} = **38.8** kips	V_{min} = **-34** kips
Deflection	δ_{max} = **0.8** in	δ_{min} = **0** in
Maximum reaction at support A	R_{A_max} = **38.8** kips	R_{A_min} = **38.8** kips
Unfactored dead load reaction at support A	R_{A_Dead} = **6.9** kips	
Unfactored snow load reaction at support A	R_{A_Snow} = **19.1** kips	
Maximum reaction at support B	R_{B_max} = **34** kips	R_{B_min} = **34** kips
Unfactored dead load reaction at support B	R_{B_Dead} = **6.9** kips	
Unfactored snow load reaction at support B	R_{B_Snow} = **16.1** kips	

Section details

Section type	**W 18x50 (AISC 15th Edn (v15.0))**
ASTM steel designation	**A992**
Steel yield stress	F_y = **50** ksi
Steel tensile stress	F_u = **65** ksi
Modulus of elasticity	E = **29000** ksi



Resistance factors

Resistance factor for tensile yielding	ϕ_{ty} = **0.90**

Resistance factor for tensile rupture ϕ_{tr} = **0.75**

Resistance factor for compression ϕ_c = **0.90**

Resistance factor for flexure ϕ_b = **0.90**

Lateral bracing

Span 1 has continuous lateral bracing

Classification of sections for local buckling - Section B4.1

Classification of flanges in flexure - Table B4.1b (case 10)

Width to thickness ratio $b_f / (2 \times t_f)$ = **6.58**

Limiting ratio for compact section $\lambda_{pff} = 0.38 \times \sqrt{[E / F_y]}$ = **9.15**

Limiting ratio for non-compact section $\lambda_{rff} = 1.0 \times \sqrt{[E / F_y]}$ = **24.08** Compact

Classification of web in flexure - Table B4.1b (case 15)

Width to thickness ratio $(d - 2 \times k) / t_w$ = **45.23**

Limiting ratio for compact section $\lambda_{pwf} = 3.76 \times \sqrt{[E / F_y]}$ = **90.55**

Limiting ratio for non-compact section $\lambda_{rwf} = 5.70 \times \sqrt{[E / F_y]}$ = **137.27** Compact

Section is compact in flexure

Design of members for shear - Chapter G

Required shear strength $V_r = \max(\text{abs}(V_{max}), \text{abs}(V_{min}))$ = **38.808** kips

Web area $A_w = d \times t_w$ = **6.39** in^2

Web plate buckling coefficient k_v = **5**

Web shear coefficient - eq G2-3 C_v = **1**

Nominal shear strength – eq G2-1 $V_n = 0.6 \times F_y \times A_w \times C_v$ = **191.700** kips

Resistance factor for shear ϕ_v = **1.00**

Design shear strength $V_c = \phi_v \times V_n$ = **191.700** kips

PASS - Design shear strength exceeds required shear strength

Design of members for flexure in the major axis - Chapter F

Required flexural strength $M_r = \max(\text{abs}(M_{s1\_max}), \text{abs}(M_{s1\_min}))$ = **226.782** kips_ft

Yielding - Section F2.1

Nominal flexural strength for yielding - eq F2-1 $M_{nyld} = M_p = F_y \times Z_x$ = **420.833** kips_ft

Nominal flexural strength $M_n = M_{nyld}$ = **420.833** kips_ft

Design flexural strength $M_c = \phi_b \times M_n$ = **378.750** kips_ft

PASS - Design flexural strength exceeds required flexural strength

Design of members for vertical deflection

Consider deflection due to dead, live, roof live and snow loads

Limiting deflection $\delta_{lim} = L_{s1} / 360$ = **0.867** in

Maximum deflection span 1 $\delta = \max(\text{abs}(\delta_{max}), \text{abs}(\delta_{min}))$ = **0.806** in

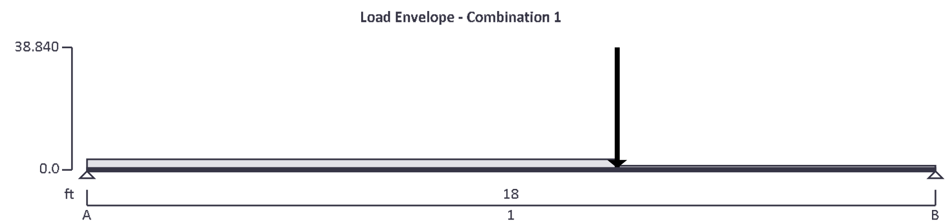
PASS - Maximum deflection does not exceed deflection limit

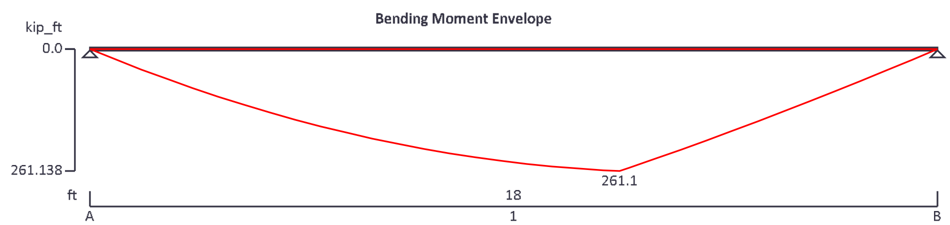
STEEL BEAM - GRID G-I

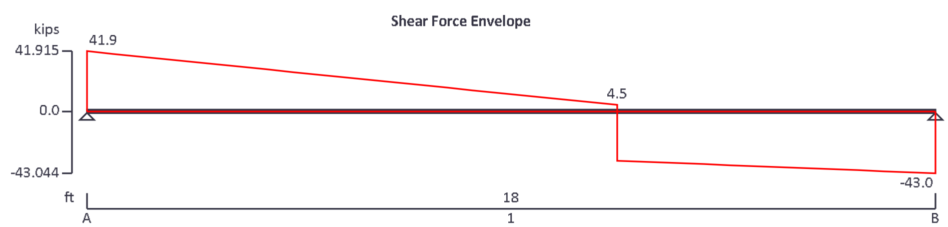
STEEL BEAM ANALYSIS & DESIGN (AISC360-10)

In accordance with AISC360-10 using the LRFD method

Tedds calculation version 3.0.14







Support conditions

Support A	Vertically restrained
	Rotationally free
Support B	Vertically restrained
	Rotationally free

Applied loading

Beam loads	Dead self weight of beam × 1
	DL - Dead partial UDL 1.085 kips/ft from 0.00 in to 135.00 in
	SL - Snow partial UDL 1.2 kips/ft from 0.00 in to 135.00 in
	Pd - Dead point load 6.9 kips at 135.00 in
	Ps - Snow point load 19.1 kips at 135.00 in

DL - Dead partial UDL 0.83 kips/ft from 135.00 in to 216.00 in

SL - Snow partial UDL 0.12 kips/ft from 135.00 in to 216.00 in

Load combinations

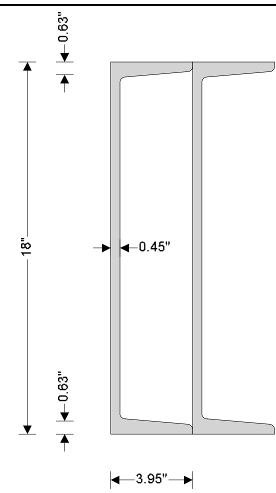
Load combination 1	Support A	Dead × 1.20
		Live × 1.60
		Roof live × 1.60
		Snow × 1.60
		Dead × 1.20
		Live × 1.60
		Roof live × 1.60
		Snow × 1.60
	Support B	Dead × 1.20
		Live × 1.60
		Roof live × 1.60
		Snow × 1.60

Analysis results

Maximum moment	M_{max} = **261.1** kips_ft	M_{min} = **0** kips_ft
Maximum shear	V_{max} = **41.9** kips	V_{min} = **-43** kips
Deflection	δ_{max} = **0.3** in	δ_{min} = **0** in
Maximum reaction at support A	R_{A_max} = **41.9** kips	R_{A_min} = **41.9** kips
Unfactored dead load reaction at support A	R_{A_Dead} = **12.8** kips	
Unfactored snow load reaction at support A	R_{A_Snow} = **16.6** kips	
Maximum reaction at support B	R_{B_max} = **43** kips	R_{B_min} = **43** kips
Unfactored dead load reaction at support B	R_{B_Dead} = **13.5** kips	
Unfactored snow load reaction at support B	R_{B_Snow} = **16.8** kips	

Section details

Section type	**2 x MC 18x42.7 (AISC 15th Edn (v15.0))**
ASTM steel designation	**A992**
Steel yield stress	F_y = **50** ksi
Steel tensile stress	F_u = **65** ksi
Modulus of elasticity	E = **29000** ksi



Resistance factors

Resistance factor for tensile yielding	ϕ_{ty} = **0.90**
Resistance factor for tensile rupture	ϕ_{tr} = **0.75**
Resistance factor for compression	ϕ_c = **0.90**
Resistance factor for flexure	ϕ_b = **0.90**

Lateral bracing

Span 1 has continuous lateral bracing

Classification of sections for local buckling - Section B4.1

Classification of flanges in flexure - Table B4.1b (case 10)

Width to thickness ratio	b_f / t_f = **6.32**	
Limiting ratio for compact section	$\lambda_{pff} = 0.38 \times \sqrt{[E / F_y]}$ = **9.15**	
Limiting ratio for non-compact section	$\lambda_{rff} = 1.0 \times \sqrt{[E / F_y]}$ = **24.08**	Compact

Classification of web in flexure - Table B4.1b (case 15)

Width to thickness ratio	$(d - 2 \times k) / t_w$ = **33.60**	
Limiting ratio for compact section	$\lambda_{pwf} = 3.76 \times \sqrt{[E / F_y]}$ = **90.55**	
Limiting ratio for non-compact section	$\lambda_{rwf} = 5.70 \times \sqrt{[E / F_y]}$ = **137.27**	Compact

Section is compact in flexure

Design of members for shear - Chapter G

Required shear strength	$V_r = \max(\text{abs}(V_{max}), \text{abs}(V_{min}))$ = **43.044** kips
Web area	$A_w = d \times t_w$ = **8.1** in^2
Web plate buckling coefficient	k_v = **5**
Web shear coefficient - eq G2-3	C_v = **1**
Nominal shear strength – eq G2-1	$V_n = 0.6 \times F_y \times N \times A_w \times C_v$ = **486.000** kips
Resistance factor for shear	ϕ_v = **0.90**
Design shear strength	$V_c = \phi_v \times V_n$ = **437.400** kips

PASS - Design shear strength exceeds required shear strength

Design of members for flexure in the major axis - Chapter F

Required flexural strength $M_r = max(abs(M_{s1\_max}), abs(M_{s1\_min}))$ = **261.138** kips_ft

Yielding - Section F2.1

Nominal flexural strength for yielding - eq F2-1 $M_{nyld} = M_p = F_y \times N \times Z_x$ = **625.833** kips_ft

Nominal flexural strength $M_n = M_{nyld}$ = **625.833** kips_ft

Design flexural strength $M_c = \phi_b \times M_n$ = **563.250** kips_ft

PASS - Design flexural strength exceeds required flexural strength

Design of members for vertical deflection

Consider deflection due to dead, live, roof live and snow loads

Limiting deflection $\delta_{lim} = L_{s1} / 600$ = **0.36** in

Maximum deflection span 1 $\delta = max(abs(\delta_{max}), abs(\delta_{min}))$ = **0.3** in

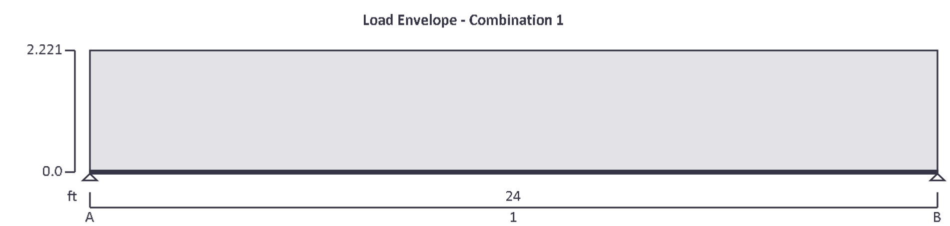
PASS - Maximum deflection does not exceed deflection limit

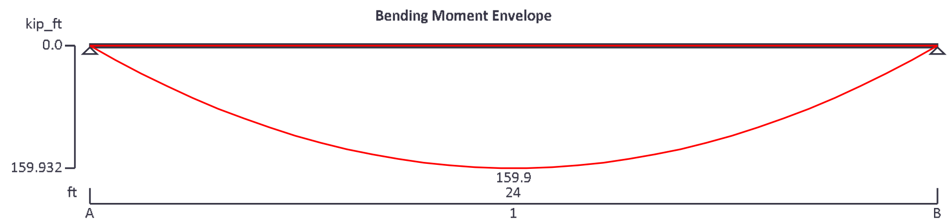
STEEL BEAM - GRID 11.5

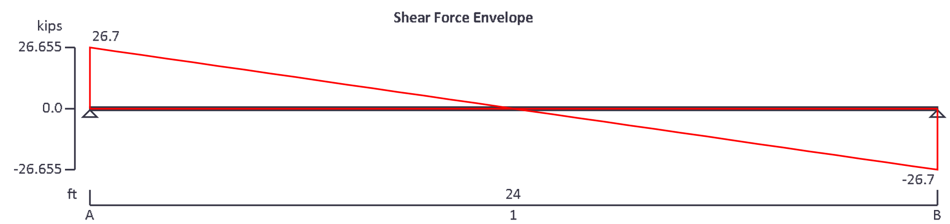
STEEL BEAM ANALYSIS & DESIGN (AISC360-10)

In accordance with AISC360-10 using the LRFD method

Tedds calculation version 3.0.14







Support conditions

Support A	Vertically restrained
	Rotationally free
Support B	Vertically restrained
	Rotationally free

Applied loading

Beam loads	Dead self weight of beam × 1
	DL - Dead full UDL 0.26 kips/ft
	SL - Snow full UDL 1.17 kips/ft

Load combinations

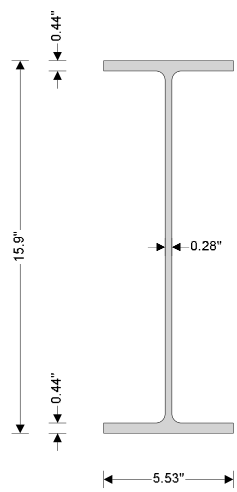
Load combination 1	Support A	Dead × 1.20
		Live × 1.60
		Roof live × 1.60
		Snow × 1.60
		Dead × 1.20
		Live × 1.60
		Roof live × 1.60
		Snow × 1.60
	Support B	Dead × 1.20
		Live × 1.60
		Roof live × 1.60
		Snow × 1.60

Analysis results

Maximum moment	M_{max} = **159.9** kips_ft	M_{min} = **0** kips_ft
Maximum shear	V_{max} = **26.7** kips	V_{min} = **-26.7** kips
Deflection	δ_{max} = **1** in	δ_{min} = **0** in
Maximum reaction at support A	R_{A_max} = **26.7** kips	R_{A_min} = **26.7** kips
Unfactored dead load reaction at support A	R_{A_Dead} = **3.5** kips	
Unfactored snow load reaction at support A	R_{A_Snow} = **14** kips	
Maximum reaction at support B	R_{B_max} = **26.7** kips	R_{B_min} = **26.7** kips
Unfactored dead load reaction at support B	R_{B_Dead} = **3.5** kips	
Unfactored snow load reaction at support B	R_{B_Snow} = **14** kips	

Section details

Section type	**W 16x31 (AISC 15th Edn (v15.0))**
ASTM steel designation	**A992**
Steel yield stress	F_y = **50** ksi
Steel tensile stress	F_u = **65** ksi
Modulus of elasticity	E = **29000** ksi



Resistance factors

Resistance factor for tensile yielding	ϕ_{ty} = **0.90**
Resistance factor for tensile rupture	ϕ_{tr} = **0.75**
Resistance factor for compression	ϕ_c = **0.90**
Resistance factor for flexure	ϕ_b = **0.90**

Lateral bracing

Span 1 has continuous lateral bracing

Classification of sections for local buckling - Section B4.1

Classification of flanges in flexure - Table B4.1b (case 10)

Width to thickness ratio	$b_f / (2 \times t_f)$ = **6.28**	
Limiting ratio for compact section	$\lambda_{pff} = 0.38 \times \sqrt{[E / F_y]}$ = **9.15**	
Limiting ratio for non-compact section	$\lambda_{rff} = 1.0 \times \sqrt{[E / F_y]}$ = **24.08**	Compact

Classification of web in flexure - Table B4.1b (case 15)

Width to thickness ratio	$(d - 2 \times k) / t_w$ = **51.69**	
Limiting ratio for compact section	$\lambda_{pwf} = 3.76 \times \sqrt{[E / F_y]}$ = **90.55**	
Limiting ratio for non-compact section	$\lambda_{rwf} = 5.70 \times \sqrt{[E / F_y]}$ = **137.27**	Compact

Section is compact in flexure

Design of members for shear - Chapter G

Required shear strength	$V_r = \max(\text{abs}(V_{max}), \text{abs}(V_{min}))$ = **26.655** kips
Web area	$A_w = d \times t_w$ = **4.373** in^2
Web plate buckling coefficient	k_v = **5**
Web shear coefficient - eq G2-3	C_v = **1**
Nominal shear strength – eq G2-1	$V_n = 0.6 \times F_y \times A_w \times C_v$ = **131.175** kips
Resistance factor for shear	ϕ_v = **1.00**
Design shear strength	$V_c = \phi_v \times V_n$ = **131.175** kips

PASS - Design shear strength exceeds required shear strength

Design of members for flexure in the major axis - Chapter F

Required flexural strength	$M_r = \max(\text{abs}(M_{s1\_max}), \text{abs}(M_{s1\_min}))$ = **159.932** kips_ft

Yielding - Section F2.1

Nominal flexural strength for yielding - eq F2-1	$M_{nyld} = M_p = F_y \times Z_x$ = **225** kips_ft
Nominal flexural strength	$M_n = M_{nyld}$ = **225.000** kips_ft
Design flexural strength	$M_c = \phi_b \times M_n$ = **202.500** kips_ft

PASS - Design flexural strength exceeds required flexural strength

Design of members for vertical deflection

Consider deflection due to dead, live, roof live and snow loads

Limiting deflection	$\delta_{lim} = L_{s1} / 250$ = **1.152** in
Maximum deflection span 1	$\delta = \max(\text{abs}(\delta_{max}), \text{abs}(\delta_{min}))$ = **1.003** in

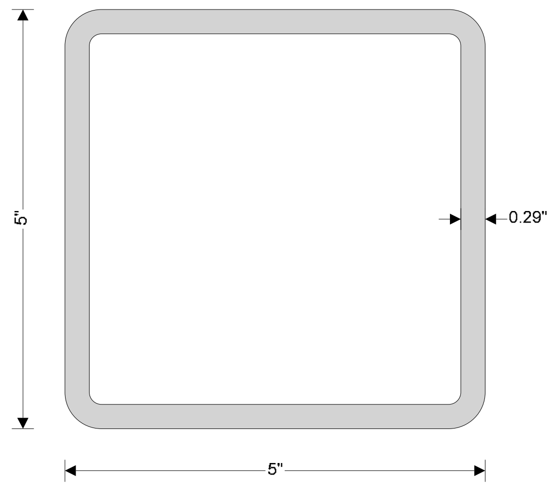
PASS - Maximum deflection does not exceed deflection limit

STEEL COLUMN AT H/9.7

STEEL COLUMN DESIGN

In accordance with AISC360-10 and the LRFD method

Tedds calculation version 1.0.10



Column and loading details

Column details

Column section **HSS 5x5x5/16**

Design loading

Required axial strength P_r = **114** kips (Compression)

Moment about x axis at end 1 M_{x1} = **0.0** kips_ft

Moment about x axis at end 2 M_{x2} = **0.0** kips_ft

Maximum moment about x axis $M_x = max(abs(M_{x1}), abs(M_{x2}))$ = **0.0** kips_ft

Moment about y axis at end 1 M_{y1} = **0.0** kips_ft

Moment about y axis at end 2 M_{y2} = **0.0** kips_ft

Maximum moment about y axis $M_y = max(abs(M_{y1}), abs(M_{y2}))$ = **0.0** kips_ft

Maximum shear force parallel to y axis V_{ry} = **0.0** kips

Maximum shear force parallel to x axis V_{rx} = **0.0** kips

Material details

Steel grade **A500 Gr. B**

Yield strength F_y = **46** ksi

Ultimate strength F_u = **58** ksi

Modulus of elasticity E = **29000** ksi

Shear modulus of elasticity G = **11200** ksi

Unbraced lengths

For buckling about x axis L_x = **156** in

For buckling about y axis L_y = **12** in

For torsional buckling L_z = **12** in

Effective length factors

For buckling about x axis K_x = **1.00**

For buckling about y axis K_y = **13.00**

For torsional buckling K_z = **1.00**

Section classification

Section classification for local buckling (cl. B4)

Critical flange width $b = b_f - 3 \times t$ = **4.127** in

Critical web width $h = d - 3 \times t$ = **4.127** in

Width to thickness ratio of flange (compression) $\lambda_{f\_c} = b / t$ = **14.182**

Width to thickness ratio of web (compression) $\lambda_{w\_c} = h / t$ = **14.182**

Width to thickness ratio of flange (major flexure) $\lambda_{f\_fx} = b / t$ = **14.182**

Width to thickness ratio of web (major flexure) $\lambda_{w\_fx} = h / t$ = **14.182**

Width to thickness ratio of flange (minor flexure) $\lambda_{f\_fy} = h / t$ = **14.182**

Width to thickness ratio of web (minor flexure) $\lambda_{w\_fy} = b / t$ = **14.182**

Compression

Limit for nonslender section $\lambda_{r\_c} = 1.40 \times \sqrt{(E / F_y)}$ = **35.152**

The section is nonslender in compression

Slenderness

Member slenderness

Slenderness ratio about x axis $SR_x = K_x \times L_x / r_x$ = **82.1**

Slenderness ratio about y axis $SR_y = K_y \times L_y / r_y$ = **82.1**

Reduction factor for slender elements

Reduction factor for slender elements (E7)

The section does not contain any slender elements therefore:-

Slender element reduction factor Q = **1.0**

Compressive strength

Flexural buckling about x axis (cl. E3)

Elastic critical buckling stress $F_{ex} = (\pi^2 \times E) / (SR_x)^2$ = **42.5** ksi

Reduction factor $Q_x = Q$ = **1.000**

Flexural buckling stress about x axis $F_{crx} = Q_x \times (0.658^{Q_x \times F_y / F_{ex}}) \times F_y$ = **29.2** ksi

Nominal flexural buckling strength $P_{nx} = F_{crx} \times A_g$ = **153.7** kips

Flexural buckling about y axis (cl. E3)

Elastic critical buckling stress $F_{ey} = (\pi^2 \times E) / (SR_y)^2$ = **42.5** ksi

Reduction factor $Q_y = Q$ = **1.000**

Flexural buckling stress about y axis $F_{cry} = Q_y \times (0.658^{Q_y \times F_y / F_{ey}}) \times F_y$ = **29.2** ksi

Nominal flexural buckling strength $P_{ny} = F_{cry} \times A_g$ = **153.7** kips

Design compressive strength (cl.E1)

