Office

Conventional Steel Framing Study

STEEL SOLUTIONS CENTER

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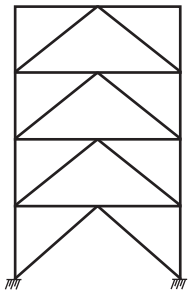
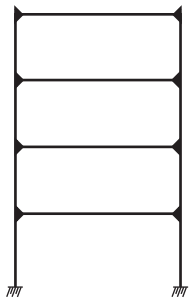
Project Information

- Minneapolis, Minn.
- Four-story office building
- Conventional composite steel beam gravity framing
- Steel ordinary concentrically braced frames and moment frames
- Typical floor-to-floor height: 14’-0”

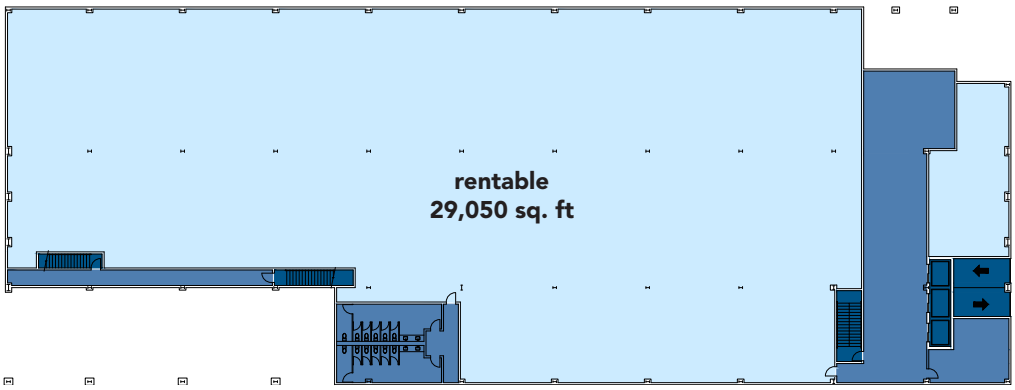


Concentrically Braced Frame

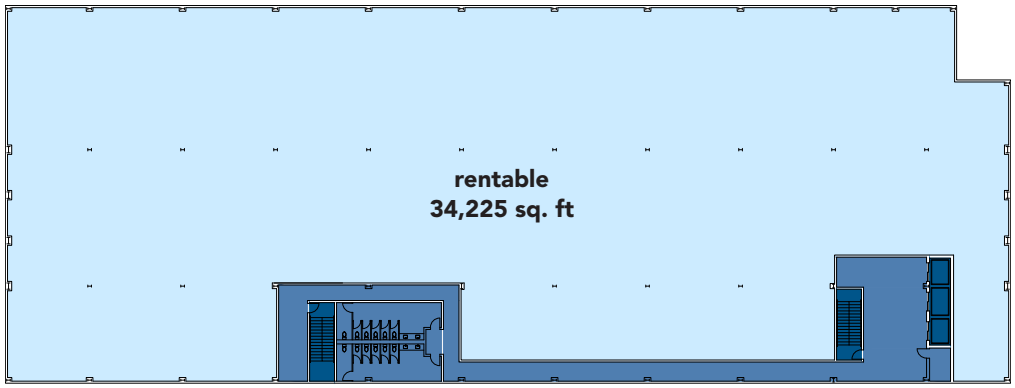


Moment Frame

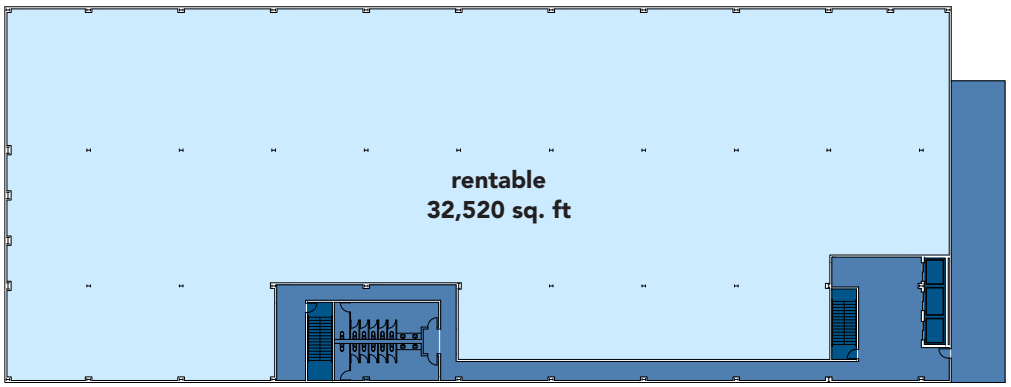
Architectural Floor Plans



First Floor Plan



Second and Third Floor Plans

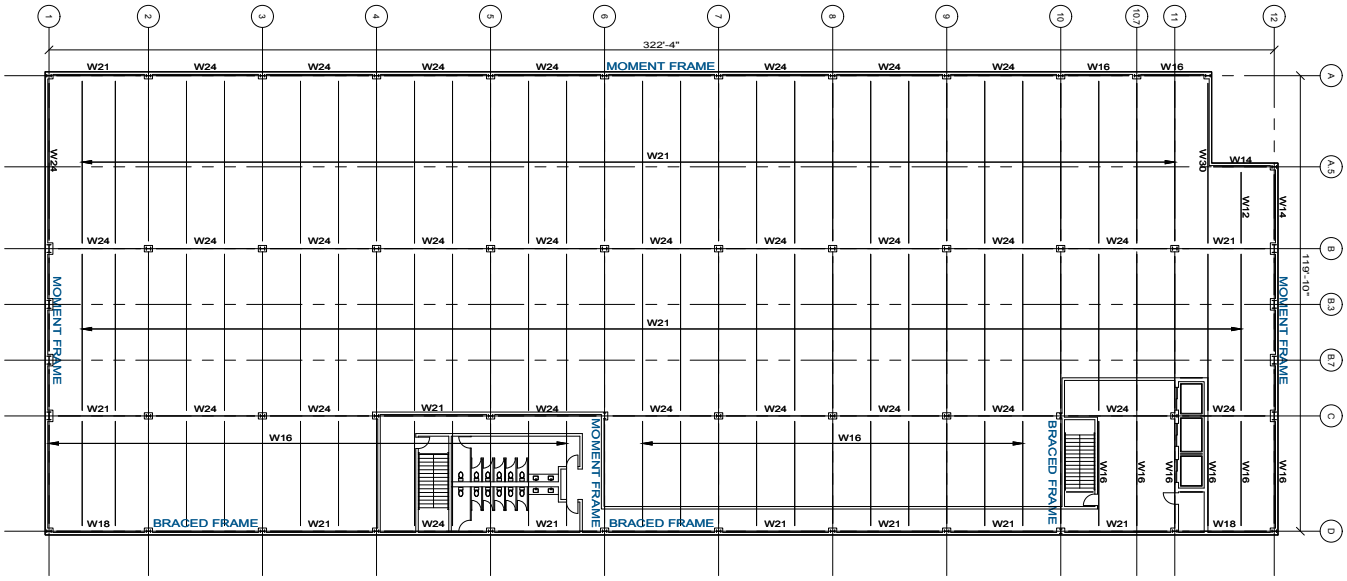


Fourth Floor Plan

Cover rendering courtesy of Ryan A+E.

Typical Structural Framing Plan

See pages 5 through 8 for detailed framing plans and frame elevations.



Steel Quantity Totals

See page 4 for detailed steel quantity information.

Total Building Area = 192,730 sq. ft				
Total Steel Tonnage	Total Pounds Per sq. ft	Total Pieces	Total Studs	Total Cambered Beams
728	7.55	939	10,722	354

Steel Benefits

Long-span beams with open, column-free spaces attract potential tenants, providing flexibility for office layout.

Steel framing will reduce overall project costs, including lower foundation costs due to steel's higher strength-to-weight ratio, general condition savings due to faster construction schedules, and increased revenue from earlier occupancy thanks to faster construction.

Steel framing can more easily be adapted for future changes in loading conditions, vertical expansion, and changes in occupancy than other framing systems.

