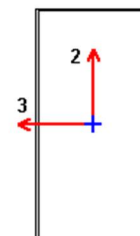


ETABS 2016 Composite Column Design

AS COLUMN



Element Details

Level	Element	Unique Name	Location (in)	Combo	Section	Classification
Story1	C55	6	0	LRFD 1.4DL	8x4x16ga. Column	Compact

LLRF and Demand/Capacity Ratio

L (in)	LLRF	Stress Ratio Limit
96.0000	1	0.95

Analysis and Design Parameters

Provision	Analysis	2nd Order	Reduction
LRFD	Direct Analysis	General 2nd Order	Tau-b Fixed

Stiffness Reduction Factors

$\alpha P_r / P_y$	$\alpha P_r / P_e$
0.005	0.002

Design Code Parameters

Φ_b	Φ_c	Φ_{TY}	Φ_{TF}	Φ_V	Φ_{V-RI}	Φ_{VT}
0.9	0.75	0.9	0.75	0.9	1	1

Design Properties of Steel Section

A (in ²)	J (in ⁴)	I ₃₃ (in ⁴)	I ₂₂ (in ⁴)	A _{v3} (in ²)	A _{v2} (in ²)
2.47	15.08	18.05	8.06	0.51	1.87

Material Properties

E _s (lb/in ²)	f' _c (lb/in ²)	F _y (lb/in ²)
29500000	3000	33000

Demand/Capacity (D/C) Ratio Eqn.(H1-1b)

D/C Ratio =	$(P_r / 2P_c) + (M_{r33} / M_{c33}) + (M_{r22} / M_{c22})$
0.002 =	0.002 + 0 + 0

Stress Check forces and Moments

Location (in)	P _u (lb)	M _{u33} (lb-in)	M _{u22} (lb-in)	V _{u2} (lb)	V _{u3} (lb)	T _u (lb-in)
0	-438.62	0	0	0	0	0

Axial Force & Biaxial Moment Design Factors (H1-1b)

	L Factor	K₁	K₂	B₁	B₂	C_m
Major Bending	1	1	1	1	1	1
Minor Bending	1	1	1	1	1	1

Parameters for Lateral Torsion Buckling

L_{ltb}	K_{ltb}	C_b
1	1	1

Axial Force and Capacities

P_u Force (lb)	φP_{nc} Capacity (lb)	φP_{nt} Capacity (lb)
438.62	92612.69	73321.88

Moments and Capacities

	M_u Moment (lb-in)	φM_n Capacity (lb-in)	φM_n (No LTB) (lb-in)
Major Bending	0	216294.13	216294.13
Minor Bending	0	159046.22	

Torsion Moment and Capacities

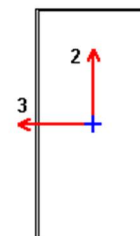
T_u Moment (lb-in)	T_n Capacity (lb-in)	φT_n Capacity (lb-in)
0	76106.91	68496.22

Shear Design

	V_u Force (lb)	φV_n Capacity (lb)
Major Shear	0	34804.69
Minor Shear	0	8074.69

ETABS 2016 Composite Column Design

AS BEAM



Element Details

Level	Element	Unique Name	Location (in)	Combo	Section	Classification
Story1	B443	2	3	LRFD 0.9DL + 1.0WL	8x4x16ga. Beam	Compact

LLRF and Demand/Capacity Ratio

L (in)	LLRF	Stress Ratio Limit
528.00000	1	0.95

Analysis and Design Parameters

Provision	Analysis	2nd Order	Reduction
LRFD	Direct Analysis	General 2nd Order	Tau-b Fixed

Stiffness Reduction Factors

$\alpha P_r / P_y$	$\alpha P_r / P_e$
0.019	0.175

Design Code Parameters

Φ_b	Φ_c	Φ_{TY}	Φ_{TF}	Φ_v	Φ_{V-RI}	Φ_{VT}
0.9	0.75	0.9	0.75	0.9	1	1

Design Properties of Steel Section

A (ft ²)	J (in ⁴)	I ₃₃ (in ⁴)	I ₂₂ (in ⁴)	A _{v3} (ft ²)	A _{v2} (ft ²)
0.0171	15.076383	18.05009	8.059733	0.0035	0.013

Material Properties

E _s (lb/ft ²)	f' _c (lb/ft ²)	F _y (lb/ft ²)
4248000000	432000	4752000

Demand/Capacity (D/C) Ratio Eqn.(H1-1a)

D/C Ratio =	$(P_r / P_c) + (8/9)(M_{r33} / M_{c33}) + (8/9)(M_{r22} / M_{c22})$
0.298 =	0.247 + 0.008 + 0.043

Stress Check forces and Moments

Location (in)	P _u (lb)	M _{u33} (lb-in)	M _{u22} (lb-in)	V _{u2} (lb)	V _{u3} (lb)	T _u (lb-in)
3	-1508.32	2053.74	7766.77	97.58	420.25	2520.76

Axial Force & Biaxial Moment Design Factors (H1-1a)

	L Factor	K₁	K₂	B₁	B₂	C_m
Major Bending	1	1	1	1	1	1
Minor Bending	0.989	1	1	1	1	1

Parameters for Lateral Torsion Buckling

L_{ltb}	K_{ltb}	C_b
0.989	0	1.69

Axial Force and Capacities

P_u Force (lb)	φP_{nc} Capacity (lb)	φP_{nt} Capacity (lb)
1508.32	6116.71	73321.88

Moments and Capacities

	M_u Moment (lb-in)	φM_n Capacity (lb-in)	φM_n (No LTB) (lb-in)
Major Bending	2053.74	216294.13	216294.13
Minor Bending	7766.77	159046.22	

Torsion Moment and Capacities

T_u Moment (lb-in)	T_n Capacity (lb-in)	φT_n Capacity (lb-in)
2520.76	76106.91	68496.22

Shear Design

	V_u Force (lb)	φV_n Capacity (lb)
Major Shear	97.58	34804.69
Minor Shear	420.25	8074.69