Resistance factor for compression ϕ_c = **0.90**

Design compressive strength $P_c = \phi_c \times \min(P_{nx}, P_{ny})$ = **138.4** kips

PASS - The design compressive strength exceeds the required compressive strength

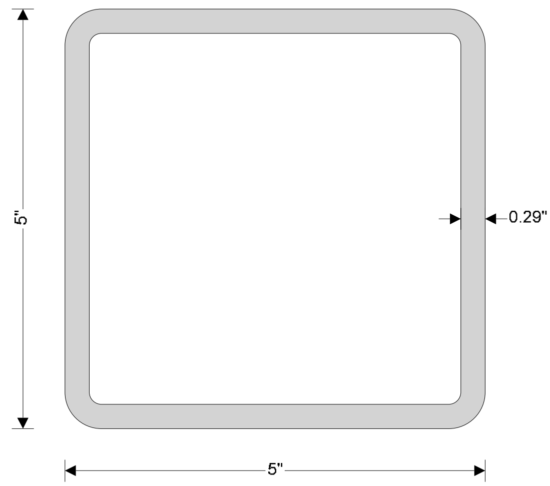
REQUIRED COLUMN SECTION IS LARGER THAN EXISTING. SEE BUILT UP COLUMN DESIGN CALCULATIONS ON FOLLOWING PAGES

STEEL COLUMN AT H/11.5

STEEL COLUMN DESIGN

In accordance with AISC360-10 and the LRFD method

Tedds calculation version 1.0.10



Column and loading details

Column details

Column section	**HSS 5x5x5/16**

Design loading

Required axial strength	P_r = **50** kips (Compression)
Moment about x axis at end 1	M_{x1} = **17.0** kips_ft
Moment about x axis at end 2	M_{x2} = **0.0** kips_ft
	Single curvature bending about x axis
Maximum moment about x axis	M_x = max(abs(M_{x1}), abs(M_{x2})) = **17.0** kips_ft
Moment about y axis at end 1	M_{y1} = **0.0** kips_ft
Moment about y axis at end 2	M_{y2} = **0.0** kips_ft
Maximum moment about y axis	M_y = max(abs(M_{y1}), abs(M_{y2})) = **0.0** kips_ft
Maximum shear force parallel to y axis	V_{ry} = **0.0** kips
Maximum shear force parallel to x axis	V_{rx} = **0.0** kips

Material details

Steel grade	**A500 Gr. B**
Yield strength	F_y = **46** ksi
Ultimate strength	F_u = **58** ksi
Modulus of elasticity	E = **29000** ksi
Shear modulus of elasticity	G = **11200** ksi

Unbraced lengths

For buckling about x axis	L_x = **156** in
For buckling about y axis	L_y = **12** in

For torsional buckling L_z = **12** in

Effective length factors

For buckling about x axis K_x = **1.00**

For buckling about y axis K_y = **13.00**

For torsional buckling K_z = **1.00**

Section classification

Section classification for local buckling (cl. B4)

Critical flange width $b = b_f - 3 \times t$ = **4.127** in

Critical web width $h = d - 3 \times t$ = **4.127** in

Width to thickness ratio of flange (compression) $\lambda_{f\_c} = b / t$ = **14.182**

Width to thickness ratio of web (compression) $\lambda_{w\_c} = h / t$ = **14.182**

Width to thickness ratio of flange (major flexure) $\lambda_{f\_fx} = b / t$ = **14.182**

Width to thickness ratio of web (major flexure) $\lambda_{w\_fx} = h / t$ = **14.182**

Width to thickness ratio of flange (minor flexure) $\lambda_{f\_fy} = h / t$ = **14.182**

Width to thickness ratio of web (minor flexure) $\lambda_{w\_fy} = b / t$ = **14.182**

Compression

Limit for nonslender section $\lambda_{r\_c} = 1.40 \times \sqrt{(E / F_y)}$ = **35.152**

The section is nonslender in compression

Flexure

Limit for compact flange $\lambda_{pf\_f} = 1.12 \times \sqrt{(E / F_y)}$ = **28.121**

Limit for noncompact flange $\lambda_{rf\_f} = 1.40 \times \sqrt{(E / F_y)}$ = **35.152**

Limit for compact web $\lambda_{pw\_f} = 2.42 \times \sqrt{(E / F_y)}$ = **60.762**

Limit for noncompact web $\lambda_{rw\_f} = 5.70 \times \sqrt{(E / F_y)}$ = **143.118**

The section is compact in flexure about the major axis

Slenderness

Member slenderness

Slenderness ratio about x axis $SR_x = K_x \times L_x / r_x$ = **82.1**

Slenderness ratio about y axis $SR_y = K_y \times L_y / r_y$ = **82.1**

Second order effects

Second order effects for bending about x axis (cl. App 8.1)

Coefficient C_m $C_{mx} = 0.6 + 0.4 \times M_{x2} / M_{x1}$ = **0.600**

Coefficient α α = **1.0**

Elastic critical buckling stress $P_{e1x} = \pi^2 \times E \times I_x / (K_{1x} \times L_x)^2$ = **223.5** kips

P-δ amplifier $B_{1x} = \max(1.0, C_{mx} / (1 - \alpha \times P_r / P_{e1x}))$ = **1.000**

Required flexural strength $M_{rx} = B_{1x} \times M_x$ = **17.0** kips_ft

Second order effects for bending about y axis (cl. App 8.1)

Coefficient C_m $C_{my} = 0.6 + 0.4 \times M_{y1} / M_{y2}$ = **0.600**

Coefficient α α = **1.0**

Elastic critical buckling stress $P_{e1y} = \pi^2 \times E \times I_y / (K_{1y} \times L_y)^2$ = **37764.9** kips

P-δ amplifier $B_{1y} = \max(1.0, C_{my} / (1 - \alpha \times P_r / P_{e1y}))$ = **1.000**

Required flexural strength $M_{ry} = B_{1y} \times M_y$ = **0.0** kips_ft

Reduction factor for slender elements

Reduction factor for slender elements (E7)

The section does not contain any slender elements therefore:-

Slender element reduction factor Q = **1.0**

Compressive strength

Flexural buckling about x axis (cl. E3)

Elastic critical buckling stress $F_{ex} = (\pi^2 \times E) / (SR_x)^2$ = **42.5** ksi

Reduction factor $Q_x = Q$ = **1.000**

Flexural buckling stress about x axis $F_{crx} = Q_x \times (0.658^{Q_x \times F_y / F_{ex}}) \times F_y$ = **29.2** ksi

Nominal flexural buckling strength $P_{nx} = F_{crx} \times A_g$ = **153.7** kips

Flexural buckling about y axis (cl. E3)

Elastic critical buckling stress $F_{ey} = (\pi^2 \times E) / (SR_y)^2$ = **42.5** ksi

Reduction factor $Q_y = Q$ = **1.000**

Flexural buckling stress about y axis $F_{cry} = Q_y \times (0.658^{Q_y \times F_y / F_{ey}}) \times F_y$ = **29.2** ksi

Nominal flexural buckling strength $P_{ny} = F_{cry} \times A_g$ = **153.7** kips

Design compressive strength (cl.E1)

Resistance factor for compression ϕ_c = **0.90**

Design compressive strength $P_c = \phi_c \times \min(P_{nx}, P_{ny})$ = **138.4** kips

PASS - The design compressive strength exceeds the required compressive strength

Flexural strength about the major axis

Yielding (cl. F7.1)

Nominal flexural strength $M_{nx\_yld} = M_{px} = F_y \times Z_x$ = **35.1** kips_ft

Design flexural strength about the major axis (cl. F1)

Resistance factor for flexure ϕ_b = **0.90**

Allowable flexural strength $M_{cx} = \phi_b \times \min(M_{nx\_yld})$ = **31.602** kip_ft

PASS - The allowable flexural strength about the major axis exceeds the required flexural strength

Combined forces

Member utilization (cl. H1.1)

Equation H1-1a $UR = \text{abs}(P_r) / P_c + 8 / 9 \times (M_{rx} / M_{cx} + M_{ry} / M_{cy})$ = **0.840**

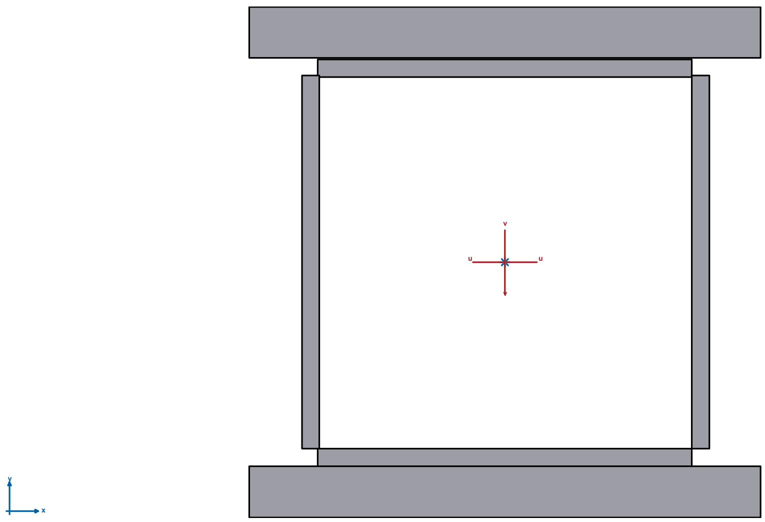
PASS - The member is adequate for the combined forces

REQUIRED COLUMN SECTION IS LARGER THAN EXISTING.
SEE BUILT UP COLUMN DESIGN CALCULATIONS ON
FOLLOWING PAGES

Tekla Tedds Jirsa Hedrick Structural Engineers 8490 E Crescent Pkwy Suite 250 Greenwood Village, CO 80111	Project Steamboat Schools				Job Ref. 20191103	
	Section SP - Built Up Column Properties				Sheet no./rev. 1	
	Calc. by VSW	Date 3/16/2020	Chk'd by	Date	App'd by	Date

CALCULATION OF SECTION PROPERTIES

Tedds calculation version 2.0.07



Area

A = **7.54** in^2

2nd moment of area

I_{uu} = **31.5** in^4 I_{vv} = **16.5** in^4 I_{xx} = **31.5** in^4 I_{yy} = **16.5** in^4

Radius of gyration

r_{uu} = **2.04** in r_{vv} = **1.48** in r_{xx} = **2.04** in r_{yy} = **1.48** in

Plastic section modulus (only shapes with all rectangles at 90 degs)

Z_{xx} = **14.8** in^3 Z_{yy} = **9.84** in^3

Distance to combined centroid

X_e = **0.00** in Y_e = **0.00** in

Distance to equal axis area (only shapes with all rectangles at 90 degs)

X_p = **0.00** in Y_p = **0.00** in

Elastic section modulus

S_{xx} = **12.6** in^3 S_{yy} = **6.59** in^3

COLUMNS ON GRID H

HSS4X4X3/16 , $P_u = 114K$

PER AISC SECTION E6:

HSS4X4X3/16 → $r = 1.55$ IN

PL3/8 x 5 : $r = \sqrt{I/A} = 0.108$ IN

$$I = \frac{5" \times .375"^3}{12} = .022\,IN^4$$

$$A = 5" \times .375" = 1.875\,IN^2$$

FOR 2" WELDS @ 8" OC → $a = 8"$

$a/r_i = 8"/.108" = 74$ ⇒ EQN E6-2b GOVERNS

$$\left(\frac{KL}{r}\right)_m = \sqrt{\left(\frac{KL}{r}\right)_o^2 + \left(\frac{K_i a}{r_i}\right)^2}$$

$$= \sqrt{\left(\frac{1(13' \times 12")}{1.49"}\right)^2 + \left(\frac{1(8")}{.108"}\right)^2}$$

$$= 128$$

b/t = 20 FOR BARE COLUMN

SLENDERNESS LIMIT $= 1.4\sqrt{E/F_y} = 35$

PER SECTION E3:

$$\phi P_n = \phi F_{cr} A_g$$

$$4.71\sqrt{E/F_y} = 118 \text{ (FOR 46 KSI)}$$

$$F_{cr} = 0.877 F_e \quad \text{(E3-3)}$$

JIRSA|HEDRICK Structural Engineers

PROJECT NO. 20191103 SHEET ____ OF ____

PROJECT STEAMBOAT SCHOOLS

SUBJECT SP-BUILT UP COLUMN BY VSW DATE 3/16/20

$$F_e = \frac{\pi^2 E}{\left(\frac{KL}{r}\right)^2} = \frac{\pi^2 \cdot 29000\,KSI}{128^2} = 17.46\,KSI$$

$$F_{cr} = 0.877\,(17.46\,KSI) = 15.3\,KSI$$

$$\phi F_{cr} A_g = 0.9\,(15.3\,KSI)(6.29\,IN^2)$$

$$= 86K \rightarrow NG$$

TRY 1/2" PLATES

$$I = \frac{5" \times .5"^3}{12} = .052\,IN^4$$

$$A = 5" \times .5" = 2.5\,IN^2$$

$$r = .144"$$

$$a/r_i = 55$$

$$\left(\frac{KL}{r}\right)_m = \sqrt{\left(\frac{1 \times (13' \times 12")}{2.04"}\right)^2 + \left(\frac{1\,(8")}{.144"}\right)^2}$$

$$= 94.4 < 118$$

$$F_{cr} = .658^{F_y/F_e} \times F_y$$

$$F_e = \frac{\pi^2\,29000\,KSI}{94^2} = 32\,KSI$$

$$F_{cr} = .658^{36/32} \times 36 = 22.5\,KSI$$

$$\phi P_c = .9\,(22.5\,KSI)(7.54\,IN^2) = 153K \text{ OK}$$

ADD 5" × 1/2" PLATES 2 SIDES

JIRSA | HEDRICK
Structural Engineers

PROJECT NO. 20191103 SHEET ____ OF ____

PROJECT STEAMBOAT SCHOOLS

SUBJECT SP - PREK COLUMN BY VSW DATE 1/29/20

SP-(E) COLUMN

GRID 2B

- COLUMN = HSS8×8×3/8
- FOOTING = 7'-6" □ × 1'-4"
  ↳ ASSUME Q = 3000psf

$P_{MAX} = 3000psf (7.5')^2 = 169K$

$P_u = 1.5(169K) = 254K$

2 CHANNELS ~> 1 EA SIDE

$P_u = 254K/2 = 127K,\ P = 85K$

$L = 8.67'$

$M_n = F_y Z_x$

$$M = \frac{PL}{4} = \frac{85K(8.67' \cdot 12")}{4} = 2211K\text{-}IN$$

$1.67(2211K\text{-}IN) = 50KSI \cdot Z_{req}$

$Z = 74 IN^3$

FOR $\Delta = L/240 = 0.43"$:

$$.43" = \frac{85K(8.67' \cdot 12")^3}{48(29000KSI)I}$$

$I_{req} = 160 IN^4$

MC18×51.9 ~> REACTION = 43K EA END

HSS8×8×3/16

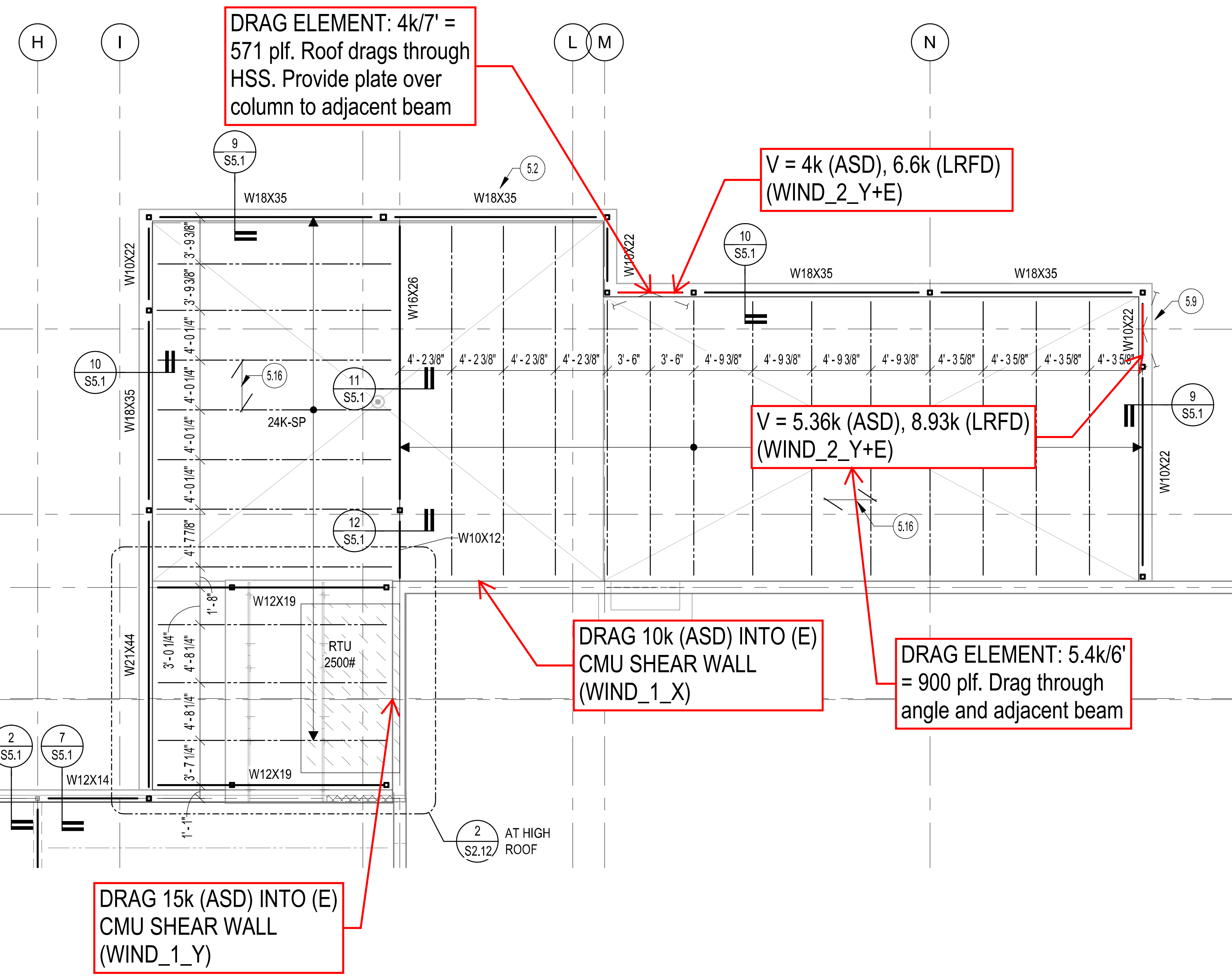
$P/\Omega = 117K$

Lateral Analysis

SP - Lateral Plan

Red lines = braced frames

Wind load per foot = 250 plf (ASD), 425 plf (LRFD)
Diaphragm shear (north-south) = 4k/79' = 51 plf
Diaphragm shear (north-south) = 10k/79' = 127 plf
Diaphragm shear (east-west) = 5.4k/23' = 235 plf
Diaphragm shear (east-west) = 15k/46' = 326 plf
Diaphragm shear capacity = 550 plf (ASD)



LOAD CASE: Wind

Wind ASCE 7-10
Exposure: C
Basic Wind Speed (mph): 120.0
Apply Directionality Factor, Kd = 0.85
Use Topography Factor, Kzt: 1.00
Use Calculated Frequency for X-Dir.
Use Calculated Frequency for Y-Dir.
Gust Factor for Rigid Structures, G: Use Calculated G for X-Dir.
Gust Factor for Rigid Structures, G: Use Calculated G for Y-Dir.
Damping Ratio for Flexible Structures= 0.01
Mean Roof Height (ft): Top Story Height + Parapet = 21.42
Ground Level: Base

WIND PRESSURES:

X-Direction: Natural Frequency = 19.217 Structure is Rigid
Y-Direction: Natural Frequency = 8.851 Structure is Rigid
CpWindward = 0.80 qLeeward (qh) = 28.67 psf
GCpn (Parapet): Windward = 1.50 Leeward = -1.00

Height	Kz	Kzt	qz	Gust Factor G		CpLeeward		Pressure (psf)	
ft			psf	X	Y	X	Y	X	Y
21.42	0.915	1.000	28.671	0.892	0.893	-0.500	-0.466	33.248	32.412
14.67	0.849	1.000	26.599	----	----	----	----	66.498	66.498
12.67	0.849	1.000	26.599	0.879	0.868	-0.357	-0.500	27.702	30.910
0.00	0.849	1.000	26.599	0.879	0.868	-0.357	-0.500	27.702	30.910

APPLIED DIAPHRAGM FORCES

Type: Wind_ASCE710_1_X

Level	Diaph.#	Ht	Fx	Fy	X	Y
		ft	kips	kips	ft	ft
Penthouse	1	21.42	0.00	0.00	15.92	16.00
Roof	1	12.67	17.08	0.00	38.87	29.00

APPLIED STORY FORCES

Type: Wind_ASCE710_1_X

Level	Ht	Fx	Fy
	ft	kips	kips
Penthouse	21.42	0.00	0.00
Roof	12.67	17.08	0.00
		17.08	0.00

Note: Diaphragm (or Diaphragms) at Top Story Found with No Lateral Members. Calculated Story Forces for Wind or Seismic Load Cases at This Level Combined to Story Below by the Program. It is also Assumed for This Level that Center of Rigidity is at the Center of Mass.

APPLIED DIAPHRAGM FORCES

Type: Wind_ASCE710_1_Y

Level	Diaph.#	Ht	Fx	Fy	X	Y
		ft	kips	kips	ft	ft
Penthouse	1	21.42	0.00	0.00	15.92	16.00
Roof	1	12.67	0.00	29.16	40.60	29.96

APPLIED STORY FORCES

Type: Wind_ASCE710_1_Y

Level	Ht	Fx	Fy
	ft	kips	kips
Penthouse	21.42	0.00	0.00
Roof	12.67	0.00	29.16
		0.00	29.16

Note: Diaphragm (or Diaphragms) at Top Story Found with No Lateral Members. Calculated Story Forces for Wind or Seismic Load Cases at This Level Combined to Story Below by the Program. It is also Assumed for This Level that Center of Rigidity is at the Center of Mass.

APPLIED DIAPHRAGM FORCES

Type: Wind_ASCE710_2_X+E

Level	Diaph.#	Ht	Fx	Fy	X	Y
		ft	kips	kips	ft	ft
Penthouse	1	21.42	0.00	0.00	15.92	18.55
Roof	1	12.67	12.81	0.00	38.87	35.57

APPLIED STORY FORCES

Type: Wind_ASCE710_2_X+E

Level	Ht	Fx	Fy
	ft	kips	kips
Penthouse	21.42	0.00	0.00
Roof	12.67	12.81	0.00
		12.81	0.00

Note: Diaphragm (or Diaphragms) at Top Story Found with No Lateral Members. Calculated Story Forces for Wind or Seismic Load Cases at This Level Combined to Story Below by the Program. It is also Assumed for This Level that Center of Rigidity is at the Center of Mass.