Structural steel's recycled content and recycling rate exceed those of any other construction material, with steel produced within the United States containing approximately 93% recycled steel scrap and 98% of all structural steel recycled back into new steel products, at the end of a building's life.

Schedule and Pricing

Contact the Steel Solutions Center for assistance with locating an AISC member fabricator in your area for pricing and schedule information. You may also search our website for further information on member fabricators in your region. AISC member fabricators are an excellent source of pricing and schedule information. E-mail **solutions@aisc.org** or call 866.ASK.AISC to find an AISC member fabricator in your area.

Loading Summary

Criteria are based on the 2012 *International Building Code* (*IBC*) and a project location of Minneapolis, Minn.

Gravity Loading	
Live Loads	
Office	65 psf (including 15 psf partition loading)
Roof Deck	100 psf
Roof Snow	50 psf
Dead Loads	
Typical Floor	46 psf (3 in. metal deck with 3¼ in. LW Concrete)
Roof	4 psf (3 in. metal deck)
Superimposed Dead Loads	
Office	10 psf (CMEP, etc.)
Occupied Roof	45 psf (CMEP, pavers, roofing, etc.)
Unoccupied Roof	20 psf (CMEP, roofing, etc.)
Cladding	
Brick Façade	770 plf

Wind Loading	
Basic Wind Speed	115 mph
Exposure Category	C
Drift Limit	H/500

Seismic Loading	
Seismic Design Category	A
Seismic Importance Factor	1.00
Spectral Response Acceleration, Short Period, S_s	0.048 g
Spectral Response Acceleration, One Second Period, S_1	0.027 g
Site Class	D
Building Period Coefficient, C_T	0.02
Response Modification Factor, R	3.00
System Overstrength Factor, Ω_0	3.00
Deflection Amplication Factor, C_d	3.00
Allowable Story Drift Coefficient	0.02
Lateral Force Resisting System	
Steel Systems Not Specifically Detailed For Seismic Resistance	
Risk Category	II

Steel Quantity Takeoff

Suspended Steel Floor Areas		Total Area	192,730 ft²	
		Typical Floor	155,340 ft²	
		Roof	37,390 ft²	
Estimated Steel Quantities				
Gravity Columns	W14s	63 tons	0.65 psf	109 pieces
Gravity Beams	Wide Flange	535 tons	5.55 psf	695 pieces
		10,722 studs		
		354 Beams cambered between 0.75 and 2.00 inches		
Lateral Frames	Beams	38 tons	0.39 psf	43 pieces
	Columns	44 tons	0.46 psf	66 pieces
	Braces (HSS)	13 tons	0.13 psf	26 pieces
Steel not indicated in sketches (5%)		35 tons	0.36 psf	
		728 tons	**7.55 psf**	**939 pieces**

Notes

1. The quantities are based on centerline dimensions.
2. Steel not indicated in sketches accounts for framing not included in the estimate such as framing for openings or various members eliminated for simplification. It does not include connection material, slab edge material or façade attachments.

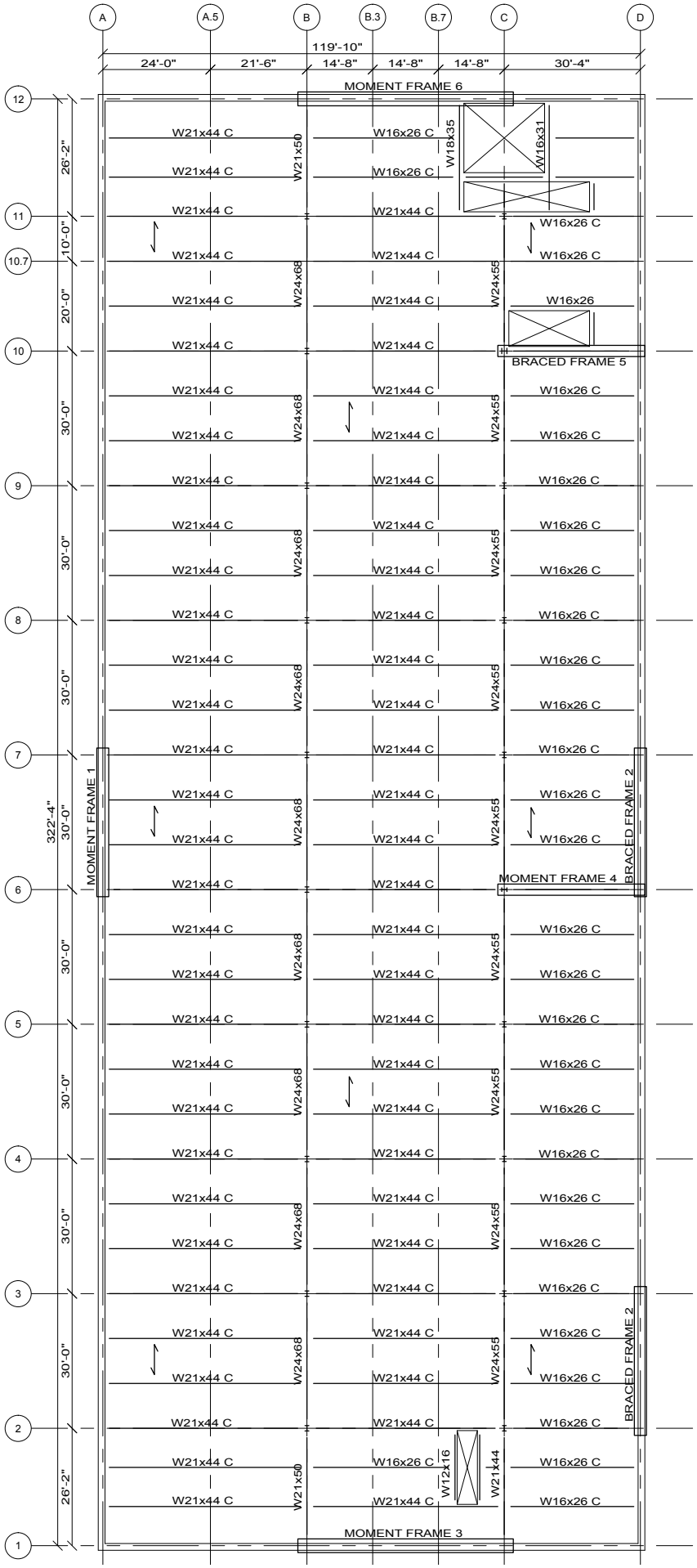
Material Specification

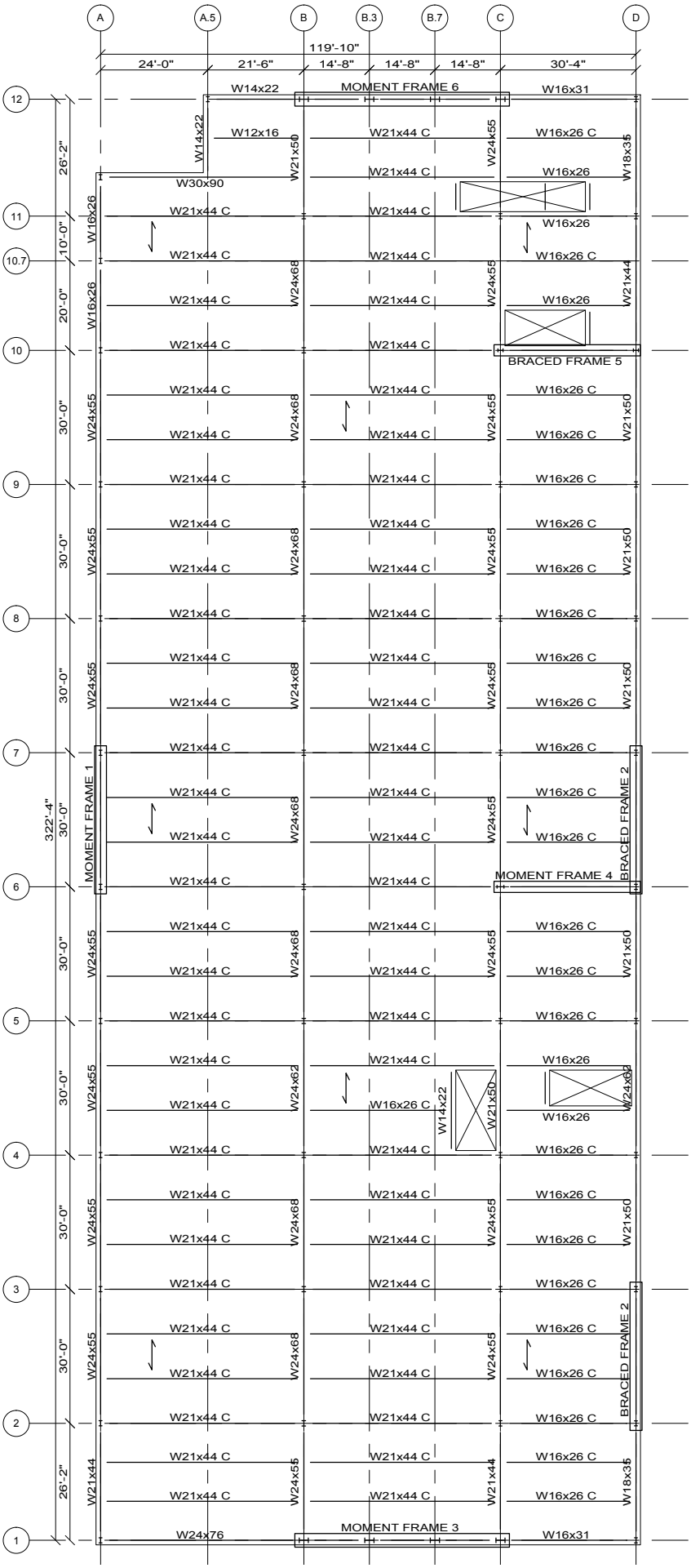
1. Wide flange shapes are ASTM A992
2. Rectangular HSS sections are ASTM A500 Gr. C.

First Floor Framing Plan

Notes:

1. Each member is marked with the estimated member size for wide-flange (W) beam and the designation for camber. If present, the designation "C" indicates an assumed camber from ¾ in. to 2 in. The estimated number of studs for each member is not indicated; a total estimated number of studs is provided in the quantities.
2. Boxes indicate lateral frames. The wide-flange beams are moment-connected to the columns in the moment frames and pin-connected to columns in the braced frames. NO special base plate detail is assumed for the columns.
3. indicates the direction of the estimated floor slab, which consists of 3 in. composite metal deck with 3¼ in. lightweight concrete topping.
4. See the Column and Frame Layout Plans and the Column Schedule for gravity column sizes.
5. All beams are W12×14, unless noted otherwise.