APPLIED DIAPHRAGM FORCES

Type: Wind_ASCE710_2_X-E

Level	Diaph.#	Ht	Fx	Fy	X	Y
		ft	kips	kips	ft	ft

Penthouse	1	21.42	0.00	0.00	15.92	13.45
Roof	1	12.67	12.81	0.00	38.87	22.44

APPLIED STORY FORCES

Type: Wind_ASCE710_2_X-E

Level	Ht ft	Fx kips	Fy kips
Penthouse	21.42	0.00	0.00
Roof	12.67	12.81	0.00
		12.81	0.00

Note: Diaphragm (or Diaphragms) at Top Story Found with No Lateral Members. Calculated Story Forces for Wind or Seismic Load Cases at This Level Combined to Story Below by the Program. It is also Assumed for This Level that Center of Rigidity is at the Center of Mass.

APPLIED DIAPHRAGM FORCES

Type: Wind_ASCE710_2_Y+E

Level	Diaph.#	Ht ft	Fx kips	Fy kips	X ft	Y ft
Penthouse	1	21.42	0.00	0.00	18.09	16.00
Roof	1	12.67	0.00	21.87	52.24	29.96

APPLIED STORY FORCES

Type: Wind_ASCE710_2_Y+E

Level	Ht ft	Fx kips	Fy kips
Penthouse	21.42	0.00	0.00
Roof	12.67	0.00	21.87
		0.00	21.87

Note: Diaphragm (or Diaphragms) at Top Story Found with No Lateral Members. Calculated Story Forces for Wind or Seismic Load Cases at This Level Combined to Story Below by the Program. It is also Assumed for This Level that Center of Rigidity is at the Center of Mass.

APPLIED DIAPHRAGM FORCES

Type: Wind_ASCE710_2_Y-E

Level	Diaph.#	Ht ft	Fx kips	Fy kips	X ft	Y ft
Penthouse	1	21.42	0.00	0.00	13.74	16.00
Roof	1	12.67	0.00	21.87	28.95	29.96

APPLIED STORY FORCES

Type: Wind_ASCE710_2_Y-E

Level	Ht	Fx	Fy
	ft	kips	kips
Penthouse	21.42	0.00	0.00
Roof	12.67	0.00	21.87
		0.00	21.87

Note: Diaphragm (or Diaphragms) at Top Story Found with No Lateral Members. Calculated Story Forces for Wind or Seismic Load Cases at This Level Combined to Story Below by the Program. It is also Assumed for This Level that Center of Rigidity is at the Center of Mass.

APPLIED DIAPHRAGM FORCES

Type: Wind_ASCE710_3_X+Y

Level	Diaph.#	Ht	Fx	Fy	X	Y
		ft	kips	kips	ft	ft
Penthouse	1	21.42	0.00	0.00	15.92	16.00
Roof	1	12.67	12.16	22.39	40.02	29.69

APPLIED STORY FORCES

Type: Wind_ASCE710_3_X+Y

Level	Ht	Fx	Fy
	ft	kips	kips
Penthouse	21.42	0.00	0.00
Roof	12.67	12.16	22.39
		12.16	22.39

Note: Diaphragm (or Diaphragms) at Top Story Found with No Lateral Members. Calculated Story Forces for Wind or Seismic Load Cases at This Level Combined to Story Below by the Program. It is also Assumed for This Level that Center of Rigidity is at the Center of Mass.

APPLIED DIAPHRAGM FORCES

Type: Wind_ASCE710_3_X-Y

Level	Diaph.#	Ht	Fx	Fy	X	Y
		ft	kips	kips	ft	ft
Penthouse	1	21.42	0.00	-0.00	15.92	16.00
Roof	1	12.67	12.16	-22.39	40.02	29.69

APPLIED STORY FORCES

Type: Wind_ASCE710_3_X-Y

Level	Ht	Fx	Fy
	ft	kips	kips

Penthouse	21.42	0.00	0.00
Roof	12.67	12.16	-22.39
		12.16	-22.39

Note: Diaphragm (or Diaphragms) at Top Story Found with No Lateral Members. Calculated Story Forces for Wind or Seismic Load Cases at This Level Combined to Story Below by the Program. It is also Assumed for This Level that Center of Rigidity is at the Center of Mass.

APPLIED DIAPHRAGM FORCES

Type: Wind_ASCE710_4_X+Y_CW

Level	Diaph.#	Ht	Fx	Fy	X	Y
		ft	kips	kips	ft	ft
Penthouse	1	21.42	0.00	0.00	13.74	18.55
Roof	1	12.67	9.12	16.79	28.60	36.47

APPLIED STORY FORCES

Type: Wind_ASCE710_4_X+Y_CW

Level	Ht	Fx	Fy
	ft	kips	kips
Penthouse	21.42	0.00	0.00
Roof	12.67	9.12	16.79
		9.12	16.79

Note: Diaphragm (or Diaphragms) at Top Story Found with No Lateral Members. Calculated Story Forces for Wind or Seismic Load Cases at This Level Combined to Story Below by the Program. It is also Assumed for This Level that Center of Rigidity is at the Center of Mass.

APPLIED DIAPHRAGM FORCES

Type: Wind_ASCE710_4_X+Y_CCW

Level	Diaph.#	Ht	Fx	Fy	X	Y
		ft	kips	kips	ft	ft
Penthouse	1	21.42	0.00	0.00	18.09	13.45
Roof	1	12.67	9.12	16.79	51.45	22.92

APPLIED STORY FORCES

Type: Wind_ASCE710_4_X+Y_CCW

Level	Ht	Fx	Fy
	ft	kips	kips
Penthouse	21.42	0.00	0.00
Roof	12.67	9.12	16.79
		9.12	16.79

Note: Diaphragm (or Diaphragms) at Top Story Found with No Lateral Members. Calculated Story Forces for Wind or Seismic Load Cases at This Level Combined to Story Below by the Program. It is also Assumed for This Level that Center of Rigidity is at the Center of Mass.

APPLIED DIAPHRAGM FORCES

Type: Wind_ASCE710_4_X-Y_CW

Level	Diaph.#	Ht	Fx	Fy	X	Y
		ft	kips	kips	ft	ft
Penthouse	1	21.42	0.00	-0.00	18.09	18.55
Roof	1	12.67	9.12	-16.79	51.45	36.47

APPLIED STORY FORCES

Type: Wind_ASCE710_4_X-Y_CW

Level	Ht	Fx	Fy
	ft	kips	kips
Penthouse	21.42	0.00	0.00
Roof	12.67	9.12	-16.79
		9.12	-16.79

Note: Diaphragm (or Diaphragms) at Top Story Found with No Lateral Members. Calculated Story Forces for Wind or Seismic Load Cases at This Level Combined to Story Below by the Program. It is also Assumed for This Level that Center of Rigidity is at the Center of Mass.

APPLIED DIAPHRAGM FORCES

Type: Wind_ASCE710_4_X-Y_CCW

Level	Diaph.#	Ht	Fx	Fy	X	Y
		ft	kips	kips	ft	ft
Penthouse	1	21.42	0.00	-0.00	13.74	13.45
Roof	1	12.67	9.12	-16.79	28.60	22.92

APPLIED STORY FORCES

Type: Wind_ASCE710_4_X-Y_CCW

Level	Ht	Fx	Fy
	ft	kips	kips
Penthouse	21.42	0.00	0.00
Roof	12.67	9.12	-16.79
		9.12	-16.79

Note: Diaphragm (or Diaphragms) at Top Story Found with No Lateral Members. Calculated Story Forces for Wind or Seismic Load Cases at This Level Combined to Story Below by the Program. It is also Assumed for This Level that Center of Rigidity is at the Center of Mass.

LOAD CASE: Seismic

Seismic ASCE 7-10 Equivalent Lateral Force

Site Class: D	Importance Factor: 1.25	Ss: 0.270 g	S1: 0.074 g	TL: 4.00 s
Fa: 1.584	Fv: 2.400	SDs: 0.285 g	SD1: 0.118 g	

Occupancy Category: III Seismic Design Category: B

Provisions for: Force

Ground Level: Base

Dir	Eccent	R	Ta Equation	Building Period-T
X	+ And -	3.3	Std,Ct=0.020,x=0.75	Calculated
Y	+ And -	3.3	Std,Ct=0.020,x=0.75	Calculated

Dir	Ta	Cu	T	T-used	Cs Eq12.8-2	Cs(max) Eq12.8-3	Cs(min) Eq12.8-5	Cs-used	k
X	0.199	1.663	0.052	0.052	0.110	0.875	0.016	0.110	1.000

Dir	Ta	Cu	T	T-used	Cs Eq12.8-2	Cs(max) Eq12.8-3	Cs(min) Eq12.8-5	Cs-used	k
Y	0.199	1.663	0.113	0.113	0.110	0.403	0.016	0.110	1.000

Total Building Weight (kips) = 107.19

APPLIED DIAPHRAGM FORCES

Type: EQ_ASCE710_X_+E_F

Level	Diaph.#	Ht ft	Fx kips	Fy kips	X ft	Y ft
Penthouse	1	21.42	0.00	0.00	17.66	16.85
Roof	1	12.67	11.75	0.00	33.98	31.08

APPLIED STORY FORCES

Type: EQ_ASCE710_X_+E_F

Level	Ht ft	Fx kips	Fy kips
Penthouse	21.42	0.00	0.00
Roof	12.67	11.75	0.00
		11.75	0.00

Note: Diaphragm (or Diaphragms) at Top Story Found with No Lateral Members. Calculated Story Forces for Wind or Seismic Load Cases at This Level Combined to Story Below by the Program. It is also Assumed for This Level that Center of Rigidity is at the Center of Mass.

APPLIED DIAPHRAGM FORCES

Type: EQ_ASCE710_X_-E_F

Level	Diaph.#	Ht	Fx	Fy	X	Y

		ft	kips	kips	ft	ft
Penthouse	1	21.42	0.00	0.00	17.66	15.15
Roof	1	12.67	11.75	0.00	33.98	26.72

APPLIED STORY FORCES

Type: EQ_ASCE710_X_-E_F

Level	Ht	Fx	Fy
	ft	kips	kips
Penthouse	21.42	0.00	0.00
Roof	12.67	11.75	0.00
		11.75	0.00

Note: Diaphragm (or Diaphragms) at Top Story Found with No Lateral Members. Calculated Story Forces for Wind or Seismic Load Cases at This Level Combined to Story Below by the Program. It is also Assumed for This Level that Center of Rigidity is at the Center of Mass.

APPLIED DIAPHRAGM FORCES

Type: EQ_ASCE710_Y_+E_F

Level	Diaph.#	Ht	Fx	Fy	X	Y
		ft	kips	kips	ft	ft
Penthouse	1	21.42	0.00	0.00	18.38	16.00
Roof	1	12.67	0.00	11.75	37.61	28.90

APPLIED STORY FORCES

Type: EQ_ASCE710_Y_+E_F

Level	Ht	Fx	Fy
	ft	kips	kips
Penthouse	21.42	0.00	0.00
Roof	12.67	0.00	11.75
		0.00	11.75

Note: Diaphragm (or Diaphragms) at Top Story Found with No Lateral Members. Calculated Story Forces for Wind or Seismic Load Cases at This Level Combined to Story Below by the Program. It is also Assumed for This Level that Center of Rigidity is at the Center of Mass.

APPLIED DIAPHRAGM FORCES

Type: EQ_ASCE710_Y_-E_F

Level	Diaph.#	Ht	Fx	Fy	X	Y
		ft	kips	kips	ft	ft
Penthouse	1	21.42	0.00	0.00	16.93	16.00
Roof	1	12.67	0.00	11.75	30.34	28.90

APPLIED STORY FORCES

Type: EQ_ASCE710_Y_-E_F

Level	Ht	Fx	Fy
	ft	kips	kips
Penthouse	21.42	0.00	0.00
Roof	12.67	0.00	11.75
		0.00	11.75

Note: Diaphragm (or Diaphragms) at Top Story Found with No Lateral Members. Calculated Story Forces for Wind or Seismic Load Cases at This Level Combined to Story Below by the Program. It is also Assumed for This Level that Center of Rigidity is at the Center of Mass.

APPLIED DIAPHRAGM FORCES

Type: EQ_ASCE710_X_+E_0.3Y_+E_F

Level	Diaph.#	Ht	Fx	Fy	X	Y
		ft	kips	kips	ft	ft
Penthouse	1	21.42	0.00	0.00	18.38	16.85
Roof	1	12.67	11.75	3.53	37.61	31.08

APPLIED STORY FORCES

Type: EQ_ASCE710_X_+E_0.3Y_+E_F

Level	Ht	Fx	Fy
	ft	kips	kips
Penthouse	21.42	0.00	0.00
Roof	12.67	11.75	3.53
		11.75	3.53

Note: Diaphragm (or Diaphragms) at Top Story Found with No Lateral Members. Calculated Story Forces for Wind or Seismic Load Cases at This Level Combined to Story Below by the Program. It is also Assumed for This Level that Center of Rigidity is at the Center of Mass.

APPLIED DIAPHRAGM FORCES

Type: EQ_ASCE710_X_+E_-0.3Y_+E_F

Level	Diaph.#	Ht	Fx	Fy	X	Y
		ft	kips	kips	ft	ft
Penthouse	1	21.42	0.00	-0.00	18.38	16.85
Roof	1	12.67	11.75	-3.53	37.61	31.08

APPLIED STORY FORCES

Type: EQ_ASCE710_X_+E_-0.3Y_+E_F

Level	Ht	Fx	Fy
	ft	kips	kips

Penthouse	21.42	0.00	0.00
Roof	12.67	11.75	-3.53
		11.75	-3.53

Note: Diaphragm (or Diaphragms) at Top Story Found with No Lateral Members. Calculated Story Forces for Wind or Seismic Load Cases at This Level Combined to Story Below by the Program. It is also Assumed for This Level that Center of Rigidity is at the Center of Mass.

APPLIED DIAPHRAGM FORCES

Type: EQ_ASCE710_-X_+E_0.3Y_+E_F

Level	Diaph.#	Ht	Fx	Fy	X	Y
		ft	kips	kips	ft	ft
Penthouse	1	21.42	-0.00	0.00	18.38	16.85
Roof	1	12.67	-11.75	3.53	37.61	31.08

APPLIED STORY FORCES

Type: EQ_ASCE710_-X_+E_0.3Y_+E_F

Level	Ht	Fx	Fy
	ft	kips	kips
Penthouse	21.42	0.00	0.00
Roof	12.67	-11.75	3.53
		-11.75	3.53

Note: Diaphragm (or Diaphragms) at Top Story Found with No Lateral Members. Calculated Story Forces for Wind or Seismic Load Cases at This Level Combined to Story Below by the Program. It is also Assumed for This Level that Center of Rigidity is at the Center of Mass.

APPLIED DIAPHRAGM FORCES

Type: EQ_ASCE710_-X_+E_-0.3Y_+E_F

Level	Diaph.#	Ht	Fx	Fy	X	Y
		ft	kips	kips	ft	ft
Penthouse	1	21.42	-0.00	-0.00	18.38	16.85
Roof	1	12.67	-11.75	-3.53	37.61	31.08

APPLIED STORY FORCES

Type: EQ_ASCE710_-X_+E_-0.3Y_+E_F

Level	Ht	Fx	Fy
	ft	kips	kips
Penthouse	21.42	0.00	0.00
Roof	12.67	-11.75	-3.53
		-11.75	-3.53

Note: Diaphragm (or Diaphragms) at Top Story Found with No Lateral Members. Calculated Story Forces for Wind or Seismic Load Cases at This Level Combined to Story Below by the Program. It is also Assumed for This Level that Center of Rigidity is at the Center of Mass.

APPLIED DIAPHRAGM FORCES

Type: EQ_ASCE710_0.3X_+E_Y_+E_F

Level	Diaph.#	Ht	Fx	Fy	X	Y
		ft	kips	kips	ft	ft
Penthouse	1	21.42	0.00	0.00	18.38	16.85
Roof	1	12.67	3.53	11.75	37.61	31.08

APPLIED STORY FORCES

Type: EQ_ASCE710_0.3X_+E_Y_+E_F

Level	Ht	Fx	Fy
	ft	kips	kips
Penthouse	21.42	0.00	0.00
Roof	12.67	3.53	11.75
		3.53	11.75

Note: Diaphragm (or Diaphragms) at Top Story Found with No Lateral Members. Calculated Story Forces for Wind or Seismic Load Cases at This Level Combined to Story Below by the Program. It is also Assumed for This Level that Center of Rigidity is at the Center of Mass.

APPLIED DIAPHRAGM FORCES

Type: EQ_ASCE710_0.3X_+E_-Y_+E_F

Level	Diaph.#	Ht	Fx	Fy	X	Y
		ft	kips	kips	ft	ft
Penthouse	1	21.42	0.00	-0.00	18.38	16.85
Roof	1	12.67	3.53	-11.75	37.61	31.08

APPLIED STORY FORCES

Type: EQ_ASCE710_0.3X_+E_-Y_+E_F

Level	Ht	Fx	Fy
	ft	kips	kips
Penthouse	21.42	0.00	0.00
Roof	12.67	3.53	-11.75
		3.53	-11.75

Note: Diaphragm (or Diaphragms) at Top Story Found with No Lateral Members. Calculated Story Forces for Wind or Seismic Load Cases at This Level Combined to Story Below by the Program. It is also Assumed for This Level that Center of Rigidity is at the Center of Mass.

APPLIED DIAPHRAGM FORCES

Type: EQ_ASCE710_-0.3X_+E_Y_+E_F

Level	Diaph.#	Ht	Fx	Fy	X	Y
		ft	kips	kips	ft	ft
Penthouse	1	21.42	-0.00	0.00	18.38	16.85
Roof	1	12.67	-3.53	11.75	37.61	31.08

APPLIED STORY FORCES

Type: EQ_ASCE710_-0.3X_+E_Y_+E_F

Level	Ht	Fx	Fy
	ft	kips	kips
Penthouse	21.42	0.00	0.00
Roof	12.67	-3.53	11.75
		-3.53	11.75

Note: Diaphragm (or Diaphragms) at Top Story Found with No Lateral Members. Calculated Story Forces for Wind or Seismic Load Cases at This Level Combined to Story Below by the Program. It is also Assumed for This Level that Center of Rigidity is at the Center of Mass.

APPLIED DIAPHRAGM FORCES

Type: EQ_ASCE710_-0.3X_+E_-Y_+E_F

Level	Diaph.#	Ht	Fx	Fy	X	Y
		ft	kips	kips	ft	ft
Penthouse	1	21.42	-0.00	-0.00	18.38	16.85
Roof	1	12.67	-3.53	-11.75	37.61	31.08

APPLIED STORY FORCES

Type: EQ_ASCE710_-0.3X_+E_-Y_+E_F

Level	Ht	Fx	Fy
	ft	kips	kips
Penthouse	21.42	0.00	0.00
Roof	12.67	-3.53	-11.75
		-3.53	-11.75

Note: Diaphragm (or Diaphragms) at Top Story Found with No Lateral Members. Calculated Story Forces for Wind or Seismic Load Cases at This Level Combined to Story Below by the Program. It is also Assumed for This Level that Center of Rigidity is at the Center of Mass.

APPLIED DIAPHRAGM FORCES

Type: EQ_ASCE710_X_+E_0.3Y_-E_F

Level	Diaph.#	Ht	Fx	Fy	X	Y
		ft	kips	kips	ft	ft

Penthouse	1	21.42	0.00	0.00	16.93	16.85
Roof	1	12.67	11.75	3.53	30.34	31.08

APPLIED STORY FORCES

Type: EQ_ASCE710_X_+E_0.3Y_-E_F

Level	Ht ft	Fx kips	Fy kips
Penthouse	21.42	0.00	0.00
Roof	12.67	11.75	3.53
		11.75	3.53

Note: Diaphragm (or Diaphragms) at Top Story Found with No Lateral Members. Calculated Story Forces for Wind or Seismic Load Cases at This Level Combined to Story Below by the Program. It is also Assumed for This Level that Center of Rigidity is at the Center of Mass.

APPLIED DIAPHRAGM FORCES

Type: EQ_ASCE710_X_+E_-0.3Y_-E_F

Level	Diaph.#	Ht ft	Fx kips	Fy kips	X ft	Y ft
Penthouse	1	21.42	0.00	-0.00	16.93	16.85
Roof	1	12.67	11.75	-3.53	30.34	31.08

APPLIED STORY FORCES

Type: EQ_ASCE710_X_+E_-0.3Y_-E_F

Level	Ht ft	Fx kips	Fy kips
Penthouse	21.42	0.00	0.00
Roof	12.67	11.75	-3.53
		11.75	-3.53

Note: Diaphragm (or Diaphragms) at Top Story Found with No Lateral Members. Calculated Story Forces for Wind or Seismic Load Cases at This Level Combined to Story Below by the Program. It is also Assumed for This Level that Center of Rigidity is at the Center of Mass.

APPLIED DIAPHRAGM FORCES

Type: EQ_ASCE710_-X_+E_0.3Y_-E_F

Level	Diaph.#	Ht ft	Fx kips	Fy kips	X ft	Y ft
Penthouse	1	21.42	-0.00	0.00	16.93	16.85
Roof	1	12.67	-11.75	3.53	30.34	31.08

APPLIED STORY FORCES

Type: EQ_ASCE710_-X_+E_0.3Y_-E_F

Level	Ht	Fx	Fy
	ft	kips	kips
Penthouse	21.42	0.00	0.00
Roof	12.67	-11.75	3.53
		-11.75	3.53

Note: Diaphragm (or Diaphragms) at Top Story Found with No Lateral Members. Calculated Story Forces for Wind or Seismic Load Cases at This Level Combined to Story Below by the Program. It is also Assumed for This Level that Center of Rigidity is at the Center of Mass.

APPLIED DIAPHRAGM FORCES

Type: EQ_ASCE710_-X_+E_-0.3Y_-E_F

Level	Diaph.#	Ht	Fx	Fy	X	Y
		ft	kips	kips	ft	ft
Penthouse	1	21.42	-0.00	-0.00	16.93	16.85
Roof	1	12.67	-11.75	-3.53	30.34	31.08

APPLIED STORY FORCES

Type: EQ_ASCE710_-X_+E_-0.3Y_-E_F

Level	Ht	Fx	Fy
	ft	kips	kips
Penthouse	21.42	0.00	0.00
Roof	12.67	-11.75	-3.53
		-11.75	-3.53

Note: Diaphragm (or Diaphragms) at Top Story Found with No Lateral Members. Calculated Story Forces for Wind or Seismic Load Cases at This Level Combined to Story Below by the Program. It is also Assumed for This Level that Center of Rigidity is at the Center of Mass.

APPLIED DIAPHRAGM FORCES

Type: EQ_ASCE710_0.3X_+E_Y_-E_F

Level	Diaph.#	Ht	Fx	Fy	X	Y
		ft	kips	kips	ft	ft
Penthouse	1	21.42	0.00	0.00	16.93	16.85
Roof	1	12.67	3.53	11.75	30.34	31.08

APPLIED STORY FORCES

Type: EQ_ASCE710_0.3X_+E_Y_-E_F

Level	Ht	Fx	Fy
	ft	kips	kips

Penthouse	21.42	0.00	0.00
Roof	12.67	3.53	11.75
		3.53	11.75

Note: Diaphragm (or Diaphragms) at Top Story Found with No Lateral Members. Calculated Story Forces for Wind or Seismic Load Cases at This Level Combined to Story Below by the Program. It is also Assumed for This Level that Center of Rigidity is at the Center of Mass.

APPLIED DIAPHRAGM FORCES

Type: EQ_ASCE710_0.3X_+E_-Y_-E_F

Level	Diaph.#	Ht ft	Fx kips	Fy kips	X ft	Y ft
Penthouse	1	21.42	0.00	-0.00	16.93	16.85
Roof	1	12.67	3.53	-11.75	30.34	31.08

APPLIED STORY FORCES

Type: EQ_ASCE710_0.3X_+E_-Y_-E_F

Level	Ht ft	Fx kips	Fy kips
Penthouse	21.42	0.00	0.00
Roof	12.67	3.53	-11.75
		3.53	-11.75

Note: Diaphragm (or Diaphragms) at Top Story Found with No Lateral Members. Calculated Story Forces for Wind or Seismic Load Cases at This Level Combined to Story Below by the Program. It is also Assumed for This Level that Center of Rigidity is at the Center of Mass.

APPLIED DIAPHRAGM FORCES

Type: EQ_ASCE710_-0.3X_+E_Y_-E_F

Level	Diaph.#	Ht ft	Fx kips	Fy kips	X ft	Y ft
Penthouse	1	21.42	-0.00	0.00	16.93	16.85
Roof	1	12.67	-3.53	11.75	30.34	31.08

APPLIED STORY FORCES

Type: EQ_ASCE710_-0.3X_+E_Y_-E_F

Level	Ht ft	Fx kips	Fy kips
Penthouse	21.42	0.00	0.00
Roof	12.67	-3.53	11.75
		-3.53	11.75

Note: Diaphragm (or Diaphragms) at Top Story Found with No Lateral Members. Calculated Story Forces for Wind or Seismic Load Cases at This Level Combined to Story Below by the Program. It is also Assumed for This Level that Center of Rigidity is at the Center of Mass.

APPLIED DIAPHRAGM FORCES

Type: EQ_ASCE710_-0.3X_+E_-Y_-E_F

Level	Diaph.#	Ht	Fx	Fy	X	Y
		ft	kips	kips	ft	ft
Penthouse	1	21.42	-0.00	-0.00	16.93	16.85
Roof	1	12.67	-3.53	-11.75	30.34	31.08

APPLIED STORY FORCES

Type: EQ_ASCE710_-0.3X_+E_-Y_-E_F

Level	Ht	Fx	Fy
	ft	kips	kips
Penthouse	21.42	0.00	0.00
Roof	12.67	-3.53	-11.75
		-3.53	-11.75

Note: Diaphragm (or Diaphragms) at Top Story Found with No Lateral Members. Calculated Story Forces for Wind or Seismic Load Cases at This Level Combined to Story Below by the Program. It is also Assumed for This Level that Center of Rigidity is at the Center of Mass.

APPLIED DIAPHRAGM FORCES

Type: EQ_ASCE710_X_-E_0.3Y_+E_F

Level	Diaph.#	Ht	Fx	Fy	X	Y
		ft	kips	kips	ft	ft
Penthouse	1	21.42	0.00	0.00	18.38	15.15
Roof	1	12.67	11.75	3.53	37.61	26.72

APPLIED STORY FORCES

Type: EQ_ASCE710_X_-E_0.3Y_+E_F

Level	Ht	Fx	Fy
	ft	kips	kips
Penthouse	21.42	0.00	0.00
Roof	12.67	11.75	3.53
		11.75	3.53

Note: Diaphragm (or Diaphragms) at Top Story Found with No Lateral Members. Calculated Story Forces for Wind or Seismic Load Cases at This Level Combined to Story Below by the Program. It is also Assumed for This Level that Center of Rigidity is at the Center of Mass.

APPLIED DIAPHRAGM FORCES

Type: EQ_ASCE710_X_-E_-0.3Y_+E_F

Level	Diaph.#	Ht	Fx	Fy	X	Y
		ft	kips	kips	ft	ft
Penthouse	1	21.42	0.00	-0.00	18.38	15.15
Roof	1	12.67	11.75	-3.53	37.61	26.72

APPLIED STORY FORCES

Type: EQ_ASCE710_X_-E_-0.3Y_+E_F

Level	Ht	Fx	Fy
	ft	kips	kips
Penthouse	21.42	0.00	0.00
Roof	12.67	11.75	-3.53
		11.75	-3.53

Note: Diaphragm (or Diaphragms) at Top Story Found with No Lateral Members. Calculated Story Forces for Wind or Seismic Load Cases at This Level Combined to Story Below by the Program. It is also Assumed for This Level that Center of Rigidity is at the Center of Mass.

APPLIED DIAPHRAGM FORCES

Type: EQ_ASCE710_-X_-E_0.3Y_+E_F

Level	Diaph.#	Ht	Fx	Fy	X	Y
		ft	kips	kips	ft	ft
Penthouse	1	21.42	-0.00	0.00	18.38	15.15
Roof	1	12.67	-11.75	3.53	37.61	26.72

APPLIED STORY FORCES

Type: EQ_ASCE710_-X_-E_0.3Y_+E_F

Level	Ht	Fx	Fy
	ft	kips	kips
Penthouse	21.42	0.00	0.00
Roof	12.67	-11.75	3.53
		-11.75	3.53

Note: Diaphragm (or Diaphragms) at Top Story Found with No Lateral Members. Calculated Story Forces for Wind or Seismic Load Cases at This Level Combined to Story Below by the Program. It is also Assumed for This Level that Center of Rigidity is at the Center of Mass.

APPLIED DIAPHRAGM FORCES

Type: EQ_ASCE710_-X_-E_-0.3Y_+E_F

Level	Diaph.#	Ht	Fx	Fy	X	Y
		ft	kips	kips	ft	ft

Penthouse	1	21.42	-0.00	-0.00	18.38	15.15
Roof	1	12.67	-11.75	-3.53	37.61	26.72

APPLIED STORY FORCES

Type: EQ_ASCE710_-X_-E_-0.3Y_+E_F

Level	Ht ft	Fx kips	Fy kips
Penthouse	21.42	0.00	0.00
Roof	12.67	-11.75	-3.53
		-11.75	-3.53

Note: Diaphragm (or Diaphragms) at Top Story Found with No Lateral Members. Calculated Story Forces for Wind or Seismic Load Cases at This Level Combined to Story Below by the Program. It is also Assumed for This Level that Center of Rigidity is at the Center of Mass.

APPLIED DIAPHRAGM FORCES

Type: EQ_ASCE710_0.3X_-E_Y_+E_F

Level	Diaph.#	Ht ft	Fx kips	Fy kips	X ft	Y ft
Penthouse	1	21.42	0.00	0.00	18.38	15.15
Roof	1	12.67	3.53	11.75	37.61	26.72

APPLIED STORY FORCES

Type: EQ_ASCE710_0.3X_-E_Y_+E_F

Level	Ht ft	Fx kips	Fy kips
Penthouse	21.42	0.00	0.00
Roof	12.67	3.53	11.75
		3.53	11.75

Note: Diaphragm (or Diaphragms) at Top Story Found with No Lateral Members. Calculated Story Forces for Wind or Seismic Load Cases at This Level Combined to Story Below by the Program. It is also Assumed for This Level that Center of Rigidity is at the Center of Mass.

APPLIED DIAPHRAGM FORCES

Type: EQ_ASCE710_0.3X_-E_-Y_+E_F

Level	Diaph.#	Ht ft	Fx kips	Fy kips	X ft	Y ft
Penthouse	1	21.42	0.00	-0.00	18.38	15.15
Roof	1	12.67	3.53	-11.75	37.61	26.72

APPLIED STORY FORCES

Type: EQ_ASCE710_0.3X_-E_-Y_+E_F

Level	Ht	Fx	Fy
	ft	kips	kips
Penthouse	21.42	0.00	0.00
Roof	12.67	3.53	-11.75
		3.53	-11.75

Note: Diaphragm (or Diaphragms) at Top Story Found with No Lateral Members. Calculated Story Forces for Wind or Seismic Load Cases at This Level Combined to Story Below by the Program. It is also Assumed for This Level that Center of Rigidity is at the Center of Mass.

APPLIED DIAPHRAGM FORCES

Type: EQ_ASCE710_-0.3X_-E_Y_+E_F

Level	Diaph.#	Ht	Fx	Fy	X	Y
		ft	kips	kips	ft	ft
Penthouse	1	21.42	-0.00	0.00	18.38	15.15
Roof	1	12.67	-3.53	11.75	37.61	26.72

APPLIED STORY FORCES

Type: EQ_ASCE710_-0.3X_-E_Y_+E_F

Level	Ht	Fx	Fy
	ft	kips	kips
Penthouse	21.42	0.00	0.00
Roof	12.67	-3.53	11.75
		-3.53	11.75

Note: Diaphragm (or Diaphragms) at Top Story Found with No Lateral Members. Calculated Story Forces for Wind or Seismic Load Cases at This Level Combined to Story Below by the Program. It is also Assumed for This Level that Center of Rigidity is at the Center of Mass.

APPLIED DIAPHRAGM FORCES

Type: EQ_ASCE710_-0.3X_-E_-Y_+E_F

Level	Diaph.#	Ht	Fx	Fy	X	Y
		ft	kips	kips	ft	ft
Penthouse	1	21.42	-0.00	-0.00	18.38	15.15
Roof	1	12.67	-3.53	-11.75	37.61	26.72

APPLIED STORY FORCES

Type: EQ_ASCE710_-0.3X_-E_-Y_+E_F

Level	Ht	Fx	Fy
	ft	kips	kips

Penthouse	21.42	0.00	0.00
Roof	12.67	-3.53	-11.75
		-3.53	-11.75

Note: Diaphragm (or Diaphragms) at Top Story Found with No Lateral Members. Calculated Story Forces for Wind or Seismic Load Cases at This Level Combined to Story Below by the Program. It is also Assumed for This Level that Center of Rigidity is at the Center of Mass.

APPLIED DIAPHRAGM FORCES

Type: EQ_ASCE710_X_-E_0.3Y_-E_F

Level	Diaph.#	Ht	Fx	Fy	X	Y
		ft	kips	kips	ft	ft
Penthouse	1	21.42	0.00	0.00	16.93	15.15
Roof	1	12.67	11.75	3.53	30.34	26.72

APPLIED STORY FORCES

Type: EQ_ASCE710_X_-E_0.3Y_-E_F

Level	Ht	Fx	Fy
	ft	kips	kips
Penthouse	21.42	0.00	0.00
Roof	12.67	11.75	3.53
		11.75	3.53

Note: Diaphragm (or Diaphragms) at Top Story Found with No Lateral Members. Calculated Story Forces for Wind or Seismic Load Cases at This Level Combined to Story Below by the Program. It is also Assumed for This Level that Center of Rigidity is at the Center of Mass.

APPLIED DIAPHRAGM FORCES

Type: EQ_ASCE710_X_-E_-0.3Y_-E_F

Level	Diaph.#	Ht	Fx	Fy	X	Y
		ft	kips	kips	ft	ft
Penthouse	1	21.42	0.00	-0.00	16.93	15.15
Roof	1	12.67	11.75	-3.53	30.34	26.72

APPLIED STORY FORCES

Type: EQ_ASCE710_X_-E_-0.3Y_-E_F

Level	Ht	Fx	Fy
	ft	kips	kips
Penthouse	21.42	0.00	0.00
Roof	12.67	11.75	-3.53
		11.75	-3.53

Note: Diaphragm (or Diaphragms) at Top Story Found with No Lateral Members. Calculated Story Forces for Wind or Seismic Load Cases at This Level Combined to Story Below by the Program. It is also Assumed for This Level that Center of Rigidity is at the Center of Mass.

APPLIED DIAPHRAGM FORCES

Type: EQ_ASCE710_-X_-E_0.3Y_-E_F

Level	Diaph.#	Ht	Fx	Fy	X	Y
		ft	kips	kips	ft	ft
Penthouse	1	21.42	-0.00	0.00	16.93	15.15
Roof	1	12.67	-11.75	3.53	30.34	26.72

APPLIED STORY FORCES

Type: EQ_ASCE710_-X_-E_0.3Y_-E_F

Level	Ht	Fx	Fy
	ft	kips	kips
Penthouse	21.42	0.00	0.00
Roof	12.67	-11.75	3.53
		-11.75	3.53

Note: Diaphragm (or Diaphragms) at Top Story Found with No Lateral Members. Calculated Story Forces for Wind or Seismic Load Cases at This Level Combined to Story Below by the Program. It is also Assumed for This Level that Center of Rigidity is at the Center of Mass.

APPLIED DIAPHRAGM FORCES

Type: EQ_ASCE710_-X_-E_-0.3Y_-E_F

Level	Diaph.#	Ht	Fx	Fy	X	Y
		ft	kips	kips	ft	ft
Penthouse	1	21.42	-0.00	-0.00	16.93	15.15
Roof	1	12.67	-11.75	-3.53	30.34	26.72

APPLIED STORY FORCES

Type: EQ_ASCE710_-X_-E_-0.3Y_-E_F

Level	Ht	Fx	Fy
	ft	kips	kips
Penthouse	21.42	0.00	0.00
Roof	12.67	-11.75	-3.53
		-11.75	-3.53

Note: Diaphragm (or Diaphragms) at Top Story Found with No Lateral Members. Calculated Story Forces for Wind or Seismic Load Cases at This Level Combined to Story Below by the Program. It is also Assumed for This Level that Center of Rigidity is at the Center of Mass.

APPLIED DIAPHRAGM FORCES

Type: EQ_ASCE710_0.3X_-E_Y_-E_F

Level	Diaph.#	Ht	Fx	Fy	X	Y
		ft	kips	kips	ft	ft
Penthouse	1	21.42	0.00	0.00	16.93	15.15
Roof	1	12.67	3.53	11.75	30.34	26.72

APPLIED STORY FORCES

Type: EQ_ASCE710_0.3X_-E_Y_-E_F

Level	Ht	Fx	Fy
	ft	kips	kips
Penthouse	21.42	0.00	0.00
Roof	12.67	3.53	11.75
		3.53	11.75

Note: Diaphragm (or Diaphragms) at Top Story Found with No Lateral Members. Calculated Story Forces for Wind or Seismic Load Cases at This Level Combined to Story Below by the Program. It is also Assumed for This Level that Center of Rigidity is at the Center of Mass.

APPLIED DIAPHRAGM FORCES

Type: EQ_ASCE710_0.3X_-E_-Y_-E_F

Level	Diaph.#	Ht	Fx	Fy	X	Y
		ft	kips	kips	ft	ft
Penthouse	1	21.42	0.00	-0.00	16.93	15.15
Roof	1	12.67	3.53	-11.75	30.34	26.72

APPLIED STORY FORCES

Type: EQ_ASCE710_0.3X_-E_-Y_-E_F

Level	Ht	Fx	Fy
	ft	kips	kips
Penthouse	21.42	0.00	0.00
Roof	12.67	3.53	-11.75
		3.53	-11.75

Note: Diaphragm (or Diaphragms) at Top Story Found with No Lateral Members. Calculated Story Forces for Wind or Seismic Load Cases at This Level Combined to Story Below by the Program. It is also Assumed for This Level that Center of Rigidity is at the Center of Mass.

APPLIED DIAPHRAGM FORCES

Type: EQ_ASCE710_-0.3X_-E_Y_-E_F

Level	Diaph.#	Ht	Fx	Fy	X	Y
		ft	kips	kips	ft	ft

Penthouse	1	21.42	-0.00	0.00	16.93	15.15
Roof	1	12.67	-3.53	11.75	30.34	26.72

APPLIED STORY FORCES

Type: EQ_ASCE710_-0.3X_-E_Y_-E_F

Level	Ht	Fx	Fy
	ft	kips	kips
Penthouse	21.42	0.00	0.00
Roof	12.67	-3.53	11.75
		-3.53	11.75

Note: Diaphragm (or Diaphragms) at Top Story Found with No Lateral Members. Calculated Story Forces for Wind or Seismic Load Cases at This Level Combined to Story Below by the Program. It is also Assumed for This Level that Center of Rigidity is at the Center of Mass.

APPLIED DIAPHRAGM FORCES

Type: EQ_ASCE710_-0.3X_-E_-Y_-E_F

Level	Diaph.#	Ht	Fx	Fy	X	Y
		ft	kips	kips	ft	ft
Penthouse	1	21.42	-0.00	-0.00	16.93	15.15
Roof	1	12.67	-3.53	-11.75	30.34	26.72

APPLIED STORY FORCES

Type: EQ_ASCE710_-0.3X_-E_-Y_-E_F

Level	Ht	Fx	Fy
	ft	kips	kips
Penthouse	21.42	0.00	0.00
Roof	12.67	-3.53	-11.75
		-3.53	-11.75

Note: Diaphragm (or Diaphragms) at Top Story Found with No Lateral Members. Calculated Story Forces for Wind or Seismic Load Cases at This Level Combined to Story Below by the Program. It is also Assumed for This Level that Center of Rigidity is at the Center of Mass.

Member Force Envelope

STEEL COLUMN INFORMATION:

Column Number: 9 **Frame Number: 1**

Level Top: Roof Column Line (39.25,48.00)
Bot: Base

Fy (ksi) = 50.00 Column Size = HSS4X4X5/16
Elastic Modulus (ksi) = 29000
Orientation (deg) = 0.00 Length (ft) = 12.67

INPUT PARAMETERS:

		Top	Bottom
Fixity	Major Axis:	Fix	Fix
	Minor Axis:	Fix	Fix
	Torsion:	Fix	Fix
Joint Face Dist (in):			
	Major:	5.10	0.00
	Minor:	0.00	0.00
Rigid End Zone (in):			
	Major:	0.00	0.00 (Ignore)
	Minor:	0.00	0.00 (Ignore)

Member Force Output: At Face of Joint
P-Delta: Yes Scale Factor: 1.00
Ground Level: Base

LOAD CASE DEFINITIONS:

D	DeadLoad	RAMUSER
Sp	PosSnowLoad	RAMUSER
W1	Wind	Wind_ASCE710_1_X
W2	Wind	Wind_ASCE710_1_Y
W3	Wind	Wind_ASCE710_2_X+E
W4	Wind	Wind_ASCE710_2_X-E
W5	Wind	Wind_ASCE710_2_Y+E
W6	Wind	Wind_ASCE710_2_Y-E
W7	Wind	Wind_ASCE710_3_X+Y
W8	Wind	Wind_ASCE710_3_X-Y
W9	Wind	Wind_ASCE710_4_X+Y_CW
W10	Wind	Wind_ASCE710_4_X+Y_CCW
W11	Wind	Wind_ASCE710_4_X-Y_CW
W12	Wind	Wind_ASCE710_4_X-Y_CCW
E1	Seismic	EQ_ASCE710_X_+E_F
E2	Seismic	EQ_ASCE710_X_-E_F
E3	Seismic	EQ_ASCE710_Y_+E_F
E4	Seismic	EQ_ASCE710_Y_-E_F
E5	Seismic	EQ_ASCE710_X_+E_0.3Y_+E_F
E6	Seismic	EQ_ASCE710_X_+E_-0.3Y_+E_F
E7	Seismic	EQ_ASCE710_-X_+E_0.3Y_+E_F
E8	Seismic	EQ_ASCE710_-X_+E_-0.3Y_+E_F

E9	Seismic	EQ_ASCE710_0.3X_+E_Y_+E_F
E10	Seismic	EQ_ASCE710_0.3X_+E_-Y_+E_F
E11	Seismic	EQ_ASCE710_-0.3X_+E_Y_+E_F
E12	Seismic	EQ_ASCE710_-0.3X_+E_-Y_+E_F
E13	Seismic	EQ_ASCE710_X_+E_0.3Y_-E_F
E14	Seismic	EQ_ASCE710_X_+E_-0.3Y_-E_F
E15	Seismic	EQ_ASCE710_-X_+E_0.3Y_-E_F
E16	Seismic	EQ_ASCE710_-X_+E_-0.3Y_-E_F
E17	Seismic	EQ_ASCE710_0.3X_+E_Y_-E_F
E18	Seismic	EQ_ASCE710_0.3X_+E_-Y_-E_F
E19	Seismic	EQ_ASCE710_-0.3X_+E_Y_-E_F
E20	Seismic	EQ_ASCE710_-0.3X_+E_-Y_-E_F
E21	Seismic	EQ_ASCE710_X_-E_0.3Y_+E_F
E22	Seismic	EQ_ASCE710_X_-E_-0.3Y_+E_F
E23	Seismic	EQ_ASCE710_-X_-E_0.3Y_+E_F
E24	Seismic	EQ_ASCE710_-X_-E_-0.3Y_+E_F
E25	Seismic	EQ_ASCE710_0.3X_-E_Y_+E_F
E26	Seismic	EQ_ASCE710_0.3X_-E_-Y_+E_F
E27	Seismic	EQ_ASCE710_-0.3X_-E_Y_+E_F
E28	Seismic	EQ_ASCE710_-0.3X_-E_-Y_+E_F
E29	Seismic	EQ_ASCE710_X_-E_0.3Y_-E_F
E30	Seismic	EQ_ASCE710_X_-E_-0.3Y_-E_F
E31	Seismic	EQ_ASCE710_-X_-E_0.3Y_-E_F
E32	Seismic	EQ_ASCE710_-X_-E_-0.3Y_-E_F
E33	Seismic	EQ_ASCE710_0.3X_-E_Y_-E_F
E34	Seismic	EQ_ASCE710_0.3X_-E_-Y_-E_F
E35	Seismic	EQ_ASCE710_-0.3X_-E_Y_-E_F
E36	Seismic	EQ_ASCE710_-0.3X_-E_-Y_-E_F

LOAD COMBINATIONS: IBC 2015 / ASCE 7-10 LRFD

No. of Generated Combinations: 314

No. of Generated Combinations Selected to Use: 314

MEMBER FORCE MAXIMA AND MINIMA

	P	Mmajor	Mminor	Vmajor	Vminor	Tors
	kips	kip-ft	kip-ft	kips	kips	kip-ft
Max @ T:	13.56	0.74	0.00	0.01	0.01	0.01
LC:	25	25	31	85	28	31
Max @ B:	13.56	0.12	0.17	0.01	0.01	0.01
LC:	25	85	28	85	28	31
Maximum:	13.56	0.74	0.17	0.01	0.01	0.01
LC:	25	25	28	85	28	31
@ (ft):	0.43	0.43	12.67	0.43	0.00	0.43

	P	Mmajor	Mminor	Vmajor	Vminor	Tors
Min @ T:	-5.44	-0.03	-0.00	-0.10	-0.01	-0.01
LC:	85	85	91	25	88	91
Min @ B:	-5.44	-0.49	-0.14	-0.10	-0.01	-0.01
LC:	85	25	88	25	88	91
Minimum:	-5.44	-0.49	-0.14	-0.10	-0.01	-0.01
LC:	85	25	88	25	88	91
@ (ft):	0.43	12.67	12.67	0.43	0.00	0.43

STEEL COLUMN INFORMATION:

Column Number: 16 **Frame Number: 1**

Level Top: Roof Column Line (46.25,48.00)
Bot: Base
Fy (ksi) = 46.00 Column Size = HSS4X4X5/16
Elastic Modulus (ksi) = 29000
Orientation (deg) = 0.00 Length (ft) = 12.67

INPUT PARAMETERS:

		Top	Bottom
Fixity	Major Axis:	Fix	Fix
	Minor Axis:	Fix	Fix
	Torsion:	Fix	Fix
Joint Face Dist (in):			
	Major:	5.10	0.00
	Minor:	0.00	0.00
Rigid End Zone (in):			
	Major:	0.00	0.00 (Ignore)
	Minor:	0.00	0.00 (Ignore)