Second and Third Floor Framing Plan

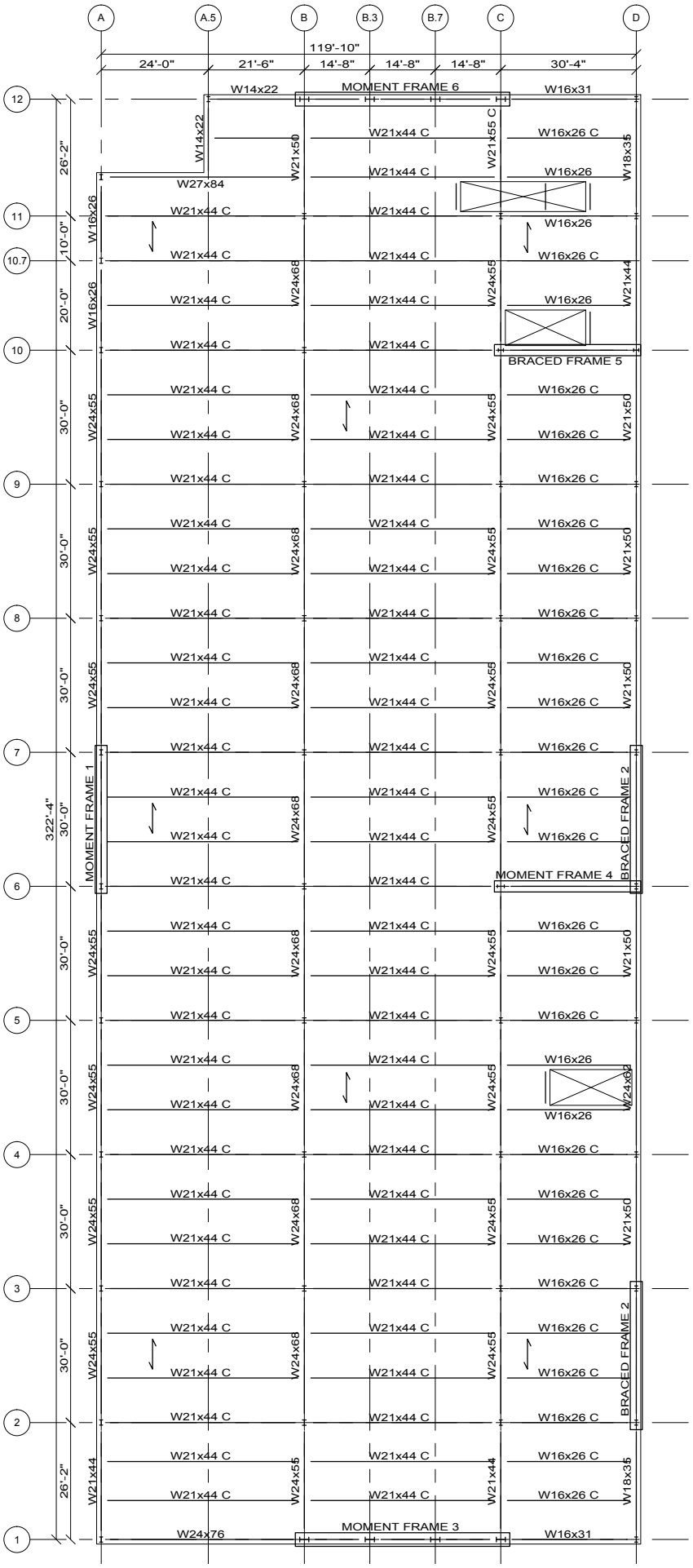
Notes:

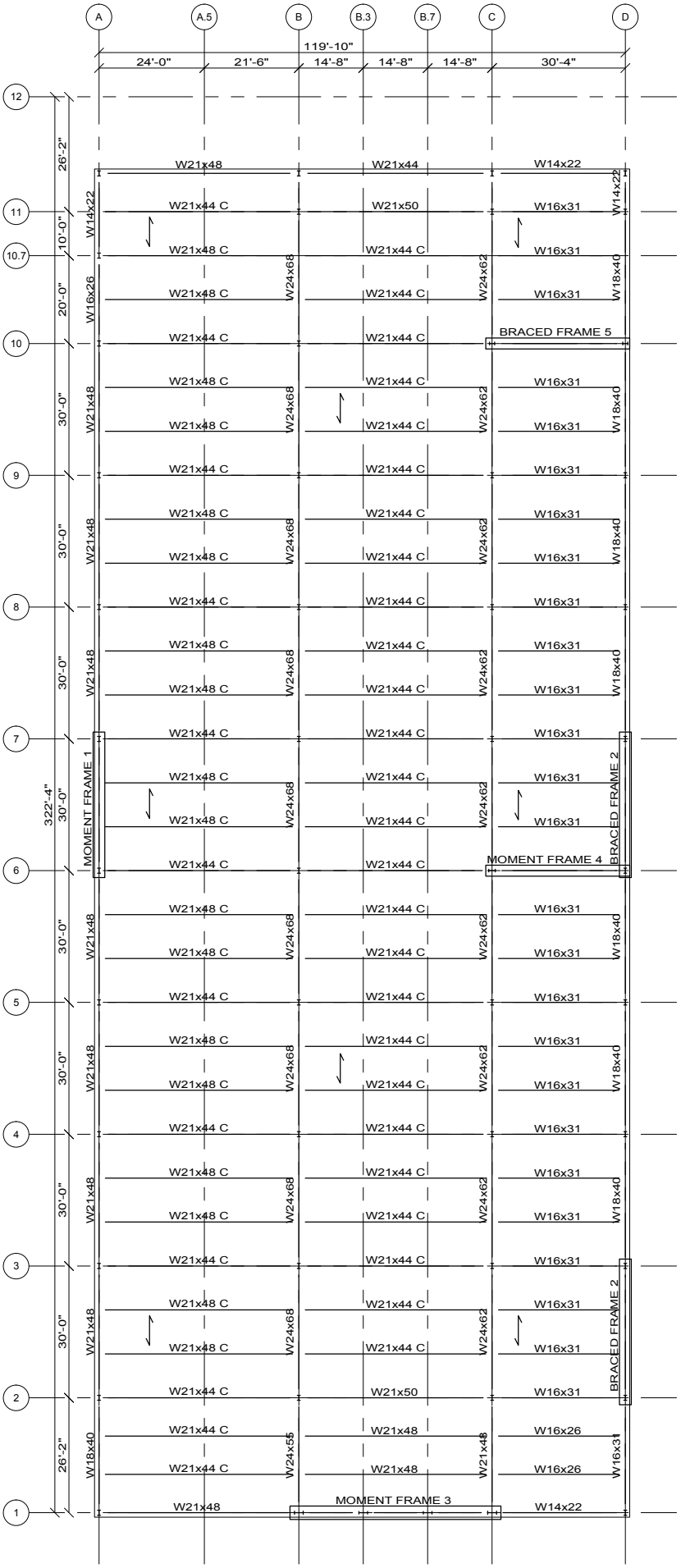
1. Each member is marked with the estimated member size for wide-flange (W) beam and the designation for camber. If present, the designation "C" indicates an assumed camber from ¾ in. to 2 in. The estimated number of studs for each member is not indicated; a total estimated number of studs is provided in the quantities.
2. Boxes indicate lateral frames. The wide-flange beams are moment-connected to the columns in the moment frames and pin-connected to columns in the braced frames. NO special base plate detail is assumed for the columns.
3. ⟵⟶ indicates the direction of the estimated floor slab, which consists of 3 in. composite metal deck with 3¼ in. lightweight concrete topping.
4. See the Column and Frame Layout Plans and the Column Schedule for gravity column sizes.
5. All beams are W12×14, unless noted otherwise.