Member Force Output: At Face of Joint
P-Delta: Yes Scale Factor: 1.00
Ground Level: Base

LOAD CASE DEFINITIONS:

D	DeadLoad	RAMUSER
Sp	PosSnowLoad	RAMUSER
W1	Wind	Wind_ASCE710_1_X
W2	Wind	Wind_ASCE710_1_Y
W3	Wind	Wind_ASCE710_2_X+E
W4	Wind	Wind_ASCE710_2_X-E
W5	Wind	Wind_ASCE710_2_Y+E
W6	Wind	Wind_ASCE710_2_Y-E
W7	Wind	Wind_ASCE710_3_X+Y
W8	Wind	Wind_ASCE710_3_X-Y
W9	Wind	Wind_ASCE710_4_X+Y_CW
W10	Wind	Wind_ASCE710_4_X+Y_CCW
W11	Wind	Wind_ASCE710_4_X-Y_CW
W12	Wind	Wind_ASCE710_4_X-Y_CCW
E1	Seismic	EQ_ASCE710_X_+E_F
E2	Seismic	EQ_ASCE710_X_-E_F
E3	Seismic	EQ_ASCE710_Y_+E_F
E4	Seismic	EQ_ASCE710_Y_-E_F
E5	Seismic	EQ_ASCE710_X_+E_0.3Y_+E_F
E6	Seismic	EQ_ASCE710_X_+E_-0.3Y_+E_F
E7	Seismic	EQ_ASCE710_-X_+E_0.3Y_+E_F
E8	Seismic	EQ_ASCE710_-X_+E_-0.3Y_+E_F

E9	Seismic	EQ_ASCE710_0.3X_+E_Y_+E_F
E10	Seismic	EQ_ASCE710_0.3X_+E_-Y_+E_F
E11	Seismic	EQ_ASCE710_-0.3X_+E_Y_+E_F
E12	Seismic	EQ_ASCE710_-0.3X_+E_-Y_+E_F
E13	Seismic	EQ_ASCE710_X_+E_0.3Y_-E_F
E14	Seismic	EQ_ASCE710_X_+E_-0.3Y_-E_F
E15	Seismic	EQ_ASCE710_-X_+E_0.3Y_-E_F
E16	Seismic	EQ_ASCE710_-X_+E_-0.3Y_-E_F
E17	Seismic	EQ_ASCE710_0.3X_+E_Y_-E_F
E18	Seismic	EQ_ASCE710_0.3X_+E_-Y_-E_F
E19	Seismic	EQ_ASCE710_-0.3X_+E_Y_-E_F
E20	Seismic	EQ_ASCE710_-0.3X_+E_-Y_-E_F
E21	Seismic	EQ_ASCE710_X_-E_0.3Y_+E_F
E22	Seismic	EQ_ASCE710_X_-E_-0.3Y_+E_F
E23	Seismic	EQ_ASCE710_-X_-E_0.3Y_+E_F
E24	Seismic	EQ_ASCE710_-X_-E_-0.3Y_+E_F
E25	Seismic	EQ_ASCE710_0.3X_-E_Y_+E_F
E26	Seismic	EQ_ASCE710_0.3X_-E_-Y_+E_F
E27	Seismic	EQ_ASCE710_-0.3X_-E_Y_+E_F
E28	Seismic	EQ_ASCE710_-0.3X_-E_-Y_+E_F
E29	Seismic	EQ_ASCE710_X_-E_0.3Y_-E_F
E30	Seismic	EQ_ASCE710_X_-E_-0.3Y_-E_F
E31	Seismic	EQ_ASCE710_-X_-E_0.3Y_-E_F
E32	Seismic	EQ_ASCE710_-X_-E_-0.3Y_-E_F
E33	Seismic	EQ_ASCE710_0.3X_-E_Y_-E_F
E34	Seismic	EQ_ASCE710_0.3X_-E_-Y_-E_F
E35	Seismic	EQ_ASCE710_-0.3X_-E_Y_-E_F
E36	Seismic	EQ_ASCE710_-0.3X_-E_-Y_-E_F

LOAD COMBINATIONS: IBC 2015 / ASCE 7-10 LRFD

No. of Generated Combinations: 314

No. of Generated Combinations Selected to Use: 314

MEMBER FORCE MAXIMA AND MINIMA

	P	Mmajor	Mminor	Vmajor	Vminor	Tors
	kips	kip-ft	kip-ft	kips	kips	kip-ft
Max @ T:	25.95	0.10	0.00	0.04	0.02	0.01
LC:	13	97	91	13	28	31
Max @ B:	25.95	0.21	0.20	0.04	0.02	0.01
LC:	13	37	28	13	28	31
Maximum:	25.95	0.21	0.20	0.04	0.02	0.01
LC:	13	37	28	13	28	31
@ (ft):	0.43	12.67	12.67	0.43	0.00	0.43

	P	Mmajor	Mminor	Vmajor	Vminor	Tors
Min @ T:	3.80	-0.31	-0.00	-0.02	-0.01	-0.01
LC:	249	13	31	97	88	91
Min @ B:	3.80	-0.17	-0.16	-0.02	-0.01	-0.01
LC:	249	97	88	97	88	91
Minimum:	3.80	-0.31	-0.16	-0.02	-0.01	-0.01
LC:	249	13	88	97	88	91
@ (ft):	0.43	0.43	12.67	0.43	0.00	0.43

STEEL BEAM INFORMATION:

Beam Number: 44 **Frame Number: 1**

Level: Roof	I-End (39.25,48.00)	J-End (46.25,48.00)
Fy (ksi) = 50.00	Beam Size = W10X22	
Length (ft) = 7.00		
Elastic Modulus (ksi) = 29000		

INPUT PARAMETERS:

		I-End	J-End
Fixity	Major Axis:	Fix	Fix
	Minor Axis:	Fix	Fix
	Torsion:	Fix	Fix
Rigid End Zone (in):		0.00	0.00 (Ignore)

Member Force Output: At Face of Joint
P-Delta: Yes Scale Factor: 1.00
Ground Level: Base

LOAD CASE DEFINITIONS:

D	DeadLoad	RAMUSER
Sp	PosSnowLoad	RAMUSER
W1	Wind	Wind_ASCE710_1_X
W2	Wind	Wind_ASCE710_1_Y
W3	Wind	Wind_ASCE710_2_X+E
W4	Wind	Wind_ASCE710_2_X-E
W5	Wind	Wind_ASCE710_2_Y+E
W6	Wind	Wind_ASCE710_2_Y-E
W7	Wind	Wind_ASCE710_3_X+Y
W8	Wind	Wind_ASCE710_3_X-Y
W9	Wind	Wind_ASCE710_4_X+Y_CW
W10	Wind	Wind_ASCE710_4_X+Y_CCW
W11	Wind	Wind_ASCE710_4_X-Y_CW
W12	Wind	Wind_ASCE710_4_X-Y_CCW
E1	Seismic	EQ_ASCE710_X_+E_F
E2	Seismic	EQ_ASCE710_X_-E_F
E3	Seismic	EQ_ASCE710_Y_+E_F
E4	Seismic	EQ_ASCE710_Y_-E_F
E5	Seismic	EQ_ASCE710_X_+E_0.3Y_+E_F
E6	Seismic	EQ_ASCE710_X_+E_-0.3Y_+E_F
E7	Seismic	EQ_ASCE710_-X_+E_0.3Y_+E_F
E8	Seismic	EQ_ASCE710_-X_+E_-0.3Y_+E_F
E9	Seismic	EQ_ASCE710_0.3X_+E_Y_+E_F
E10	Seismic	EQ_ASCE710_0.3X_+E_-Y_+E_F
E11	Seismic	EQ_ASCE710_-0.3X_+E_Y_+E_F
E12	Seismic	EQ_ASCE710_-0.3X_+E_-Y_+E_F
E13	Seismic	EQ_ASCE710_X_+E_0.3Y_-E_F

E14	Seismic	EQ_ASCE710_X_+E_-0.3Y_-E_F
E15	Seismic	EQ_ASCE710_-X_+E_0.3Y_-E_F
E16	Seismic	EQ_ASCE710_-X_+E_-0.3Y_-E_F
E17	Seismic	EQ_ASCE710_0.3X_+E_Y_-E_F
E18	Seismic	EQ_ASCE710_0.3X_+E_-Y_-E_F
E19	Seismic	EQ_ASCE710_-0.3X_+E_Y_-E_F
E20	Seismic	EQ_ASCE710_-0.3X_+E_-Y_-E_F
E21	Seismic	EQ_ASCE710_X_-E_0.3Y_+E_F
E22	Seismic	EQ_ASCE710_X_-E_-0.3Y_+E_F
E23	Seismic	EQ_ASCE710_-X_-E_0.3Y_+E_F
E24	Seismic	EQ_ASCE710_-X_-E_-0.3Y_+E_F
E25	Seismic	EQ_ASCE710_0.3X_-E_Y_+E_F
E26	Seismic	EQ_ASCE710_0.3X_-E_-Y_+E_F
E27	Seismic	EQ_ASCE710_-0.3X_-E_Y_+E_F
E28	Seismic	EQ_ASCE710_-0.3X_-E_-Y_+E_F
E29	Seismic	EQ_ASCE710_X_-E_0.3Y_-E_F
E30	Seismic	EQ_ASCE710_X_-E_-0.3Y_-E_F
E31	Seismic	EQ_ASCE710_-X_-E_0.3Y_-E_F
E32	Seismic	EQ_ASCE710_-X_-E_-0.3Y_-E_F
E33	Seismic	EQ_ASCE710_0.3X_-E_Y_-E_F
E34	Seismic	EQ_ASCE710_0.3X_-E_-Y_-E_F
E35	Seismic	EQ_ASCE710_-0.3X_-E_Y_-E_F
E36	Seismic	EQ_ASCE710_-0.3X_-E_-Y_-E_F

LOAD COMBINATIONS: IBC 2015 / ASCE 7-10 LRFD

No. of Generated Combinations: 314

No. of Generated Combinations Selected to Use: 314

MEMBER FORCE MAXIMA AND MINIMA

	P kips	Mmajor kip-ft	Mminor kip-ft	Vmajor kips	Vminor kips	Tors kip-ft
Max @ i:	0.00	0.12	0.00	3.71	0.00	0.00
LC:	243	85	72	25	28	91
Max @ j:	0.00	0.42	0.00	-0.51	0.00	0.00
LC:	243	25	58	249	28	91
Maximum:	0.00	11.43	0.00	3.71	0.00	0.00
LC:	243	2	58	25	28	91
@ (ft):	0.00	3.50	6.83	0.17	0.17	0.00
Min @ i:	-0.00	-0.18	-0.00	0.53	-0.00	-0.00
LC:	107	49	36	248	88	31
Min @ j:	-0.00	-0.08	-0.00	-3.63	-0.00	-0.00
LC:	107	85	46	13	88	31

	P	Mmajor	Mminor	Vmajor	Vminor	Tors
Minimum:	-0.00	-0.17	-0.00	-3.63	-0.00	-0.00
LC:	107	49	46	13	88	31
@ (ft):	0.00	0.17	6.83	6.83	0.17	0.00

STEEL BRACE INFORMATION:

Brace Number: 2		**Frame Number: 1**
Story	Top: Roof	I-End (ft): (39.25,48.00)
	Bot: Base	J-End (ft): (46.25,48.00)
Fy (ksi)	= 46.00	Brace Size = HSS4X4X3/8
Length (ft) = 14.48		
Elastic Modulus (ksi) = 29000		

INPUT PARAMETERS:

		Top	**Bottom**
Fixity	Major Axis:	Pin	Pin
	Minor Axis:	Pin	Pin
	Torsion:	Pin	Pin
Member Force Output:		At Centerline of Joint	

P-Delta: Yes Scale Factor: 1.00
Ground Level: Base

LOAD CASE DEFINITIONS:

D	DeadLoad	RAMUSER
Sp	PosSnowLoad	RAMUSER
W1	Wind	Wind_ASCE710_1_X
W2	Wind	Wind_ASCE710_1_Y
W3	Wind	Wind_ASCE710_2_X+E
W4	Wind	Wind_ASCE710_2_X-E
W5	Wind	Wind_ASCE710_2_Y+E
W6	Wind	Wind_ASCE710_2_Y-E
W7	Wind	Wind_ASCE710_3_X+Y
W8	Wind	Wind_ASCE710_3_X-Y
W9	Wind	Wind_ASCE710_4_X+Y_CW
W10	Wind	Wind_ASCE710_4_X+Y_CCW
W11	Wind	Wind_ASCE710_4_X-Y_CW
W12	Wind	Wind_ASCE710_4_X-Y_CCW
E1	Seismic	EQ_ASCE710_X_+E_F
E2	Seismic	EQ_ASCE710_X_-E_F
E3	Seismic	EQ_ASCE710_Y_+E_F
E4	Seismic	EQ_ASCE710_Y_-E_F
E5	Seismic	EQ_ASCE710_X_+E_0.3Y_+E_F
E6	Seismic	EQ_ASCE710_X_+E_-0.3Y_+E_F
E7	Seismic	EQ_ASCE710_-X_+E_0.3Y_+E_F
E8	Seismic	EQ_ASCE710_-X_+E_-0.3Y_+E_F
E9	Seismic	EQ_ASCE710_0.3X_+E_Y_+E_F
E10	Seismic	EQ_ASCE710_0.3X_+E_-Y_+E_F
E11	Seismic	EQ_ASCE710_-0.3X_+E_Y_+E_F
E12	Seismic	EQ_ASCE710_-0.3X_+E_-Y_+E_F
E13	Seismic	EQ_ASCE710_X_+E_0.3Y_-E_F
E14	Seismic	EQ_ASCE710_X_+E_-0.3Y_-E_F

E15	Seismic	EQ_ASCE710_-X_+E_0.3Y_-E_F
E16	Seismic	EQ_ASCE710_-X_+E_-0.3Y_-E_F
E17	Seismic	EQ_ASCE710_0.3X_+E_Y_-E_F
E18	Seismic	EQ_ASCE710_0.3X_+E_-Y_-E_F
E19	Seismic	EQ_ASCE710_-0.3X_+E_Y_-E_F
E20	Seismic	EQ_ASCE710_-0.3X_+E_-Y_-E_F
E21	Seismic	EQ_ASCE710_X_-E_0.3Y_+E_F
E22	Seismic	EQ_ASCE710_X_-E_-0.3Y_+E_F
E23	Seismic	EQ_ASCE710_-X_-E_0.3Y_+E_F
E24	Seismic	EQ_ASCE710_-X_-E_-0.3Y_+E_F
E25	Seismic	EQ_ASCE710_0.3X_-E_Y_+E_F
E26	Seismic	EQ_ASCE710_0.3X_-E_-Y_+E_F
E27	Seismic	EQ_ASCE710_-0.3X_-E_Y_+E_F
E28	Seismic	EQ_ASCE710_-0.3X_-E_-Y_+E_F
E29	Seismic	EQ_ASCE710_X_-E_0.3Y_-E_F
E30	Seismic	EQ_ASCE710_X_-E_-0.3Y_-E_F
E31	Seismic	EQ_ASCE710_-X_-E_0.3Y_-E_F
E32	Seismic	EQ_ASCE710_-X_-E_-0.3Y_-E_F
E33	Seismic	EQ_ASCE710_0.3X_-E_Y_-E_F
E34	Seismic	EQ_ASCE710_0.3X_-E_-Y_-E_F
E35	Seismic	EQ_ASCE710_-0.3X_-E_Y_-E_F
E36	Seismic	EQ_ASCE710_-0.3X_-E_-Y_-E_F

LOAD COMBINATIONS: IBC 2015 / ASCE 7-10 LRFD

No. of Generated Combinations: 314

No. of Generated Combinations Selected to Use: 314

MEMBER FORCE MAXIMA AND MINIMA

	P kips	Mmajor kip-ft	Mminor kip-ft	Vmajor kips	Vminor kips	Tors kip-ft
Max @ T:	9.24	0.00	0.00	0.00	0.00	0.00
LC:	37	1	1	85	28	1
Max @ B:	9.24	0.00	0.00	0.00	0.00	0.00
LC:	37	1	1	85	28	1
Maximum:	9.24	0.00	0.00	0.00	0.00	0.00
LC:	37	1	1	85	28	1
@ (ft):	0.00	0.00	0.00	0.00	0.00	0.00
Min @ T:	-7.64	0.00	0.00	-0.00	-0.00	0.00
LC:	97	1	1	49	88	1
Min @ B:	-7.64	0.00	0.00	-0.00	-0.00	0.00
LC:	97	1	1	49	88	1
Minimum:	-7.64	0.00	0.00	-0.00	-0.00	0.00

Member Force Envelope

	P	Mmajor	Mminor	Vmajor	Vminor	Tors
LC:	97	1	1	49	88	1
@ (ft):	0.00	0.00	0.00	0.00	0.00	0.00

STEEL COLUMN INFORMATION:

Column Number: 10 **Frame Number: 2**

Level Top: Roof Column Line (82.67,48.00)
Bot: Base
Fy (ksi) = 50.00 Column Size = HSS4X4X5/16
Elastic Modulus (ksi) = 29000
Orientation (deg) = 90.00 Length (ft) = 12.67

INPUT PARAMETERS:

		Top	Bottom
Fixity	Major Axis:	Fix	Fix
	Minor Axis:	Fix	Fix
	Torsion:	Fix	Fix
Joint Face Dist (in):			
	Major:	5.10	0.00
	Minor:	0.00	0.00
Rigid End Zone (in):			
	Major:	0.00	0.00 (Ignore)
	Minor:	0.00	0.00 (Ignore)

Member Force Output: At Face of Joint
P-Delta: Yes Scale Factor: 1.00
Ground Level: Base

LOAD CASE DEFINITIONS:

D	DeadLoad	RAMUSER
Sp	PosSnowLoad	RAMUSER
W1	Wind	Wind_ASCE710_1_X
W2	Wind	Wind_ASCE710_1_Y
W3	Wind	Wind_ASCE710_2_X+E
W4	Wind	Wind_ASCE710_2_X-E
W5	Wind	Wind_ASCE710_2_Y+E
W6	Wind	Wind_ASCE710_2_Y-E
W7	Wind	Wind_ASCE710_3_X+Y
W8	Wind	Wind_ASCE710_3_X-Y
W9	Wind	Wind_ASCE710_4_X+Y_CW
W10	Wind	Wind_ASCE710_4_X+Y_CCW
W11	Wind	Wind_ASCE710_4_X-Y_CW
W12	Wind	Wind_ASCE710_4_X-Y_CCW
E1	Seismic	EQ_ASCE710_X_+E_F
E2	Seismic	EQ_ASCE710_X_-E_F
E3	Seismic	EQ_ASCE710_Y_+E_F
E4	Seismic	EQ_ASCE710_Y_-E_F
E5	Seismic	EQ_ASCE710_X_+E_0.3Y_+E_F
E6	Seismic	EQ_ASCE710_X_+E_-0.3Y_+E_F
E7	Seismic	EQ_ASCE710_-X_+E_0.3Y_+E_F
E8	Seismic	EQ_ASCE710_-X_+E_-0.3Y_+E_F

E9	Seismic	EQ_ASCE710_0.3X_+E_Y_+E_F
E10	Seismic	EQ_ASCE710_0.3X_+E_-Y_+E_F
E11	Seismic	EQ_ASCE710_-0.3X_+E_Y_+E_F
E12	Seismic	EQ_ASCE710_-0.3X_+E_-Y_+E_F
E13	Seismic	EQ_ASCE710_X_+E_0.3Y_-E_F
E14	Seismic	EQ_ASCE710_X_+E_-0.3Y_-E_F
E15	Seismic	EQ_ASCE710_-X_+E_0.3Y_-E_F
E16	Seismic	EQ_ASCE710_-X_+E_-0.3Y_-E_F
E17	Seismic	EQ_ASCE710_0.3X_+E_Y_-E_F
E18	Seismic	EQ_ASCE710_0.3X_+E_-Y_-E_F
E19	Seismic	EQ_ASCE710_-0.3X_+E_Y_-E_F
E20	Seismic	EQ_ASCE710_-0.3X_+E_-Y_-E_F
E21	Seismic	EQ_ASCE710_X_-E_0.3Y_+E_F
E22	Seismic	EQ_ASCE710_X_-E_-0.3Y_+E_F
E23	Seismic	EQ_ASCE710_-X_-E_0.3Y_+E_F
E24	Seismic	EQ_ASCE710_-X_-E_-0.3Y_+E_F
E25	Seismic	EQ_ASCE710_0.3X_-E_Y_+E_F
E26	Seismic	EQ_ASCE710_0.3X_-E_-Y_+E_F
E27	Seismic	EQ_ASCE710_-0.3X_-E_Y_+E_F
E28	Seismic	EQ_ASCE710_-0.3X_-E_-Y_+E_F
E29	Seismic	EQ_ASCE710_X_-E_0.3Y_-E_F
E30	Seismic	EQ_ASCE710_X_-E_-0.3Y_-E_F
E31	Seismic	EQ_ASCE710_-X_-E_0.3Y_-E_F
E32	Seismic	EQ_ASCE710_-X_-E_-0.3Y_-E_F
E33	Seismic	EQ_ASCE710_0.3X_-E_Y_-E_F
E34	Seismic	EQ_ASCE710_0.3X_-E_-Y_-E_F
E35	Seismic	EQ_ASCE710_-0.3X_-E_Y_-E_F
E36	Seismic	EQ_ASCE710_-0.3X_-E_-Y_-E_F

LOAD COMBINATIONS: IBC 2015 / ASCE 7-10 LRFD

No. of Generated Combinations: 314
No. of Generated Combinations Selected to Use: 314

MEMBER FORCE MAXIMA AND MINIMA

	P	Mmajor	Mminor	Vmajor	Vminor	Tors
	kips	kip-ft	kip-ft	kips	kips	kip-ft
Max @ T:	26.77	0.36	0.00	0.10	0.01	0.01
LC:	31	91	91	31	49	31
Max @ B:	26.77	0.66	0.13	0.10	0.01	0.01
LC:	31	31	49	31	49	31
Maximum:	26.77	0.66	0.13	0.10	0.01	0.01
LC:	31	31	49	31	49	31
@ (ft):	0.43	12.67	12.67	0.43	0.00	0.43

	P	Mmajor	Mminor	Vmajor	Vminor	Tors
Min @ T:	-16.92	-0.51	-0.00	-0.07	-0.01	-0.01
LC:	91	31	31	91	85	91
Min @ B:	-16.92	-0.50	-0.10	-0.07	-0.01	-0.01
LC:	91	91	85	91	85	91
Minimum:	-16.92	-0.51	-0.10	-0.07	-0.01	-0.01
LC:	91	31	85	91	85	91
@ (ft):	0.43	0.43	12.67	0.43	0.00	0.43

STEEL COLUMN INFORMATION:

Column Number: 15 **Frame Number: 2**

Level Top: Roof Column Line (82.67,42.00)
Bot: Base

Fy (ksi) = 50.00 Column Size = HSS4X4X5/16

Elastic Modulus (ksi) = 29000

Orientation (deg) = 90.00 Length (ft) = 12.67

INPUT PARAMETERS:

		Top	Bottom
Fixity	Major Axis:	Fix	Fix
	Minor Axis:	Fix	Fix
	Torsion:	Fix	Fix
Joint Face Dist (in):			
	Major:	5.10	0.00
	Minor:	0.00	0.00
Rigid End Zone (in):			
	Major:	0.00	0.00 (Ignore)
	Minor:	0.00	0.00 (Ignore)

Member Force Output: At Face of Joint

P-Delta: Yes Scale Factor: 1.00

Ground Level: Base

LOAD CASE DEFINITIONS:

D	DeadLoad	RAMUSER
Sp	PosSnowLoad	RAMUSER
W1	Wind	Wind_ASCE710_1_X
W2	Wind	Wind_ASCE710_1_Y
W3	Wind	Wind_ASCE710_2_X+E
W4	Wind	Wind_ASCE710_2_X-E
W5	Wind	Wind_ASCE710_2_Y+E
W6	Wind	Wind_ASCE710_2_Y-E
W7	Wind	Wind_ASCE710_3_X+Y
W8	Wind	Wind_ASCE710_3_X-Y
W9	Wind	Wind_ASCE710_4_X+Y_CW
W10	Wind	Wind_ASCE710_4_X+Y_CCW
W11	Wind	Wind_ASCE710_4_X-Y_CW
W12	Wind	Wind_ASCE710_4_X-Y_CCW
E1	Seismic	EQ_ASCE710_X_+E_F
E2	Seismic	EQ_ASCE710_X_-E_F
E3	Seismic	EQ_ASCE710_Y_+E_F
E4	Seismic	EQ_ASCE710_Y_-E_F
E5	Seismic	EQ_ASCE710_X_+E_0.3Y_+E_F
E6	Seismic	EQ_ASCE710_X_+E_-0.3Y_+E_F
E7	Seismic	EQ_ASCE710_-X_+E_0.3Y_+E_F
E8	Seismic	EQ_ASCE710_-X_+E_-0.3Y_+E_F

E9	Seismic	EQ_ASCE710_0.3X_+E_Y_+E_F
E10	Seismic	EQ_ASCE710_0.3X_+E_-Y_+E_F
E11	Seismic	EQ_ASCE710_-0.3X_+E_Y_+E_F
E12	Seismic	EQ_ASCE710_-0.3X_+E_-Y_+E_F
E13	Seismic	EQ_ASCE710_X_+E_0.3Y_-E_F
E14	Seismic	EQ_ASCE710_X_+E_-0.3Y_-E_F
E15	Seismic	EQ_ASCE710_-X_+E_0.3Y_-E_F
E16	Seismic	EQ_ASCE710_-X_+E_-0.3Y_-E_F
E17	Seismic	EQ_ASCE710_0.3X_+E_Y_-E_F
E18	Seismic	EQ_ASCE710_0.3X_+E_-Y_-E_F
E19	Seismic	EQ_ASCE710_-0.3X_+E_Y_-E_F
E20	Seismic	EQ_ASCE710_-0.3X_+E_-Y_-E_F
E21	Seismic	EQ_ASCE710_X_-E_0.3Y_+E_F
E22	Seismic	EQ_ASCE710_X_-E_-0.3Y_+E_F
E23	Seismic	EQ_ASCE710_-X_-E_0.3Y_+E_F
E24	Seismic	EQ_ASCE710_-X_-E_-0.3Y_+E_F
E25	Seismic	EQ_ASCE710_0.3X_-E_Y_+E_F
E26	Seismic	EQ_ASCE710_0.3X_-E_-Y_+E_F
E27	Seismic	EQ_ASCE710_-0.3X_-E_Y_+E_F
E28	Seismic	EQ_ASCE710_-0.3X_-E_-Y_+E_F
E29	Seismic	EQ_ASCE710_X_-E_0.3Y_-E_F
E30	Seismic	EQ_ASCE710_X_-E_-0.3Y_-E_F
E31	Seismic	EQ_ASCE710_-X_-E_0.3Y_-E_F
E32	Seismic	EQ_ASCE710_-X_-E_-0.3Y_-E_F
E33	Seismic	EQ_ASCE710_0.3X_-E_Y_-E_F
E34	Seismic	EQ_ASCE710_0.3X_-E_-Y_-E_F
E35	Seismic	EQ_ASCE710_-0.3X_-E_Y_-E_F
E36	Seismic	EQ_ASCE710_-0.3X_-E_-Y_-E_F

LOAD COMBINATIONS: IBC 2015 / ASCE 7-10 LRFD

No. of Generated Combinations: 314
No. of Generated Combinations Selected to Use: 314

MEMBER FORCE MAXIMA AND MINIMA

	P	Mmajor	Mminor	Vmajor	Vminor	Tors
	kips	kip-ft	kip-ft	kips	kips	kip-ft
Max @ T:	6.20	0.39	0.00	0.08	0.01	0.01
LC:	19	91	31	31	49	31
Max @ B:	6.20	0.61	0.10	0.08	0.01	0.01
LC:	19	31	49	31	49	31
Maximum:	6.20	0.61	0.10	0.08	0.01	0.01
LC:	19	31	49	31	49	31
@ (ft):	0.43	12.67	12.67	0.43	0.00	0.43

	P	Mmajor	Mminor	Vmajor	Vminor	Tors
Min @ T:	1.03	-0.42	-0.00	-0.07	-0.01	-0.01
LC:	79	31	91	91	85	91
Min @ B:	1.03	-0.51	-0.08	-0.07	-0.01	-0.01
LC:	79	91	85	91	85	91
Minimum:	1.03	-0.51	-0.08	-0.07	-0.01	-0.01
LC:	79	91	85	91	85	91
@ (ft):	0.43	12.67	12.67	0.43	0.00	0.43

STEEL BEAM INFORMATION:

Beam Number: 15	**Frame Number: 2**	
Level: Roof	I-End (82.67,42.00)	J-End (82.67,48.00)
Fy (ksi) = 50.00	Beam Size = W10X22	
Length (ft) = 6.00		
Elastic Modulus (ksi) = 29000		

INPUT PARAMETERS:

		I-End	J-End
Fixity	Major Axis:	Fix	Fix
	Minor Axis:	Fix	Fix
	Torsion:	Fix	Fix
Rigid End Zone (in):		0.00	0.00 (Ignore)

Member Force Output: At Face of Joint
P-Delta: Yes Scale Factor: 1.00
Ground Level: Base

LOAD CASE DEFINITIONS:

D	DeadLoad	RAMUSER
Sp	PosSnowLoad	RAMUSER
W1	Wind	Wind_ASCE710_1_X
W2	Wind	Wind_ASCE710_1_Y
W3	Wind	Wind_ASCE710_2_X+E
W4	Wind	Wind_ASCE710_2_X-E
W5	Wind	Wind_ASCE710_2_Y+E
W6	Wind	Wind_ASCE710_2_Y-E
W7	Wind	Wind_ASCE710_3_X+Y
W8	Wind	Wind_ASCE710_3_X-Y
W9	Wind	Wind_ASCE710_4_X+Y_CW
W10	Wind	Wind_ASCE710_4_X+Y_CCW
W11	Wind	Wind_ASCE710_4_X-Y_CW
W12	Wind	Wind_ASCE710_4_X-Y_CCW
E1	Seismic	EQ_ASCE710_X_+E_F
E2	Seismic	EQ_ASCE710_X_-E_F
E3	Seismic	EQ_ASCE710_Y_+E_F
E4	Seismic	EQ_ASCE710_Y_-E_F
E5	Seismic	EQ_ASCE710_X_+E_0.3Y_+E_F
E6	Seismic	EQ_ASCE710_X_+E_-0.3Y_+E_F
E7	Seismic	EQ_ASCE710_-X_+E_0.3Y_+E_F
E8	Seismic	EQ_ASCE710_-X_+E_-0.3Y_+E_F
E9	Seismic	EQ_ASCE710_0.3X_+E_Y_+E_F
E10	Seismic	EQ_ASCE710_0.3X_+E_-Y_+E_F
E11	Seismic	EQ_ASCE710_-0.3X_+E_Y_+E_F
E12	Seismic	EQ_ASCE710_-0.3X_+E_-Y_+E_F
E13	Seismic	EQ_ASCE710_X_+E_0.3Y_-E_F

E14	Seismic	EQ_ASCE710_X_+E_-0.3Y_-E_F
E15	Seismic	EQ_ASCE710_-X_+E_0.3Y_-E_F
E16	Seismic	EQ_ASCE710_-X_+E_-0.3Y_-E_F
E17	Seismic	EQ_ASCE710_0.3X_+E_Y_-E_F
E18	Seismic	EQ_ASCE710_0.3X_+E_-Y_-E_F
E19	Seismic	EQ_ASCE710_-0.3X_+E_Y_-E_F
E20	Seismic	EQ_ASCE710_-0.3X_+E_-Y_-E_F
E21	Seismic	EQ_ASCE710_X_-E_0.3Y_+E_F
E22	Seismic	EQ_ASCE710_X_-E_-0.3Y_+E_F
E23	Seismic	EQ_ASCE710_-X_-E_0.3Y_+E_F
E24	Seismic	EQ_ASCE710_-X_-E_-0.3Y_+E_F
E25	Seismic	EQ_ASCE710_0.3X_-E_Y_+E_F
E26	Seismic	EQ_ASCE710_0.3X_-E_-Y_+E_F
E27	Seismic	EQ_ASCE710_-0.3X_-E_Y_+E_F
E28	Seismic	EQ_ASCE710_-0.3X_-E_-Y_+E_F
E29	Seismic	EQ_ASCE710_X_-E_0.3Y_-E_F
E30	Seismic	EQ_ASCE710_X_-E_-0.3Y_-E_F
E31	Seismic	EQ_ASCE710_-X_-E_0.3Y_-E_F
E32	Seismic	EQ_ASCE710_-X_-E_-0.3Y_-E_F
E33	Seismic	EQ_ASCE710_0.3X_-E_Y_-E_F
E34	Seismic	EQ_ASCE710_0.3X_-E_-Y_-E_F
E35	Seismic	EQ_ASCE710_-0.3X_-E_Y_-E_F
E36	Seismic	EQ_ASCE710_-0.3X_-E_-Y_-E_F

LOAD COMBINATIONS: IBC 2015 / ASCE 7-10 LRFD

No. of Generated Combinations: 314

No. of Generated Combinations Selected to Use: 314

MEMBER FORCE MAXIMA AND MINIMA

	P	Mmajor	Mminor	Vmajor	Vminor	Tors
	kips	kip-ft	kip-ft	kips	kips	kip-ft
Max @ i:	0.00	0.54	0.00	1.37	0.00	0.00
LC:	49	31	29	19	37	91
Max @ j:	0.00	0.41	0.00	-0.11	0.00	0.00
LC:	49	91	37	91	37	91
Maximum:	0.00	2.06	0.00	1.37	0.00	0.00
LC:	49	7	37	19	37	91
@ (ft):	0.00	2.83	5.83	0.17	0.17	0.00
Min @ i:	-0.00	-0.36	-0.00	0.09	-0.00	-0.00
LC:	37	91	41	79	49	31
Min @ j:	-0.00	-0.41	-0.00	-1.47	-0.00	-0.00
LC:	37	31	49	7	49	31

	P	Mmajor	Mminor	Vmajor	Vminor	Tors
Minimum:	-0.00	-0.41	-0.00	-1.47	-0.00	-0.00
LC:	37	31	49	7	49	31
@ (ft):	0.00	5.83	5.83	5.83	0.17	0.00

STEEL BRACE INFORMATION:

Brace Number: 3 **Frame Number: 2**

Story Top: Roof	I-End (ft): (82.67,48.00)
Bot: Base	J-End (ft): (82.67,42.00)
Fy (ksi) = 46.00	Brace Size = HSS4X4X3/8
Length (ft) = 14.02	
Elastic Modulus (ksi) = 29000	

INPUT PARAMETERS:

		Top	Bottom
Fixity	Major Axis:	Pin	Pin
	Minor Axis:	Pin	Pin
	Torsion:	Pin	Pin

Member Force Output: At Centerline of Joint
P-Delta: Yes Scale Factor: 1.00
Ground Level: Base

LOAD CASE DEFINITIONS:

D	DeadLoad	RAMUSER
Sp	PosSnowLoad	RAMUSER
W1	Wind	Wind_ASCE710_1_X
W2	Wind	Wind_ASCE710_1_Y
W3	Wind	Wind_ASCE710_2_X+E
W4	Wind	Wind_ASCE710_2_X-E
W5	Wind	Wind_ASCE710_2_Y+E
W6	Wind	Wind_ASCE710_2_Y-E
W7	Wind	Wind_ASCE710_3_X+Y
W8	Wind	Wind_ASCE710_3_X-Y
W9	Wind	Wind_ASCE710_4_X+Y_CW
W10	Wind	Wind_ASCE710_4_X+Y_CCW
W11	Wind	Wind_ASCE710_4_X-Y_CW
W12	Wind	Wind_ASCE710_4_X-Y_CCW
E1	Seismic	EQ_ASCE710_X_+E_F
E2	Seismic	EQ_ASCE710_X_-E_F
E3	Seismic	EQ_ASCE710_Y_+E_F
E4	Seismic	EQ_ASCE710_Y_-E_F
E5	Seismic	EQ_ASCE710_X_+E_0.3Y_+E_F
E6	Seismic	EQ_ASCE710_X_+E_-0.3Y_+E_F
E7	Seismic	EQ_ASCE710_-X_+E_0.3Y_+E_F
E8	Seismic	EQ_ASCE710_-X_+E_-0.3Y_+E_F
E9	Seismic	EQ_ASCE710_0.3X_+E_Y_+E_F
E10	Seismic	EQ_ASCE710_0.3X_+E_-Y_+E_F
E11	Seismic	EQ_ASCE710_-0.3X_+E_Y_+E_F
E12	Seismic	EQ_ASCE710_-0.3X_+E_-Y_+E_F
E13	Seismic	EQ_ASCE710_X_+E_0.3Y_-E_F
E14	Seismic	EQ_ASCE710_X_+E_-0.3Y_-E_F

E15	Seismic	EQ_ASCE710_-X_+E_0.3Y_-E_F
E16	Seismic	EQ_ASCE710_-X_+E_-0.3Y_-E_F
E17	Seismic	EQ_ASCE710_0.3X_+E_Y_-E_F
E18	Seismic	EQ_ASCE710_0.3X_+E_-Y_-E_F
E19	Seismic	EQ_ASCE710_-0.3X_+E_Y_-E_F
E20	Seismic	EQ_ASCE710_-0.3X_+E_-Y_-E_F
E21	Seismic	EQ_ASCE710_X_-E_0.3Y_+E_F
E22	Seismic	EQ_ASCE710_X_-E_-0.3Y_+E_F
E23	Seismic	EQ_ASCE710_-X_-E_0.3Y_+E_F
E24	Seismic	EQ_ASCE710_-X_-E_-0.3Y_+E_F
E25	Seismic	EQ_ASCE710_0.3X_-E_Y_+E_F
E26	Seismic	EQ_ASCE710_0.3X_-E_-Y_+E_F
E27	Seismic	EQ_ASCE710_-0.3X_-E_Y_+E_F
E28	Seismic	EQ_ASCE710_-0.3X_-E_-Y_+E_F
E29	Seismic	EQ_ASCE710_X_-E_0.3Y_-E_F
E30	Seismic	EQ_ASCE710_X_-E_-0.3Y_-E_F
E31	Seismic	EQ_ASCE710_-X_-E_0.3Y_-E_F
E32	Seismic	EQ_ASCE710_-X_-E_-0.3Y_-E_F
E33	Seismic	EQ_ASCE710_0.3X_-E_Y_-E_F
E34	Seismic	EQ_ASCE710_0.3X_-E_-Y_-E_F
E35	Seismic	EQ_ASCE710_-0.3X_-E_Y_-E_F
E36	Seismic	EQ_ASCE710_-0.3X_-E_-Y_-E_F

LOAD COMBINATIONS: IBC 2015 / ASCE 7-10 LRFD

No. of Generated Combinations: 314

No. of Generated Combinations Selected to Use: 314

MEMBER FORCE MAXIMA AND MINIMA

	P kips	Mmajor kip-ft	Mminor kip-ft	Vmajor kips	Vminor kips	Tors kip-ft
Max @ T:	21.29	0.00	0.00	0.00	0.00	0.00
LC:	91	1	1	91	85	1
Max @ B:	21.29	0.00	0.00	0.00	0.00	0.00
LC:	91	1	1	91	85	1
Maximum:	21.29	0.00	0.00	0.00	0.00	0.00
LC:	91	1	1	91	85	1
@ (ft):	0.00	0.00	0.00	0.00	0.00	0.00
Min @ T:	-21.89	0.00	0.00	-0.00	-0.00	0.00
LC:	31	1	1	31	49	1
Min @ B:	-21.89	0.00	0.00	-0.00	-0.00	0.00
LC:	31	1	1	31	49	1
Minimum:	-21.89	0.00	0.00	-0.00	-0.00	0.00

	P	Mmajor	Mminor	Vmajor	Vminor	Tors
LC:	31	1	1	31	49	1
@ (ft):	0.00	0.00	0.00	0.00	0.00	0.00

Code Check Summary

RAM Frame 17.00.01.09
DataBase: Strawberry Park - East Addition — 04/06/20 08:57:09
Building Code: IBC — Steel Code: AISC360-16 LRFD

CRITERIA:

Rigid End Zones: Ignore Effects
Member Force Output: At Face of Joint
P-Delta: Yes — Scale Factor: 1.00
Ground Level: Base
Mesh Criteria :
- Max. Distance Between Nodes on Mesh Line (ft) : 4.00
- Merge Node Tolerance (in) : 0.0100
- Geometry Tolerance (in) : 0.0050

Walls Out-of-plane Stiffness Not Included in Analysis.
Sign considered for Dynamic Load Case Results.
Rigid Links Included at Fixed Beam-to-Wall Locations
Eigenvalue Analysis : Eigen Vectors (Subspace Iteration)

LOAD COMBINATION CRITERIA:

Snow Factor f2	Use Full Factor (f2 = 0.7) on Snow in Combination with Seismic
Live Load factor f1 (0.5 or 1.0)	0.500
Sds (for Ev)	0.285
RhoX	1.000
RhoY	1.000

LOAD CASE DEFINITIONS:

D	DeadLoad	RAMUSER
Sp	PosSnowLoad	RAMUSER
W1	Wind	Wind_ASCE710_1_X
W2	Wind	Wind_ASCE710_1_Y
W3	Wind	Wind_ASCE710_2_X+E
W4	Wind	Wind_ASCE710_2_X-E
W5	Wind	Wind_ASCE710_2_Y+E
W6	Wind	Wind_ASCE710_2_Y-E
W7	Wind	Wind_ASCE710_3_X+Y
W8	Wind	Wind_ASCE710_3_X-Y
W9	Wind	Wind_ASCE710_4_X+Y_CW
W10	Wind	Wind_ASCE710_4_X+Y_CCW
W11	Wind	Wind_ASCE710_4_X-Y_CW
W12	Wind	Wind_ASCE710_4_X-Y_CCW
E1	Seismic	EQ_ASCE710_X_+E_F
E2	Seismic	EQ_ASCE710_X_-E_F
E3	Seismic	EQ_ASCE710_Y_+E_F
E4	Seismic	EQ_ASCE710_Y_-E_F
E5	Seismic	EQ_ASCE710_X_+E_0.3Y_+E_F
E6	Seismic	EQ_ASCE710_X_+E_-0.3Y_+E_F
E7	Seismic	EQ_ASCE710_-X_+E_0.3Y_+E_F
E8	Seismic	EQ_ASCE710_-X_+E_-0.3Y_+E_F
E9	Seismic	EQ_ASCE710_0.3X_+E_Y_+E_F
E10	Seismic	EQ_ASCE710_0.3X_+E_-Y_+E_F
E11	Seismic	EQ_ASCE710_-0.3X_+E_Y_+E_F

E12	Seismic	EQ_ASCE710_-0.3X_+E_-Y_+E_F
E13	Seismic	EQ_ASCE710_X_+E_0.3Y_-E_F
E14	Seismic	EQ_ASCE710_X_+E_-0.3Y_-E_F
E15	Seismic	EQ_ASCE710_-X_+E_0.3Y_-E_F
E16	Seismic	EQ_ASCE710_-X_+E_-0.3Y_-E_F
E17	Seismic	EQ_ASCE710_0.3X_+E_Y_-E_F
E18	Seismic	EQ_ASCE710_0.3X_+E_-Y_-E_F
E19	Seismic	EQ_ASCE710_-0.3X_+E_Y_-E_F
E20	Seismic	EQ_ASCE710_-0.3X_+E_-Y_-E_F
E21	Seismic	EQ_ASCE710_X_-E_0.3Y_+E_F
E22	Seismic	EQ_ASCE710_X_-E_-0.3Y_+E_F
E23	Seismic	EQ_ASCE710_-X_-E_0.3Y_+E_F
E24	Seismic	EQ_ASCE710_-X_-E_-0.3Y_+E_F
E25	Seismic	EQ_ASCE710_0.3X_-E_Y_+E_F
E26	Seismic	EQ_ASCE710_0.3X_-E_-Y_+E_F
E27	Seismic	EQ_ASCE710_-0.3X_-E_Y_+E_F
E28	Seismic	EQ_ASCE710_-0.3X_-E_-Y_+E_F
E29	Seismic	EQ_ASCE710_X_-E_0.3Y_-E_F
E30	Seismic	EQ_ASCE710_X_-E_-0.3Y_-E_F
E31	Seismic	EQ_ASCE710_-X_-E_0.3Y_-E_F
E32	Seismic	EQ_ASCE710_-X_-E_-0.3Y_-E_F
E33	Seismic	EQ_ASCE710_0.3X_-E_Y_-E_F
E34	Seismic	EQ_ASCE710_0.3X_-E_-Y_-E_F
E35	Seismic	EQ_ASCE710_-0.3X_-E_Y_-E_F
E36	Seismic	EQ_ASCE710_-0.3X_-E_-Y_-E_F

LOAD COMBINATIONS: IBC 2015 / ASCE 7-10 LRFD

1	*	1.400 D
2	*	1.200 D + 1.600 Sp
3	*	1.200 D + 1.600 Sp + 0.500 W1
4	*	1.200 D + 1.600 Sp + 0.500 W2
5	*	1.200 D + 1.600 Sp + 0.500 W3
6	*	1.200 D + 1.600 Sp + 0.500 W4
7	*	1.200 D + 1.600 Sp + 0.500 W5
8	*	1.200 D + 1.600 Sp + 0.500 W6
9	*	1.200 D + 1.600 Sp + 0.500 W7
10	*	1.200 D + 1.600 Sp + 0.500 W8
11	*	1.200 D + 1.600 Sp + 0.500 W9
12	*	1.200 D + 1.600 Sp + 0.500 W10
13	*	1.200 D + 1.600 Sp + 0.500 W11
14	*	1.200 D + 1.600 Sp + 0.500 W12
15	*	1.200 D + 1.600 Sp - 0.500 W1
16	*	1.200 D + 1.600 Sp - 0.500 W2
17	*	1.200 D + 1.600 Sp - 0.500 W3
18	*	1.200 D + 1.600 Sp - 0.500 W4
19	*	1.200 D + 1.600 Sp - 0.500 W5