Fourth Floor Framing Plan

Notes:

1. Each member is marked with the estimated member size for wide-flange (W) beam and the designation for camber. If present, the designation "C" indicates an assumed camber from ¾ in. to 2 in. The estimated number of studs for each member is not indicated; a total estimated number of studs is provided in the quantities.
2. Boxes indicate lateral frames. The wide-flange beams are moment-connected to the columns in the moment frames and pin-connected to columns in the braced frames. NO special base plate detail is assumed for the columns.
3. ⟋⟍ indicates the direction of the estimated floor slab, which consists of 3 in. composite metal deck with 3¼ in. lightweight concrete topping.
4. See the Column and Frame Layout Plans and the Column Schedule for gravity column sizes.
5. All beams are W12×14, unless noted otherwise.



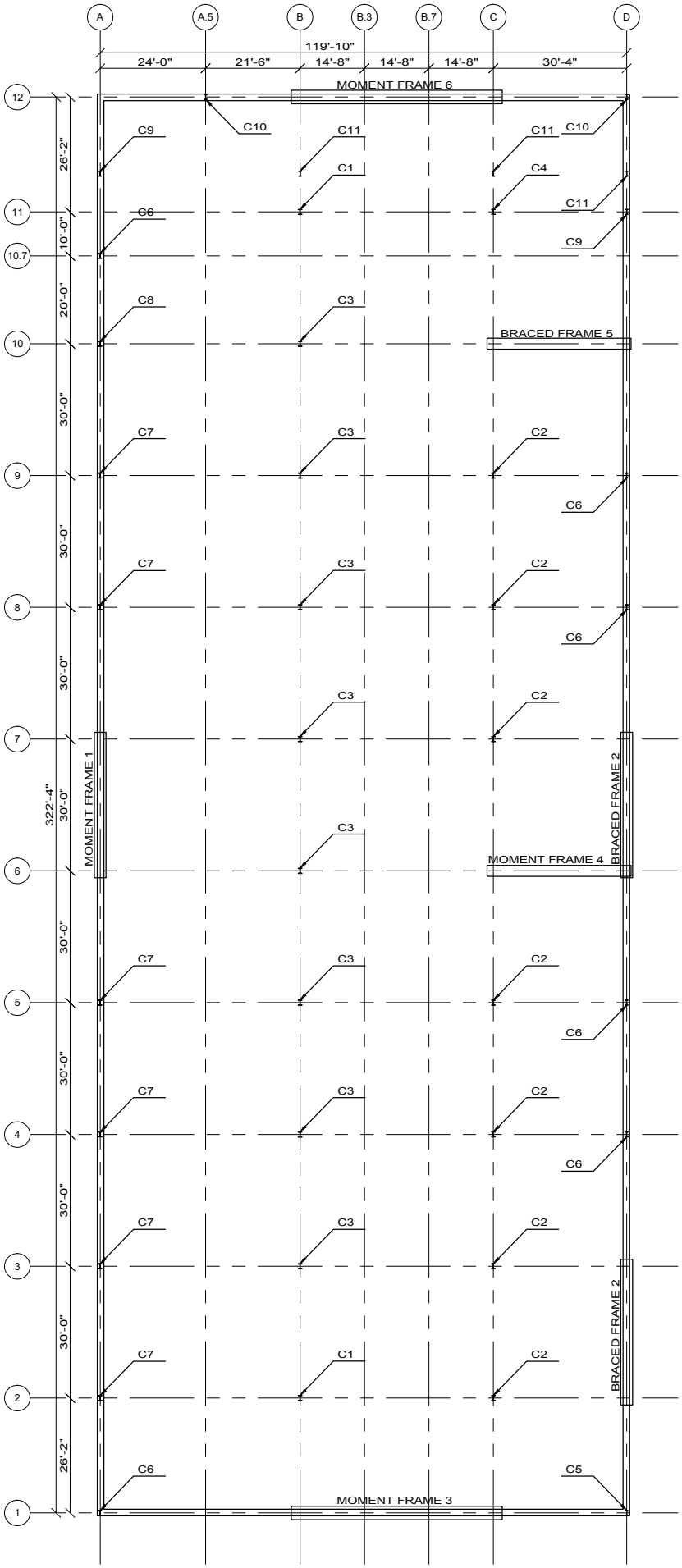


Roof Framing Plan

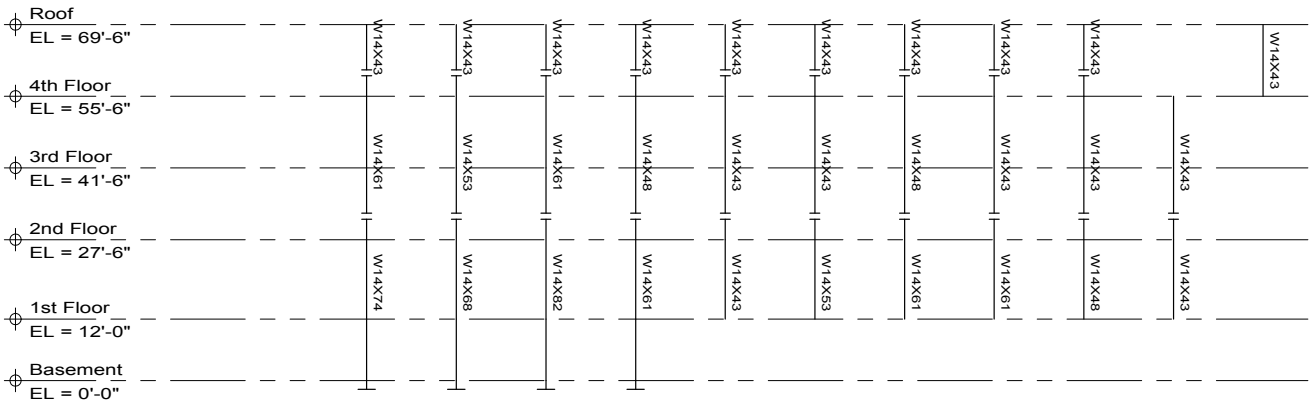
Notes:

1. Each member is marked with the estimated member size for wide-flange (W) beam and the designation for camber. If present, the designation "C" indicates an assumed camber from ¾ in. to 2 in. The estimated number of studs for each member is not indicated; a total estimated number of studs is provided in the quantities.
2. Boxes indicate lateral frames. The wide-flange beams are moment-connected to the columns in the moment frames and pin-connected to columns in the braced frames. NO special base plate detail is assumed for the columns.
3. ⟋⟍ indicates the direction of the estimated roof slab, which consists of 3 in. metal deck.
4. See the Column and Frame Layout Plans and the Column Schedule for gravity column sizes.
5. All beams are W12×14, unless noted otherwise.

Column Layout Plan



Column Schedule

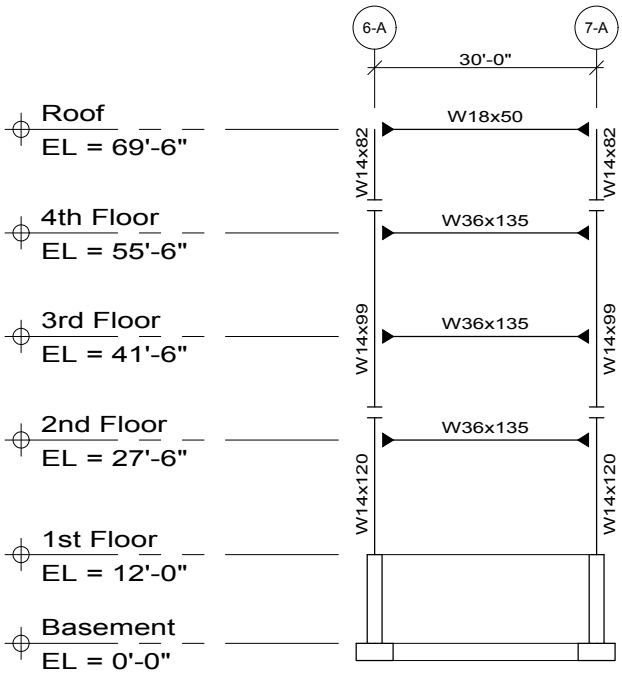


COLUMN MARK	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11

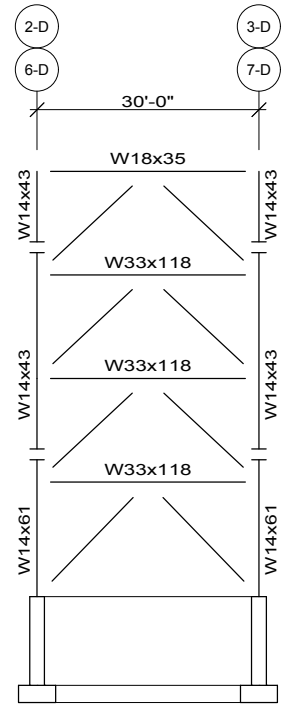
Frame Elevations

Notes:

1. All braces are HSS8×8×½, unless noted otherwise.



MOMENT FRAME 1

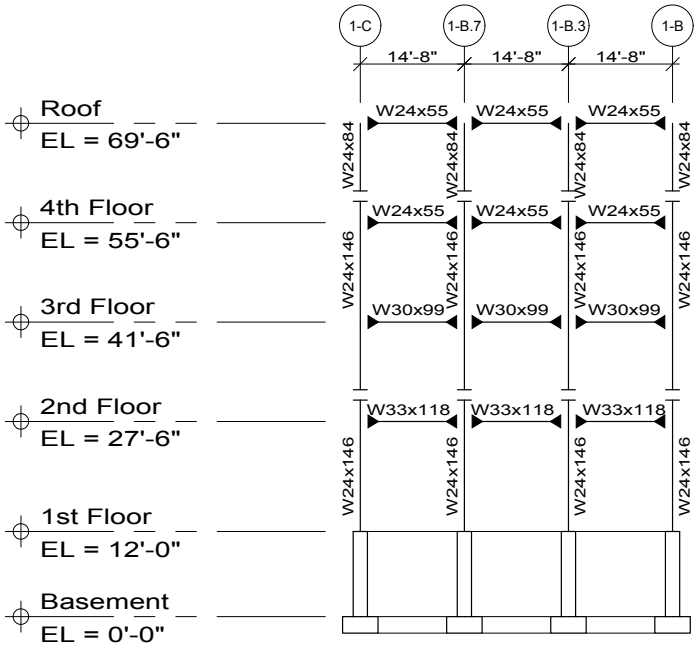


BRACED FRAME 2

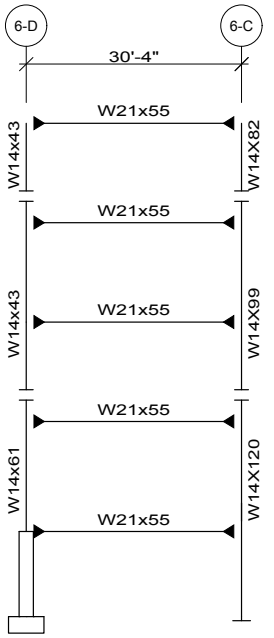
Frame Elevations

Notes:

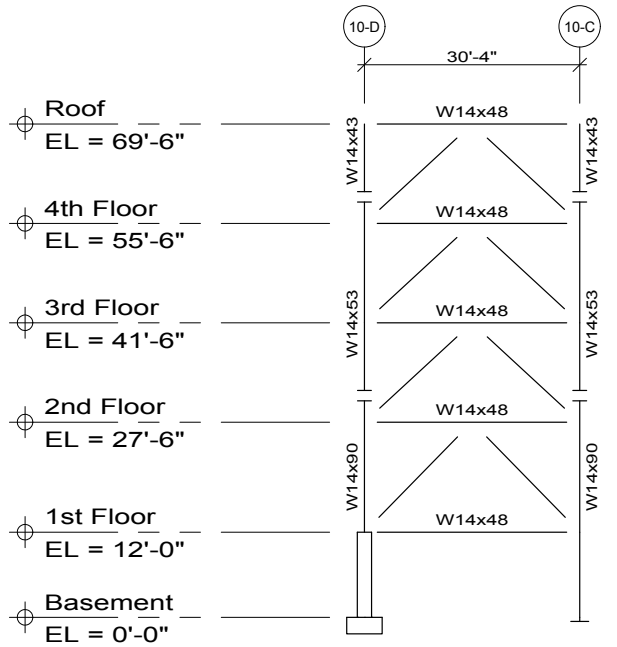
1. All braces are HSS8×8×½, unless noted otherwise.



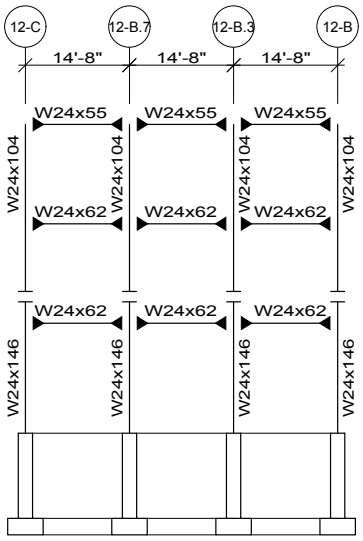
MOMENT FRAME 3



MOMENT FRAME 4



BRACED FRAME 5



MOMENT FRAME 6

IDEAS² Award-Winning Office Projects

National Award

Samsung Americas Headquarters (Device Solutions)
San Jose, Calif.

Tim Griffith Photographer, San Francisco

Presidential Award of Excellence in Engineering

Four World Trade Center
New York

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