20	*	1.200 D + 1.600 Sp - 0.500 W6
21	*	1.200 D + 1.600 Sp - 0.500 W7
22	*	1.200 D + 1.600 Sp - 0.500 W8
23	*	1.200 D + 1.600 Sp - 0.500 W9
24	*	1.200 D + 1.600 Sp - 0.500 W10
25	*	1.200 D + 1.600 Sp - 0.500 W11
26	*	1.200 D + 1.600 Sp - 0.500 W12
27	*	1.200 D + 0.500 Sp + 1.000 W1
28	*	1.200 D + 0.500 Sp + 1.000 W2
29	*	1.200 D + 0.500 Sp + 1.000 W3
30	*	1.200 D + 0.500 Sp + 1.000 W4
31	*	1.200 D + 0.500 Sp + 1.000 W5
32	*	1.200 D + 0.500 Sp + 1.000 W6
33	*	1.200 D + 0.500 Sp + 1.000 W7
34	*	1.200 D + 0.500 Sp + 1.000 W8
35	*	1.200 D + 0.500 Sp + 1.000 W9
36	*	1.200 D + 0.500 Sp + 1.000 W10
37	*	1.200 D + 0.500 Sp + 1.000 W11
38	*	1.200 D + 0.500 Sp + 1.000 W12
39	*	1.200 D + 0.500 Sp - 1.000 W1
40	*	1.200 D + 0.500 Sp - 1.000 W2
41	*	1.200 D + 0.500 Sp - 1.000 W3
42	*	1.200 D + 0.500 Sp - 1.000 W4
43	*	1.200 D + 0.500 Sp - 1.000 W5
44	*	1.200 D + 0.500 Sp - 1.000 W6
45	*	1.200 D + 0.500 Sp - 1.000 W7
46	*	1.200 D + 0.500 Sp - 1.000 W8
47	*	1.200 D + 0.500 Sp - 1.000 W9
48	*	1.200 D + 0.500 Sp - 1.000 W10
49	*	1.200 D + 0.500 Sp - 1.000 W11
50	*	1.200 D + 0.500 Sp - 1.000 W12
51	*	1.200 D + 1.000 W1
52	*	1.200 D + 1.000 W2
53	*	1.200 D + 1.000 W3
54	*	1.200 D + 1.000 W4
55	*	1.200 D + 1.000 W5
56	*	1.200 D + 1.000 W6
57	*	1.200 D + 1.000 W7
58	*	1.200 D + 1.000 W8
59	*	1.200 D + 1.000 W9
60	*	1.200 D + 1.000 W10
61	*	1.200 D + 1.000 W11
62	*	1.200 D + 1.000 W12
63	*	1.200 D - 1.000 W1
64	*	1.200 D - 1.000 W2
65	*	1.200 D - 1.000 W3

66	*	1.200 D - 1.000 W4
67	*	1.200 D - 1.000 W5
68	*	1.200 D - 1.000 W6
69	*	1.200 D - 1.000 W7
70	*	1.200 D - 1.000 W8
71	*	1.200 D - 1.000 W9
72	*	1.200 D - 1.000 W10
73	*	1.200 D - 1.000 W11
74	*	1.200 D - 1.000 W12
75	*	0.900 D + 1.000 W1
76	*	0.900 D + 1.000 W2
77	*	0.900 D + 1.000 W3
78	*	0.900 D + 1.000 W4
79	*	0.900 D + 1.000 W5
80	*	0.900 D + 1.000 W6
81	*	0.900 D + 1.000 W7
82	*	0.900 D + 1.000 W8
83	*	0.900 D + 1.000 W9
84	*	0.900 D + 1.000 W10
85	*	0.900 D + 1.000 W11
86	*	0.900 D + 1.000 W12
87	*	0.900 D - 1.000 W1
88	*	0.900 D - 1.000 W2
89	*	0.900 D - 1.000 W3
90	*	0.900 D - 1.000 W4
91	*	0.900 D - 1.000 W5
92	*	0.900 D - 1.000 W6
93	*	0.900 D - 1.000 W7
94	*	0.900 D - 1.000 W8
95	*	0.900 D - 1.000 W9
96	*	0.900 D - 1.000 W10
97	*	0.900 D - 1.000 W11
98	*	0.900 D - 1.000 W12
99	*	1.257 D + 0.700 Sp + 1.000 E1
100	*	1.257 D + 0.700 Sp + 1.000 E2
101	*	1.257 D + 0.700 Sp + 1.000 E3
102	*	1.257 D + 0.700 Sp + 1.000 E4
103	*	1.257 D + 0.700 Sp + 1.000 E5
104	*	1.257 D + 0.700 Sp + 1.000 E6
105	*	1.257 D + 0.700 Sp + 1.000 E7
106	*	1.257 D + 0.700 Sp + 1.000 E8
107	*	1.257 D + 0.700 Sp + 1.000 E9
108	*	1.257 D + 0.700 Sp + 1.000 E10
109	*	1.257 D + 0.700 Sp + 1.000 E11
110	*	1.257 D + 0.700 Sp + 1.000 E12
111	*	1.257 D + 0.700 Sp + 1.000 E13

112	*	1.257 D + 0.700 Sp + 1.000 E14
113	*	1.257 D + 0.700 Sp + 1.000 E15
114	*	1.257 D + 0.700 Sp + 1.000 E16
115	*	1.257 D + 0.700 Sp + 1.000 E17
116	*	1.257 D + 0.700 Sp + 1.000 E18
117	*	1.257 D + 0.700 Sp + 1.000 E19
118	*	1.257 D + 0.700 Sp + 1.000 E20
119	*	1.257 D + 0.700 Sp + 1.000 E21
120	*	1.257 D + 0.700 Sp + 1.000 E22
121	*	1.257 D + 0.700 Sp + 1.000 E23
122	*	1.257 D + 0.700 Sp + 1.000 E24
123	*	1.257 D + 0.700 Sp + 1.000 E25
124	*	1.257 D + 0.700 Sp + 1.000 E26
125	*	1.257 D + 0.700 Sp + 1.000 E27
126	*	1.257 D + 0.700 Sp + 1.000 E28
127	*	1.257 D + 0.700 Sp + 1.000 E29
128	*	1.257 D + 0.700 Sp + 1.000 E30
129	*	1.257 D + 0.700 Sp + 1.000 E31
130	*	1.257 D + 0.700 Sp + 1.000 E32
131	*	1.257 D + 0.700 Sp + 1.000 E33
132	*	1.257 D + 0.700 Sp + 1.000 E34
133	*	1.257 D + 0.700 Sp + 1.000 E35
134	*	1.257 D + 0.700 Sp + 1.000 E36
135	*	1.257 D + 0.700 Sp - 1.000 E1
136	*	1.257 D + 0.700 Sp - 1.000 E2
137	*	1.257 D + 0.700 Sp - 1.000 E3
138	*	1.257 D + 0.700 Sp - 1.000 E4
139	*	1.257 D + 0.700 Sp - 1.000 E5
140	*	1.257 D + 0.700 Sp - 1.000 E6
141	*	1.257 D + 0.700 Sp - 1.000 E7
142	*	1.257 D + 0.700 Sp - 1.000 E8
143	*	1.257 D + 0.700 Sp - 1.000 E9
144	*	1.257 D + 0.700 Sp - 1.000 E10
145	*	1.257 D + 0.700 Sp - 1.000 E11
146	*	1.257 D + 0.700 Sp - 1.000 E12
147	*	1.257 D + 0.700 Sp - 1.000 E13
148	*	1.257 D + 0.700 Sp - 1.000 E14
149	*	1.257 D + 0.700 Sp - 1.000 E15
150	*	1.257 D + 0.700 Sp - 1.000 E16
151	*	1.257 D + 0.700 Sp - 1.000 E17
152	*	1.257 D + 0.700 Sp - 1.000 E18
153	*	1.257 D + 0.700 Sp - 1.000 E19
154	*	1.257 D + 0.700 Sp - 1.000 E20
155	*	1.257 D + 0.700 Sp - 1.000 E21
156	*	1.257 D + 0.700 Sp - 1.000 E22
157	*	1.257 D + 0.700 Sp - 1.000 E23

158	*	1.257 D + 0.700 Sp - 1.000 E24
159	*	1.257 D + 0.700 Sp - 1.000 E25
160	*	1.257 D + 0.700 Sp - 1.000 E26
161	*	1.257 D + 0.700 Sp - 1.000 E27
162	*	1.257 D + 0.700 Sp - 1.000 E28
163	*	1.257 D + 0.700 Sp - 1.000 E29
164	*	1.257 D + 0.700 Sp - 1.000 E30
165	*	1.257 D + 0.700 Sp - 1.000 E31
166	*	1.257 D + 0.700 Sp - 1.000 E32
167	*	1.257 D + 0.700 Sp - 1.000 E33
168	*	1.257 D + 0.700 Sp - 1.000 E34
169	*	1.257 D + 0.700 Sp - 1.000 E35
170	*	1.257 D + 0.700 Sp - 1.000 E36
171	*	1.257 D + 1.000 E1
172	*	1.257 D + 1.000 E2
173	*	1.257 D + 1.000 E3
174	*	1.257 D + 1.000 E4
175	*	1.257 D + 1.000 E5
176	*	1.257 D + 1.000 E6
177	*	1.257 D + 1.000 E7
178	*	1.257 D + 1.000 E8
179	*	1.257 D + 1.000 E9
180	*	1.257 D + 1.000 E10
181	*	1.257 D + 1.000 E11
182	*	1.257 D + 1.000 E12
183	*	1.257 D + 1.000 E13
184	*	1.257 D + 1.000 E14
185	*	1.257 D + 1.000 E15
186	*	1.257 D + 1.000 E16
187	*	1.257 D + 1.000 E17
188	*	1.257 D + 1.000 E18
189	*	1.257 D + 1.000 E19
190	*	1.257 D + 1.000 E20
191	*	1.257 D + 1.000 E21
192	*	1.257 D + 1.000 E22
193	*	1.257 D + 1.000 E23
194	*	1.257 D + 1.000 E24
195	*	1.257 D + 1.000 E25
196	*	1.257 D + 1.000 E26
197	*	1.257 D + 1.000 E27
198	*	1.257 D + 1.000 E28
199	*	1.257 D + 1.000 E29
200	*	1.257 D + 1.000 E30
201	*	1.257 D + 1.000 E31
202	*	1.257 D + 1.000 E32
203	*	1.257 D + 1.000 E33

204	*	1.257 D + 1.000 E34
205	*	1.257 D + 1.000 E35
206	*	1.257 D + 1.000 E36
207	*	1.257 D - 1.000 E1
208	*	1.257 D - 1.000 E2
209	*	1.257 D - 1.000 E3
210	*	1.257 D - 1.000 E4
211	*	1.257 D - 1.000 E5
212	*	1.257 D - 1.000 E6
213	*	1.257 D - 1.000 E7
214	*	1.257 D - 1.000 E8
215	*	1.257 D - 1.000 E9
216	*	1.257 D - 1.000 E10
217	*	1.257 D - 1.000 E11
218	*	1.257 D - 1.000 E12
219	*	1.257 D - 1.000 E13
220	*	1.257 D - 1.000 E14
221	*	1.257 D - 1.000 E15
222	*	1.257 D - 1.000 E16
223	*	1.257 D - 1.000 E17
224	*	1.257 D - 1.000 E18
225	*	1.257 D - 1.000 E19
226	*	1.257 D - 1.000 E20
227	*	1.257 D - 1.000 E21
228	*	1.257 D - 1.000 E22
229	*	1.257 D - 1.000 E23
230	*	1.257 D - 1.000 E24
231	*	1.257 D - 1.000 E25
232	*	1.257 D - 1.000 E26
233	*	1.257 D - 1.000 E27
234	*	1.257 D - 1.000 E28
235	*	1.257 D - 1.000 E29
236	*	1.257 D - 1.000 E30
237	*	1.257 D - 1.000 E31
238	*	1.257 D - 1.000 E32
239	*	1.257 D - 1.000 E33
240	*	1.257 D - 1.000 E34
241	*	1.257 D - 1.000 E35
242	*	1.257 D - 1.000 E36
243	*	0.843 D + 1.000 E1
244	*	0.843 D + 1.000 E2
245	*	0.843 D + 1.000 E3
246	*	0.843 D + 1.000 E4
247	*	0.843 D + 1.000 E5
248	*	0.843 D + 1.000 E6
249	*	0.843 D + 1.000 E7

250	*	0.843 D + 1.000 E8
251	*	0.843 D + 1.000 E9
252	*	0.843 D + 1.000 E10
253	*	0.843 D + 1.000 E11
254	*	0.843 D + 1.000 E12
255	*	0.843 D + 1.000 E13
256	*	0.843 D + 1.000 E14
257	*	0.843 D + 1.000 E15
258	*	0.843 D + 1.000 E16
259	*	0.843 D + 1.000 E17
260	*	0.843 D + 1.000 E18
261	*	0.843 D + 1.000 E19
262	*	0.843 D + 1.000 E20
263	*	0.843 D + 1.000 E21
264	*	0.843 D + 1.000 E22
265	*	0.843 D + 1.000 E23
266	*	0.843 D + 1.000 E24
267	*	0.843 D + 1.000 E25
268	*	0.843 D + 1.000 E26
269	*	0.843 D + 1.000 E27
270	*	0.843 D + 1.000 E28
271	*	0.843 D + 1.000 E29
272	*	0.843 D + 1.000 E30
273	*	0.843 D + 1.000 E31
274	*	0.843 D + 1.000 E32
275	*	0.843 D + 1.000 E33
276	*	0.843 D + 1.000 E34
277	*	0.843 D + 1.000 E35
278	*	0.843 D + 1.000 E36
279	*	0.843 D - 1.000 E1
280	*	0.843 D - 1.000 E2
281	*	0.843 D - 1.000 E3
282	*	0.843 D - 1.000 E4
283	*	0.843 D - 1.000 E5
284	*	0.843 D - 1.000 E6
285	*	0.843 D - 1.000 E7
286	*	0.843 D - 1.000 E8
287	*	0.843 D - 1.000 E9
288	*	0.843 D - 1.000 E10
289	*	0.843 D - 1.000 E11
290	*	0.843 D - 1.000 E12
291	*	0.843 D - 1.000 E13
292	*	0.843 D - 1.000 E14
293	*	0.843 D - 1.000 E15
294	*	0.843 D - 1.000 E16
295	*	0.843 D - 1.000 E17

296	*	0.843 D - 1.000 E18
297	*	0.843 D - 1.000 E19
298	*	0.843 D - 1.000 E20
299	*	0.843 D - 1.000 E21
300	*	0.843 D - 1.000 E22
301	*	0.843 D - 1.000 E23
302	*	0.843 D - 1.000 E24
303	*	0.843 D - 1.000 E25
304	*	0.843 D - 1.000 E26
305	*	0.843 D - 1.000 E27
306	*	0.843 D - 1.000 E28
307	*	0.843 D - 1.000 E29
308	*	0.843 D - 1.000 E30
309	*	0.843 D - 1.000 E31
310	*	0.843 D - 1.000 E32
311	*	0.843 D - 1.000 E33
312	*	0.843 D - 1.000 E34
313	*	0.843 D - 1.000 E35
314	*	0.843 D - 1.000 E36

* = Load combination currently selected to use

Frame #1:

Level: Roof

Col. #	Pu kip	Mux kip-ft	Muy kip-ft	Vux kip	Vuy kip	LC	Interact.	Fy ksi	Size
9	13.56	0.00	0.00	-0.10	0.01	25	0.16 Axial	50	HSS4X4X5/16
16	25.95	-0.31	0.00	0.04	-0.00	13	0.32 H1-1a	46	HSS4X4X5/16

Beam #	Pu kip	Mux kip-ft	Muy kip-ft	Vux kip	Vuy kip	LC	Interact.	Fy ksi	Size
44	0.00	11.43	0.00	3.71	-0.00	2	0.12 H1-1b	50	W10X22

Brace #	Pu kip	Mux kip-ft	Muy kip-ft	Vux kip	Vuy kip	LC	Interact.	Fy ksi	Size
2	9.24	0.00	0.00	-0.00	0.00	37	0.12 Axial	46	HSS4X4X3/8

Frame #2:

Level: Roof

Col. #	Pu kip	Mux kip-ft	Muy kip-ft	Vux kip	Vuy kip	LC	Interact.	Fy ksi	Size
10	26.77	0.66	0.13	0.10	0.01	31	0.34 H1-1a	50	HSS4X4X5/16
15	6.20	0.00	0.00	0.08	0.01	19	0.07 Axial	50	HSS4X4X5/16

Code Check Summary

Beam #	Pu kip	Mux kip-ft	Muy kip-ft	Vux kip	Vuy kip	LC	Interact.	Fy ksi	Size
15	0.00	2.06	0.00	-1.47	-0.00	7	0.02 H1-1b	50	W10X22

Brace #	Pu kip	Mux kip-ft	Muy kip-ft	Vux kip	Vuy kip	LC	Interact.	Fy ksi	Size
3	21.29	0.00	0.00	-0.00	-0.00	91	0.26 Axial	46	HSS4X4X3/8

Continuous Foundation Design Envelope

RAM Foundation v17.00.01.09
DataBase: Strawberry Park - East Addition
Building Code: IBC

Date: 04/06/20 09:21:32
Design Code: ACI318-14

Footing Mark: 15

LONGITUDINAL DIRECTION

	Positive Flexure			Negative Flexure			Critical Section Shear		
Location	**Mu**	**Phi Mn**	**As Req.**	**Mu**	**Phi Mn**	**As Req.**	**Vu**	**Phi Vn**	**As Req.**
ft	**kip-ft**	**kip-ft**	**in²**	**kip-ft**	**kip-ft**	**in²**	**kip**	**kip**	**in²/ft**
0.000	0.00	215.05	1.55	-0.00	-225.85	1.55	1.93	70.23	0.00
0.367	0.59	215.05	1.55	-0.13	-225.85	1.55	4.34	70.23	0.00
1.208	3.67	215.05	1.55	-1.36	-225.85	1.55	5.51	70.23	0.00
1.500	5.21	215.05	1.55	-2.16	-225.85	1.55	9.14	70.23	0.00
1.792	4.03	215.05	1.55	-3.97	-225.85	1.55	9.68	70.23	0.00
2.633	2.97	215.05	1.55	-10.19	-225.85	1.55	8.80	70.23	0.00
3.000	2.93	215.05	1.55	-12.65	-225.85	1.55	7.04	70.23	0.00
3.505	3.24	215.05	1.55	-15.70	-225.85	1.55	6.50	70.23	0.00
6.495	11.93	215.05	1.55	-23.04	-225.85	1.55	8.00	70.23	0.00
7.000	12.77	215.05	1.55	-19.73	-225.85	1.55	9.77	70.23	0.00
7.367	13.22	215.05	1.55	-16.42	-225.85	1.55	13.49	70.23	0.00
8.208	13.57	215.05	1.55	-10.79	-225.85	1.55	16.93	70.23	0.00
8.500	13.84	215.05	1.55	-9.22	-225.85	1.55	16.39	70.23	0.00
8.792	8.68	215.05	1.55	-1.32	-225.85	1.55	13.33	70.23	0.00
9.633	1.33	215.05	1.55	-0.13	-225.85	1.55	9.53	70.23	0.00
10.000	0.00	215.05	1.55	-0.00	-225.85	1.55	3.95	70.23	0.00

Note: Locations in bold font are under a column

TRANSVERSE DIRECTION

	Top Flexure			Bottom Flexure			Punching Shear	
Location	**Mu**	**Phi Mn**	**As Req.**	**Mu**	**Phi Mn**	**As Req.**	**Vu**	**Phi Vn**
ft	**kip-ft**	**kip-ft**	**in²**	**kip-ft**	**kip-ft**	**in²**	**kip**	**kip**
0.00	1.65	153.33	2.84	4.48	145.68	2.84		
3.00	1.65	153.33	2.84	4.48	145.68	2.84	13.93	416.55
3.00	2.79	195.90	3.28	8.21	186.20	3.28		
7.00	2.79	195.90	3.28	8.21	186.20	3.28		

Continuous Foundation Design Envelope

Location	Mu	Phi Mn	As Req.	Mu	Phi Mn	As Req.	Vu	Phi Vn
7.00	1.24	153.33	2.84	7.55	145.68	2.84		
10.00	1.24	153.33	2.84	7.55	145.68	2.84	35.01	416.55

Soil Stress Under Foundation

Location	Stress	Ld Co #	Location	Stress	Ld Co #	Location	Stress	Ld Co #
ft	ksf		ft	ksf		ft	ksf	
0.00	1.19	658	0.37	1.15	658	**1.21**	1.07	658
1.50	1.08	682	**1.79**	1.09	682	2.63	1.11	682
3.00	1.12	682	3.51	1.13	682	6.49	1.55	633
7.00	1.63	633	7.37	1.71	670	**8.21**	1.90	670
8.50	1.97	670	**8.79**	2.04	670	9.63	2.24	670
10.00	2.32	670						

Note: Locations in bold font are under a column

Footing Mark: 16

LONGITUDINAL DIRECTION

Location	Positive Flexure Mu	Positive Flexure Phi Mn	Positive Flexure As Req.	Negative Flexure Mu	Negative Flexure Phi Mn	Negative Flexure As Req.	Critical Section Shear Vu	Critical Section Shear Phi Vn	Critical Section Shear As Req.
ft	kip-ft	kip-ft	in²	kip-ft	kip-ft	in²	kip	kip	in²/ft
0.000	0.00	323.52	2.58	-0.00	-339.72	2.58	11.23	117.04	0.00
0.995	10.03	323.52	2.58	-1.53	-339.72	2.58	13.34	117.04	0.00
1.000	10.09	323.52	2.58	-1.55	-339.72	2.58	17.18	117.04	0.00
1.870	24.16	323.52	2.58	-5.41	-339.72	2.58	20.85	117.04	0.00
2.708	40.82	323.52	2.58	-11.35	-339.72	2.58	21.48	117.04	0.00
3.000	46.99	323.52	2.58	-13.93	-339.72	2.58	20.80	117.04	0.00
3.292	30.63	323.52	2.58	-4.58	-339.72	2.58	10.83	117.04	0.00
4.130	38.90	323.52	2.58	-7.54	-339.72	2.58	8.89	117.04	0.00
5.000	45.75	323.52	2.58	-9.19	-339.72	2.58	6.87	117.04	0.00
5.005	45.79	323.52	2.58	-9.20	-339.72	2.58	6.85	117.04	0.00
6.995	54.83	323.52	2.58	-9.89	-339.72	2.58	5.30	117.04	0.00
7.000	54.84	323.52	2.58	-9.89	-339.72	2.58	6.08	117.04	0.00
7.870	55.89	323.52	2.58	-10.55	-339.72	2.58	8.22	117.04	0.00
8.708	55.25	323.52	2.58	-12.25	-339.72	2.58	9.28	117.04	0.00
9.000	55.73	323.52	2.58	-13.93	-339.72	2.58	23.31	117.04	0.00
9.292	48.83	323.52	2.58	-11.35	-339.72	2.58	23.99	117.04	0.00
10.130	29.45	323.52	2.58	-5.41	-339.72	2.58	24.08	117.04	0.00
11.000	12.47	323.52	2.58	-1.55	-339.72	2.58	20.53	117.04	0.00
11.005	12.39	323.52	2.58	-1.53	-339.72	2.58	16.23	117.04	0.00
12.000	0.00	323.52	2.58	-0.00	-339.72	2.58	13.61	117.04	0.00

Note: Locations in bold font are under a column

TRANSVERSE DIRECTION

Location	Top Flexure Mu	Top Flexure Phi Mn	Top Flexure As Req.	Bottom Flexure Mu	Bottom Flexure Phi Mn	Bottom Flexure As Req.	Punching Shear Vu	Punching Shear Phi Vn
ft	kip-ft	kip-ft	in²	kip-ft	kip-ft	in²	kip	kip
0.00	1.94	69.57	0.80	9.79	66.06	0.80		
1.00	1.94	69.57	0.80	9.79	66.06	0.80		

Continuous Foundation Design Envelope

Location	Mu	Phi Mn	As Req.	Mu	Phi Mn	As Req.	Vu	Phi Vn
1.00	6.74	226.72	3.44	12.99	215.34	3.44		
5.00	6.74	226.72	3.44	12.99	215.34	3.44	30.78	414.30
5.00	2.90	139.14	1.59	5.64	132.12	1.59		
7.00	2.90	139.14	1.59	5.64	132.12	1.59		
7.00	6.74	226.72	3.44	14.19	215.34	3.44		
11.00	6.74	226.72	3.44	14.19	215.34	3.44	27.23	414.30
11.00	1.94	69.57	0.80	3.10	66.06	0.80		
12.00	1.94	69.57	0.80	3.10	66.06	0.80		

Soil Stress Under Foundation

Location ft	Stress ksf	Ld Co #	Location ft	Stress ksf	Ld Co #	Location ft	Stress ksf	Ld Co #
0.00	1.19	772	0.99	1.03	652	1.00	1.03	652
1.87	0.94	652	**2.71**	0.86	652	**3.00**	0.83	652
3.29	0.81	676	4.13	0.76	676	5.00	0.71	676
5.01	0.71	676	6.99	0.76	664	7.00	0.76	664
7.87	0.84	664	**8.71**	0.92	664	**9.00**	0.95	664
9.29	0.97	664	10.13	1.05	664	11.00	1.13	664
11.01	1.13	664	12.00	1.37	760			

Note: Locations in bold font are under a column

EXISTING LATERAL EVALUATION

EXISTING WALLS

- GRID D

  LENGTH = 52', TRIB = 112' (WIND); 17' (GRAVITY)

  PER E/S-5 & K/S-1 : 10" BLOCK, #5@8" OC
  BOND BEAM @ 11' W/4-#4
  ↳ 10" WIDE

- GRID H

  LENGTH = 52', TRIB = 38'-7" (WIND); 17' (GRAVITY)

  PER J/S-5 & K/S-1 : 8" BLOCK SOLID GROUTED W/ #5@8" OC. BOND BEAM @ 13' W/ 2-#4

- GRID K

  LENGTH = 68', TRIB = 63'-7" (WIND); 24' (GRAVITY)

  PER A/S-6 & K/S-1 : 12" BLOCK W/ #5@8" OC
  8" WIDE BOND BEAM @ 12' W/ 2-#4, HORIZ. JOINT REINF @ 16" OC

WIND = 115 MPH

$$p = qGC_p - q(GC_{pi})$$

$q = .00256(.85)(1)(.98)115^2 = 28\text{psf}$

$G = .85$

$GC_{pi} = \pm .18$

$C_p = +.8\ (WW),\ -.45\ (LW)$

$$p = 28\text{psf}(.85 \times .8 + .18) + 28\text{psf}(.85 \times -.45 + -.18)$$
$$= 40\text{psf}\ (24\text{psf ASD})$$

$p_p = 2.5p = 60\text{psf}$

VN-S = 60psf (2')(212') + 40psf (11')(212')
= 119K

VE-W = 60psf (2')(263') + 40psf (11')(263')
= 147K

E = 84K ⇒ WIND CONTROLS

V = 60psf (2') + 40psf (8') = 440plf

WALL D
V = 440plf (112') = 49.3K
M = 49.3K × 12' = 592K-ft

WALL H
V = 440plf (39') = 17.2K
M = 17.2K (12') = 206K-ft

WALL K
V = 440plf (64') = 28.2K
M = 28.2K (12') = 338K-ft

} EXISTING LRFD SHEAR

DIAPHRAGM LENGTH = 51'
GRID D = 440plf (24') = 10560# / 51' = 207plf × 0.6
= 125plf ASD

GRID H = 17.2K / 51' = 337plf × 0.6 = 202plf ASD

GRID K = 440plf (15') = 6600# / 51' = 130plf × 0.6
= 78plf ASD

EXISTING WALLS W/ DEMO @ H

- GRID D

  TRIB = 151' (WIND) ; 17' (GRAVITY)

  V = 440 plf (151') = 67K

  M = 67K (12') = 804 K-ft

- GRID K

  TRIB = 103' (WIND) ; 24' (GRAVITY)

  V = 440 plf (103') = 46K

  M = 46K (12') = 552 K-ft

OPTION #1

- ELIMINATE GRID H & USE WALLS @ D, K, NEW AT D.8

GRID D LOAD DECREASES → WALL WORKS

GRID D.8

LOAD = 17.2K

DIAPHRAGM LOADS:

440plf (23') = 10120#/51' = 198 × 0.6 = 119plf

GRID K

V = 440plf (71.5') = 31.5K

DIAPHRAGM LOADS:

440plf (22') = 9680#/51' = 190 × 0.6 = 114plf

GRID F.6

- 15'-4" WALL SOLID GROUTED W/ #5@24" OC
- V_{dia} = 10120# / 15' = 675 × 0.6 = 405plf CONN. TO WALL

GRID K

(E) V_{dia} = 78plf/200plf CAPACITY = 0.39

(N) V_{dia} = 114plf/200plf CAPACITY = 0.57

>10% INCREASE IN DEMAND/CAPACITY RATIO → VERIFY DIAPHRAGM CONN IS ADEQUATE FOR NEW CODE

GRID D.8 FOOTING

$T = 17.2K(0.6) \times 13'/7.5' = 18K \Rightarrow 15.7K \rightarrow \frac{15.7K}{.6 \times .15kcf} = 175ft^3$

$C = 78psf(13')(7.5'^2/2)/7.5' = 3.8K \times .6 = 2.3K$

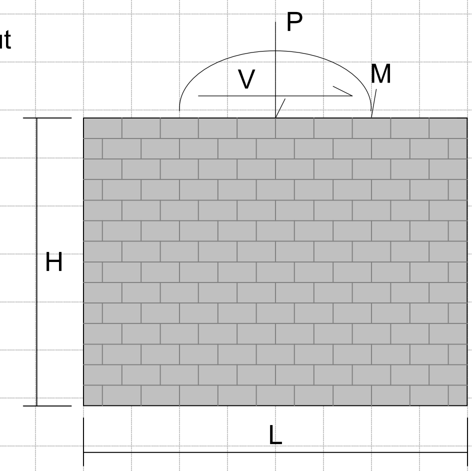
Prjct: Steamboat Schools
Topic: Grid D.8 Wall
Page:

Name: Strawberry Park
Date: 03/19/2020
Chkd:

Strength Design of a Reinforced Concrete Masonry Shearwall
Using the 2015 IBC Strength Design Code

Material and Construction Data

8 in. units, Full grout, running bond
Wall Weight = 80.35 psf
Type S Portland cement lime / Mortar cement Mortar, Coarse Grout
Masonry Density = 115.0 pcf
f'_m = 1,500 psi (Specified)
$E_m = 900(f'_m)$ = 1,350,000 psi
F_y = 60,000 psi
E_s = 29,000,000 psi

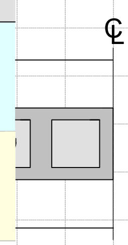


Shear Wall Design Details

Thickness = 7.625 in.
Height = 176.0 in. (14.67 ft)
Length = 90.00 in. (7.5 ft)
x = 3.813 in.
Endzone Length: S_o = 16 in = 1.333 ft (1 #5 Bars in each cell)
Middlezone Grouted Cell Spacing: Full Grout
Middlezone Steel Spacing: 24 in OC (1 #5 Bars in each cell with reinforcement)
This shear wall has an aspect ratio of 1.96 and may be a deep beam following the provisions of ACI 318.
A_o = 686.3 sq.in.
I_o = 886.6 in^4
r_o = 2.201 in.
Slenderness Reduction Factor = 0.673

Location of Reinforcing Bars

Bar	Ri	RCi	As
1	86	41	0.31
2	78	33	0.31
3	54	9	0.31
4	36	-9	0.31
5	12	-33	0.31
6	4	-41	0.31



The following design calculations are for the specified section forces

Section Design Forces Used

P_u = 9.169 kips
M_u = 2,642 kip-in
V_u = 16.94 kips

Prjct: Steamboat Schools
Topic: Grid D.8 Wall
Page:

Name: Strawberry Park
Date: 03/19/2020
Chkd:

Wall Flexural Design Data

Maximum P_n = 442.7 kips based on slenderness (TMS 402-13 §9.3.4.1.1)
Maximum P_u = 0.9(442.7) = 398.4 kips based on slenderness (TMS 402-13 §9.3.4.1.1)

Check P_u for the load condition D+0.75L+0.525Q_e.
$P_{u\ max}$ = 242.9 kips for normal reinforced shear walls (TMS 402-13 §9.3.3.5)
P_u for this load condition was not calculated and will need to be checked, if applicable.

M_n = 4,794 kip-in (399.5 kip-ft) for Design P_u
øM_n = 0.9(4,794) = 4,314 kip-in (359.5 kip-ft)

Wall Shear Design Data

Design as a normal shear wall
$V_{n\ max}$ = 106.3 kips (Section 9.3.4.1.2)
V_{nm} = 62.09 kips (Section 9.3.4.1.2.1)
V_{ns} = 0. kips
A_v /s = 0. in.
øV_n is the lesser of:
ø$V_{n\ max}$ = 0.8(106.3) = 85.05 kips
ø$V_{n\ max}$ = 0.8(62.09 + 0) = 49.67 kips CONTROLS

Development and Splice Lengths for EndZone Longitudinal Reinforcement

K = 3.5000 in.
Required Development Length: l_d = 22.48 in.
Required Lap Splice Length: = 22.48 in. (Cannot be reduced TMS 402-13 §9.3.3.4(b))
Some codes may require epoxy-coated reinforcement to have longer development and splice lengths.

Development and Splice Lengths for MidZone Longitudinal Reinforcement

K = 3.5000 in.
Required Development Length: l_d = 22.48 in.
Required Lap Splice Length: = 22.48 in. (Cannot be reduced TMS 402-13 §9.3.3.4(b))
Some codes may require epoxy-coated reinforcement to have longer development and splice lengths.

Strawberry Park - D.8 Footing

Height of wall	13 ft	Exterior Wall Weight	50 psf			
Weight of wall	75 psf	Exterior ftg	18 in			
TOF	3.5 ft	Exterior ftg thickness	12 in			
Length of wall	7.5 ft	Effective Length	20 ft - 1/2 each side of wall		Volume of Concrete	253.125 ft^3
Footing Toe	4.5 ft	Stem wall thickness	10 in			
Width of footing	5 ft					
Thickness ftg	18 in					

Shear Load 17 kips LRFD

Positive Wind Load acts against Exterior wall

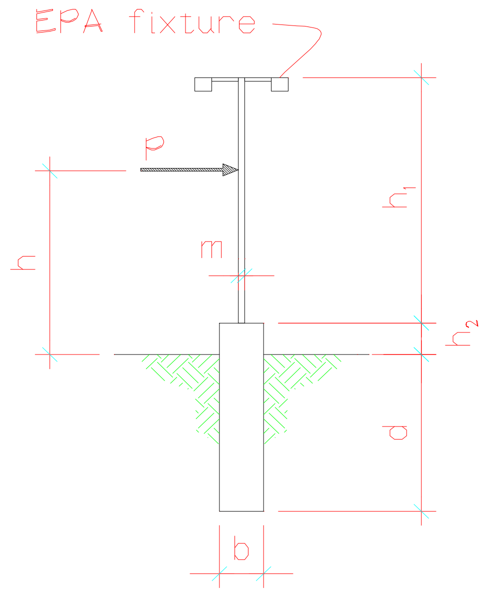
			0.6D+0.6W		0.6D-0.6W		D+0.6W		D-0.6W	
Load at exterior wall			arm (ft)	moment	arm (ft)	moment	arm (ft)	moment	arm (ft)	moment
Exterior wall	13.00 kips		12	-93.6	0.75	5.85	12	156	0.75	9.75
Stem wall	11.25 kips		12	-81	0.75	5.0625	12	135	0.75	8.4375
Soil	6.60 kips		12	-47.52	0.75	2.97	12	79.2	0.75	4.95
Ftg	4.50 kips		12	-32.4	0.75	2.025	12	54	0.75	3.375
	35.35 kips			0		0	0	0	0	0
				0		0	0	0	0	0
Loads at new wall				0		0	0	0	0	0
Wall+stem	9.28 kips		8.25	-45.9422	4.916667	27.37969	8.25	76.57031	4.916667	45.63281
Footing	12.38 kips		6	-44.55	7.166667	53.2125	6	74.25	7.166667	88.6875
Soil	20.00 kips		6	-72.0166	7.166667	86.01978	6	120.0276	7.166667	143.3663
		0.6D		-417.029		182.5195	0	695.0		304.1991
		0.6W	13	183.6	13	-183.6	13	183.6		-132.6
		SF		2.27		0.99	0	3.79		2.294111

Miscellaneous

Lightpole base design: nonconstrained at ground surface

Lightpole and base geometry

Total light fixture EPA (effective projected area)	A =	0.27	ft^2
Lightpole diameter or diagonal width	m =	5.7	in
Lightpole height above base	h_1 =	12.0	ft
Base height above grade	h_2 =	3.5	ft
Diameter of round or diagonal of square footing	b =	2.0	ft



Soil properties and wind pressure

Description of soil class of material per UBC Table 18-I-A

5. Clay, sandy clay, silty clay, clayey silt, silt & sandy silt

Lateral soil bearing per UBC Table 18-I-A

p_{table} = 100 psf per ft below grade

Increased allowable bearing by a factor 2 per UBC Table 18-I-A footnote #3

$p_{increased}$ = 200 psf per ft below grade

Components & cladding wind pressure w_{wind} = 20 psf

Resultant applied load

Resultant wind force P_{wind} = 258 lbs

Resultant height above grade of force h = 5.43 ft

Determine embedment depth required

For nonconstrained base (UBC Equation 6-1)

$d = 0.5A[1 + (1 + (4.36h/A))^{0.5}]$ but limited to 12'

where $A = 2.34P/S_1b$

and S_1 = allowable lateral soil bearing pressure based on 1/3 embedment length of base

Required embedment depth $d_{req'd}$ **= 3.49 ft**

Bearing pressure based on depth S_1 **= 233 psf**

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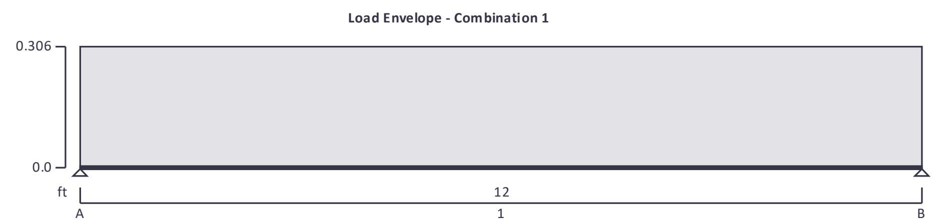
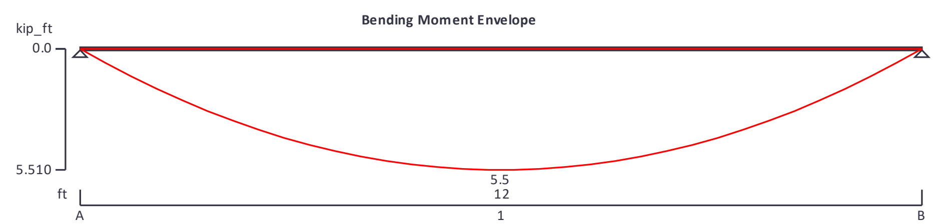
303.839.1963
Denver, CO 80218
Fax: 303.839.1983

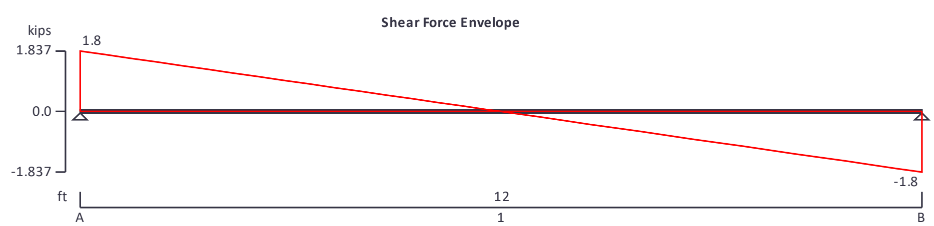
STEEL BEAM ANALYSIS & DESIGN (AISC360-10)

In accordance with AISC360-10 using the LRFD method

Tedds calculation version 3.0.14







Support conditions

Support A	Vertically restrained
	Rotationally free
Support B	Vertically restrained
	Rotationally free

Applied loading

Beam loads	Dead self weight of beam × 1
	DL - Dead full UDL 0.24 kips/ft

Load combinations

Load combination 1	Support A	Dead × 1.20
		Live × 1.60
		Roof live × 1.60
		Snow × 1.60
		Dead × 1.20

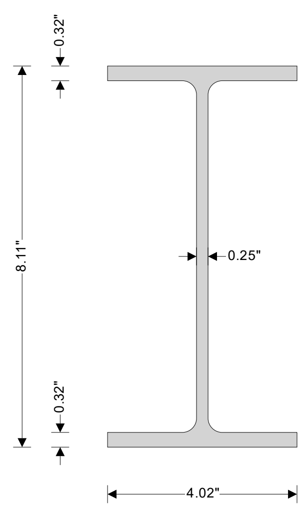
		Live × 1.60
		Roof live × 1.60
		Snow × 1.60
	Support B	Dead × 1.20
		Live × 1.60
		Roof live × 1.60
		Snow × 1.60

Analysis results

Maximum moment	M_{max} = **5.5** kips_ft	M_{min} = **0** kips_ft
Maximum shear	V_{max} = **1.8** kips	V_{min} = **-1.8** kips
Deflection	δ_{max} = **0.1** in	δ_{min} = **0** in
Maximum reaction at support A	R_{A_max} = **1.8** kips	R_{A_min} = **1.8** kips
Unfactored dead load reaction at support A	R_{A_Dead} = **1.5** kips	
Maximum reaction at support B	R_{B_max} = **1.8** kips	R_{B_min} = **1.8** kips
Unfactored dead load reaction at support B	R_{B_Dead} = **1.5** kips	

Section details

Section type	**W 8x15 (AISC 15th Edn (v15.0))**
ASTM steel designation	**A992**
Steel yield stress	F_y = **50** ksi
Steel tensile stress	F_u = **65** ksi
Modulus of elasticity	E = **29000** ksi



Resistance factors

Resistance factor for tensile yielding	ϕ_{ty} = **0.90**
Resistance factor for tensile rupture	ϕ_{tr} = **0.75**
Resistance factor for compression	ϕ_c = **0.90**
Resistance factor for flexure	ϕ_b = **0.90**

Lateral bracing

Span 1 has lateral bracing at supports only

Classification of sections for local buckling - Section B4.1

Classification of flanges in flexure - Table B4.1b (case 10)

Width to thickness ratio $b_f / (2 \times t_f)$ = **6.38**

Limiting ratio for compact section $\lambda_{pff} = 0.38 \times \sqrt{[E / F_y]}$ = **9.15**

Limiting ratio for non-compact section $\lambda_{rff} = 1.0 \times \sqrt{[E / F_y]}$ = **24.08** Compact

Classification of web in flexure - Table B4.1b (case 15)

Width to thickness ratio $(d - 2 \times k) / t_w$ = **28.08**

Limiting ratio for compact section $\lambda_{pwf} = 3.76 \times \sqrt{[E / F_y]}$ = **90.55**

Limiting ratio for non-compact section $\lambda_{rwf} = 5.70 \times \sqrt{[E / F_y]}$ = **137.27** Compact

Section is compact in flexure

Design of members for shear - Chapter G

Required shear strength $V_r = \max(\text{abs}(V_{max}), \text{abs}(V_{min}))$ = **1.837** kips

Web area $A_w = d \times t_w$ = **1.987** in^2

Web plate buckling coefficient k_v = **5**

Web shear coefficient - eq G2-3 C_v = **1**

Nominal shear strength – eq G2-1 $V_n = 0.6 \times F_y \times A_w \times C_v$ = **59.609** kips

Resistance factor for shear ϕ_v = **1.00**

Design shear strength $V_c = \phi_v \times V_n$ = **59.609** kips

PASS - Design shear strength exceeds required shear strength

Design of members for flexure in the major axis - Chapter F

Required flexural strength $M_r = \max(\text{abs}(M_{s1\_max}), \text{abs}(M_{s1\_min}))$ = **5.51** kips_ft

Yielding - Section F2.1

Nominal flexural strength for yielding - eq F2-1 $M_{nyld} = M_p = F_y \times Z_x$ = **56.667** kips_ft

Lateral-torsional buckling - Section F2.2

Unbraced length $L_b = L_{s1}$ = **144** in

Limiting unbraced length for yielding - eq F2-5 $L_p = 1.76 \times r_y \times \sqrt{[E / F_y]}$ = **37.13** in

Distance between flange centroids $h_o = d - t_f$ = **7.795** in

c = **1**

$r_{ts} = \sqrt{[\sqrt{(I_y \times C_w)} / S_x]}$ = **1.061** in

Limiting unbraced length for inelastic LTB - eq F2-6

$L_r = 1.95 \times r_{ts} \times E / (0.7 \times F_y) \times \sqrt{[(J \times c / (S_x \times h_o)) + \sqrt{((J \times c / (S_x \times h_o))^2 + 6.76 \times (0.7 \times F_y / E)^2)}]}$ = **120.799** in

Cross-section mono-symmetry parameter R_m = **1.000**

Moment at quarter point of segment M_A = **4.133** kips_ft

Moment at center-line of segment M_B = **5.510** kips_ft

Moment at three quarter point of segment M_C = **4.133** kips_ft

Maximum moment in segment M_{abs} = **5.510** kips_ft

Lateral torsional buckling modification factor - eq F1-1 $C_b = 12.5 \times M_{abs} / [2.5 \times M_{abs} + 3 \times M_A + 4 \times M_B + 3 \times M_C]$ = **1.136**

Critical flexural stress - eq F2-4 $F_{cr} = C_b \times \pi^2 \times E / (L_b / r_{ts})^2 \times \sqrt{[1 + 0.078 \times J \times c / (S_x \times h_o) \times (L_b / r_{ts})^2]}$ = **31.299** ksi

Nominal flexural strength for lateral torsional buckling - eq F2-2 $M_{nltb} = F_{cr} \times S_x$ = **30.778** kips_ft

Nominal flexural strength $M_n = \min(M_{nyld}, M_{nltb})$ = **30.778** kips_ft

Design flexural strength $M_c = \phi_b \times M_n =$ **27.700** kips_ft

PASS - Design flexural strength exceeds required flexural strength

Design of members for vertical deflection

Consider deflection due to dead, live, roof live and snow loads

Limiting deflection $\delta_{lim} = L_{s1} / 600 =$ **0.24** in

Maximum deflection span 1 $\delta = max(abs(\delta_{max}), abs(\delta_{min})) =$ **0.086** in

PASS - Maximum deflection does not exceed deflection limit